Padang, November 9-11, 2017

PROCEEDINGS

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Theme :
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FOREWORD

Welcome for all respected scholars, researchers, post graduate studentsand especially Keynote Speakers to the 4 ICTVET. The theme of the conference focus on Technical and Vocational Education and Training for sustainable societies and consist of six subthemes. i.e Development of learning model on TVET, Workplace Learning and entrepreneurship, Innovationon applied engineering and information technology, Management and Leadership on TVET, Vocational and Technical Teaachers education, and Assessment and Evaluation on TVET.

Sustainable society shoul be followed by the improvement of various factors that have impacts to the quality of vocational and technical education and training, particularly to overcome the competitiveness of the world business. As we have already known the rapid change of technology as well as the change of demography, having a great effects to the life of peoples in this world, The competitiveness need a collaborativeness to survive the life of millions peoples who lost their jobs. Young peoples as aproductive generation have to be creative and innovative to face the competitiveness. So this prociding contents consist of various findings of research in the field of vocational and technical education as well as applied technology and mainly based on the subthemes of the conference.

Finally, we would like to thank a million for all participants of this conference and all parties who support the success of this conference. Hopefully the seminars and scientific work of this seminar can be a reference material for basic education and elementary school teacher education in Indonesia.

Padang, July 2, 2018

Tim Editor

CONTENT PROSIDING ICTVET 2017 REPOSITORY UNP

THE PROSPECT OF OFFSHORE IRON SAND IN TIRAM BEACH PADANG PARIAMAN REGENCY WEST SUMATERA

Adree Octova[1], Ansosry[2], Yoszi Mingsi Anaperta[3], Indah Elok Mukhlisah[4]

[1234]Faculty of Engineering, Universitas Negeri Padang, Indonesia

ABSTRACT: The needs of iron sand for raw materials in the national steel industry in recent years has increased sharply. One area that contained offshore iron sand Tiram beach Ulakan Tapakis subdistrict Padang Pariaman Regency. Based on previous research [3] the iron sand found around the Tiram beach spread to Tiku Agam Regency. Beside to viewing the distribution or quantity of iron sand, it is necessary to test its quality to know the prospect of a raw material in the industry. Samples of iron sand were taken as much as 45 points that spread around the research location. This sample is a combination of drilling and test pit. Furthermore, the quality testing activities were conducted in the laboratory to determine the iron content. The results can be concluded that Fe content of iron sand is linear with depth. The spreading of iron sand is about 30 meters from the sea. The average quality of iron (Fe) using Atomic Absorption Spectrophotometry method (AAS) is 2,38892%.

Keywords: Iron sand, Fe Quality, Model, AAS

1. INTRODUCTION

The potential and distribution of iron sand in Indonesia are found in many beaches such as West Sumatera, South Java, Kalimantan, Sulawesi, Nusatenggara and Maluku islands, but so far exploration activities related to iron sand deposit have not been done thoroughly and systematically [6]. In 2012 based on data from the Geological Agency of the Ministry of Energy and Mineral Resources, Indonesia is estimated to have a potential iron sand as much as 182 million tons of ore and 63 million tons of metal.

Seeing this potential, the development of iron sand mineral resources in Indonesia is time to do, so that if managed and utilized properly will improve the national economy. One of the areas in West Sumatra that has the potential is Padang Pariaman regency, especially from the area of Outer Beach of Ulakan Tapakis. The estimated potential of iron sand mineral resource in Padang Pariaman Regency is 46 million tons in the form of ore and 9 million tons in the form of metal with the unexploited condition.

This research will do some activities of iron sand exploration; first: a preliminary investigation of iron sand (survey and mapping of sampling sites) with a research area of 1000 meters x 130 meters.Second: Getting 45 samples by drilling and test pits.The drilling samples spacing is about 20 meters to 300 meters, while under test pit spacing is about 25 meters. Third: making the model of potential iron sand. Forth: laboratory analysis to make measurements of iron (Fe). This step is using Atomic Absorption Spectrophotometry method (SSA).

2. IRON SAND

Offshore iron sand is sand deposits containing iron ore particles (magnetite), which are located along the coast.This is formed by the process of destruction by weather, surface water, and waves against the origin rock that containing iron minerals such as magnetite, ilmenite, iron oxide, and then accumulate and washed out by the waves of sea water.

Iron sand is one of the minerals of the iron ore group, a type of dark sand containing iron ore particles (magnetite) located along the coast. Generally, iron sand is composed of opaque minerals that have been mixed with granules of nonmetallic minerals, such as quartz, calcite, feldspar, pyroxene, and biotite. Opaque minerals contained in iron sand include magnetite, titaniferous magnetite, ilmenite, limonite and hematite. Iron sand has black color, metal luster, specific gravity 1.8 ton/m^3, and the grain size is from 116 mm to 2 mm. Iron sand has high magnetism properties.

The availability of iron precipitation can be grouped into three types: First is primary iron ore deposits, occur due to the hydrothermal process, second is the iron sediment of iron is formed by the weathering process and third is secondary iron deposits (iron sand) [7].

Economical iron deposits are generally Magnetite, Hematite, Limonite, and Siderite. Sometimes it can be a mineral; Pyrite, Pyrrhotite, Marcasite, and Chamosite. Iron is a component of the earth's crust, which is about 5%. The iron is not found in pure form but in the form of compounds with other elements, such as hematite (Fe_2O_3), magnetite (Fe_2O_4), and pyrit [5].

All strong items are usually made of iron, such as electricity poles, bridges, water gates, building frames such as pins, nails, knives, pines, hoe, wire and so on. The main use of iron is to make the steel.

3. IRON SAND EXPLORATION

Iron is one of the natural resources that most abundant in nature and most use in life. Iron found in nature in form of compounds, such as hematite, magnetite, pyrite, and siderite. From iron ore minerals, magnetite is a mineral with the highest Fe but there is a small amount. While hematite is the main ore mineral needed in the iron industry. One of the uses of iron ore is as steelmaking material. Basically, there are a lot of iron ore mineral as well as contact metasomatic secondary sludge buried and exposed randomly.

In practice, the exploration activities carried out by utilizing the properties of physics and chemistry of rocks, soil, elements and minerals, such as: magnetism, density, electricity, radioactivity, and mobility elements. There are several methods that can be used to describe these properties [4].

Iron sand exploration in this research is including several activities that starting from planning, field work, and laboratory activities.All of this steps are doing to know their sand potential.

3.1 Drilling

This drilling is intended to take the sample of iron sand in the surface or subsurface of along the coast. The work of iron sand drilling is done by using shallow drill both manual (dormer) and semi-mechanical. The activities undertaken are followed:
- Determinating of drill point location
- Setting the drilling equipment
- The initial hole preparation is carried out using the type of Ivan drill bit to the groundwater level.
- After penetrating the groundwater layer, drilling is done by using a casing inside which is installed the bailer.
- The drilling is stopped until the bedrock.

3.2 Test Pit

It is generally done on old iron sands that have been compacted. This activity is intended to take the samples of coastal iron sand in certain depth until reaches the surface of the water. The activities undertaken are followed:
- Determinating of the location of test pits
- Excavating with a well opening area of 1-meter × 1 meter or 1.5 meters × 1.5 meters.
- Making the buffer in case of collapse
- The good made is stopped when it reaches the surface of the water or has reached the bedrock.

3.3 Sample Preparation

The preparation process in the field for drill and test pit samples can be done by two methods, namely: increment and riffle splitter. The samples taken should be homogeneous from each depth interval. With sufficient representative, taking will ensure the accuracy of chemical analysis, calculation of resources or reserves of coastal iron sand deposits. The sampling is based on the standard procedure in coastal iron sand exploration.

The activities undertaken in the preparation by the incremental method are:
- Samples of drilling or test pit iron sand are accommodated on a container and stirred until homogeneous
- The sample is inserted in the increament box, flattened and divided into a box-sum line
- The sample are reduced by the increament spoon of the increament box, from each box accommodated in the sample bag
- The reduction contents are dried
- The dried container of each interval are divided into 3 parts. One section for individual samples, one for composite and one for duplicate.
- One part of the sample intervals combined with other intervals into composite samples.

Activities carried out in the preparation process by roffle splittermethod, that are:
- The samples of iron sand from drilling or test pitsare accommodated in a container and stirred to homogeneous, then dried
- The dried samplesare reduced with a riffle splitter until certain weight.
- The samples that have been splitted from each interval are divided into 3 parts. One section for individual samples, one for composite and one for duplicate
- One part of the sample intervals combined with other intervals into composite samples.

3.4 Laboratory Analysis

Laboratory analysis work includes chemical and physical analysis. Chemical analyzes were performed on individual samples to find out the elemental content in the concentrate, including: total Fe and titan. Chemical analysis can be done by several methods, including AAS, volumetric, XRF and ICP.

Physical analysis conducted to mineral grain analysis, sieve analysis, magnetic properties analysis and specific gravity. Grain mineral analyzes were performed to determine the type and percent weight of minerals for both the magnetic fraction and the nonmagnetic samples. This analyzed by grain minerals derived from composite samples representing the area or drilling block. Sieve analysis is intended to determine the size of iron sand.

4. ATOMIC ABSORPTION SPECTROPHOTOMETRY(AAS)

Spectrophotometry is a quantitative analysis

method based on the amount of radiation produced or absorbed by the atomic or analytical molecules. One part of spectrophotometry is Atomic Absorption Spectrophotometry (AAS), which is a quantitative method of elemental analysis that the measurement based on the absorption of light with certain wavelength by a metal atom in free state [8].

The advantages of the AAS method are high sensitivity and high accuracy because it can measure the metal content with ppm unit, fast analysis, requires little sample and can be used to determine the concentration of metal concentration without separating [2].

4.1 Basic Principles of AAS

The basic principle of atomic absorption spectrophotometry is the interaction between electromagnetic radiation and the sample. Atomic absorption spectrophotometry is an excellent method for the analysis of substances at low concentrations [2]. This technique is the most common used for elemental analysis. A key component of the atomic absorption spectrophotometry method is the system to produce atomic vapor in sample.

The SSA method is principally on the absorption of light by atoms. Atoms absorb the light at certain wavelengths, depending on the nature of the elements. With energy absorption, it means obtaining more energy, an atom at ground level raised its energy level when excited. The success of this analysis depends on the excitation process and obtaining a proper resonation line.

Atomic absorption spectrophotometry is a method of determining the concentration of an element in a sample by measuring the absorbance of the atomic vapor that produced at a particular wavelength. According to Lembert-Beer's law that many of the absorbed rays are proportional to the number of absorbing atoms. Mathematically can be expressed as follows:

$$A = \log (Po/Pt) = a.b.c \qquad (1)$$

Where A is the absorbance, Po is the intensity of the initial light, Pt is the intensity of transmitted light, a is the absorptivity constant, b is the absorbing medium and c is the concentration [2].

4.2 AAS Components

The Atomic Absorption Spectrophotometry Equipment (AAS) device consists of several principal parts: light source (cathode lamp), flame system (place of atomization), monochromotor, detector, and recorder. The five systems of the equipment are assembled into AAS as Fig.1.
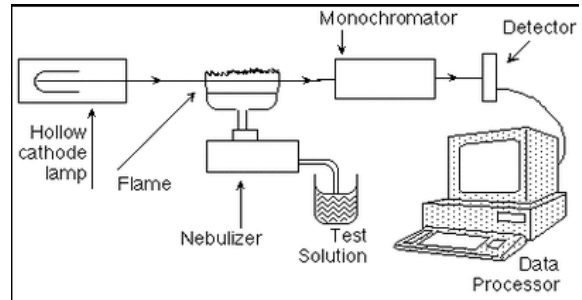
Fig.1 General schema of AAS components

5. METHODS

According to [1] in Geology Map Sheet Padang, Sumatra. The rock formations of Padang Pariaman Regency and its surroundings are dominated by alluvial deposits that consisting of silt, sand, and gravel. This deposits are widespread in almost all the coastal Padang Pariaman. Lithology information affects by coastal resistance to the erosion process by waves and tides [9]. The rock formation of Padang Pariaman Regency can be seen on the map of minerals distribution in Fig.2.
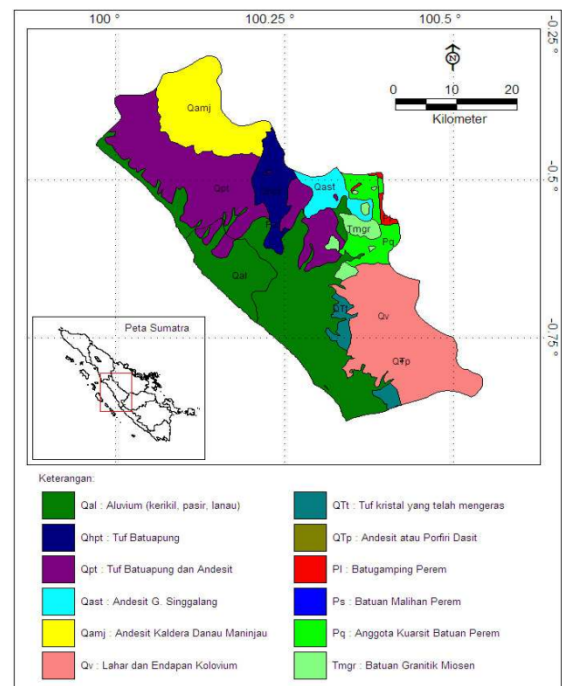
Fig.2 Materials distribution in Padang Pariaman
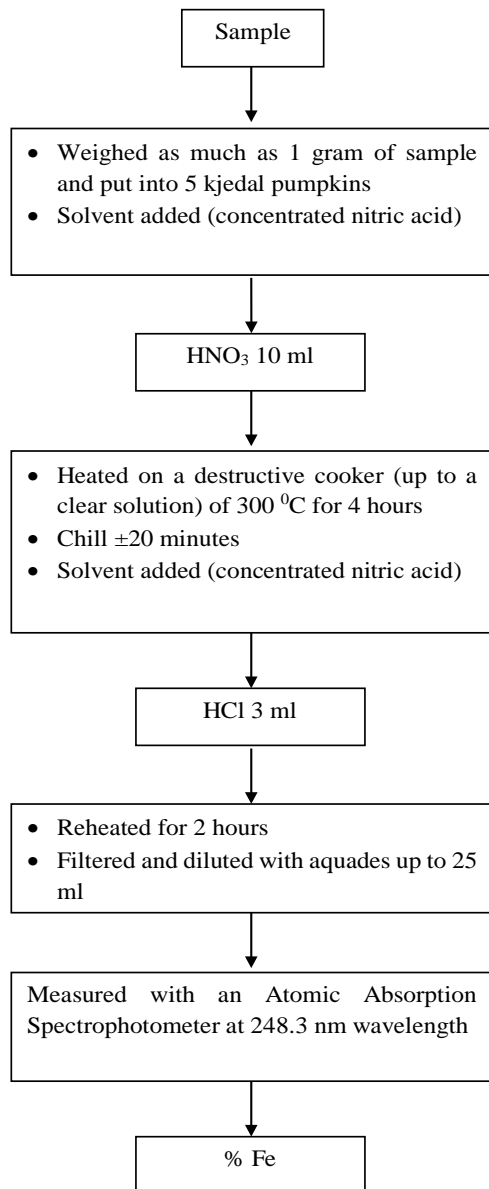
Fig.3 AAS flowchart

The steps of this research follow:
- The coordinates were collected from the field survey results with the research area 1000 meters x 130 meters.
- The samples of iron sand were 6 point drilling parallel shoreline with spacing 120-300 meters and 18 vertical drilling points with 20-125 meter spacing of the beach.
- Iron sand sampling was also done by making test pit with good dimension 1-meter × 1-meter × 1 meter with spacing of 20 meters as Fig.4.
- Laboratory test iron quality (Fe) in the iron sand. In AAS test, the sample was weighed 1 gram, then given a solution of Hydrochloric Acid (HCl) and Nitric Acid (HNO$_3$), the solution was heated for 6 hours until the Fe metals dissolved. The next step of the sample is cooled, filtered, and diluted with quads. This sample is further

incorporated into a spectrophotometer with a wavelength of 248.3 nm. The results of the Fe sample will appear on the computer screen of the tool. The step of AAS analysis is shown in Fig.3.

6. RESULT AND DISCUSSION

Parallel coastline line 1, on the first meter, was found iron sand mixed with fine sand with very dark black sand and iron. Specifically, along the coastline, the average iron sand has been found at a depth of 0.3 or 0.5 meters and is continuously at a depth of 1.5 meters to 2 meters. At a depth of 2 meters to a depth of 4 meters of iron sand begins to disappear and if there is mixed with fine to medium sand by forming vein layers. Along this coastline drilling activity is a little difficult to do at a depth of 4.5 meters to 5 meters this is caused because at a depth of 4.5 meters to 5 meters has reached the water surface and caused the wall drilling hole collapsed. The percentage of Fe content for along the coast is very constant that is between 1 - 3% and the more drilling hole value also the greater the value of this is due to the age of the iron sand sedimentation process.

Parallel coastline line 2, the first meter up to the second meter of iron sand has not been found and the new iron sand is found at a depth of 2.0 - 3 meters with the coating condition is not constant and thick. For the 2nd line parallel the coastline Fe content is quite high compared to line 1. On this line 2, the Fe content reaches 4.7275% found on the drill point DH 12.

Parallel coastline line 3, the first meter found top soil, and on the next meter found the fine to medium sand. For this 3rd line from 6 points of drilling did not find any iron sand. The drilling was stopped at a depth of 3.5 meters as water surface was found and drilling activity had to be stopped because it was no longer possible to continue. In line 3 there is no sample test and the Fe content on line 3 is considered zero.

Parallel coastline line 4, the first meter found top soil, and on the second meter found the fine to medium sand. At a depth of 3.5 meters found the sand is slightly yellow in color. In line 4 is also not found iron sand to a depth of 5 meters so there is no test sample and Fe content on line 4 is considered zero.

The highest percentage of Fe content of 4.7275% is found at drill point DH 12 at depth of 2.6 meters to 5.0 meters and the smallest is at point DH 03 which is 0.7856% at depth of 0.5 meters to 1, 5 meters. Based on the test samples from each of the drilling points and test wells, from Table 10 and 11 the Fe content obtained is very low and tends to be the same (homogeneous) ranging from 1 - 4%, this is also evidenced by the dispersion of iron sand deposits that are not too far, and to near the shore at

a depth of 0.3 meters above the surface has been found iron sand to a depth of 1.5 meters to 2 meters in the form of a layer that little inserted fine sand. The difference in the percentage of this content is influenced by the precipitation time, the iron sand that precipitates than the level is higher. The AAS results can be seen in Table 1 and 2.

The thickness of the iron sand sediment layers parallel to line 1 and line 2 line shapes varies considerably from 1 meter to 1.5 meters with thin layer coated geometries. This is due to the morphology of bedrock and precipitation mechanisms. The thickest layers are generally located along the coastline, on average on line 1 but the levels are lower than the line 2 parallel to the shoreline.

Table1Fe quality from drilling results

No	Sample Code	Fe (%)
1	DH 01.A	1.8100
2	DH 01.B1	1.7850
3	DH 01.B2	2.3037
4	DH 01.B3	2.3631
5	DH 02.A	0.9681
6	DH 02.B1	1.1381
7	DH 02.B2	1.2362
8	DH 02.B3	2.4318
9	DH 03.A	0.7856
10	DH 03.B1	1.7718
11	DH 03.B2	2.3081
12	DH 03.B3	2.4550
13	DH 04.A	0.8475
14	DH 04.B1	1.9456
15	DH 04.B2	3.0193
16	DH 04.B3	3.5893
17	DH 05.A	1.4987
18	DH 05.B1	2.2381
19	DH 05.B2	2.7418
20	DH 05.B3	3.2806
21	DH 06.A	2.1150
22	DH 06.B1	2.3006
23	DH 06.B2	2.3918
24	DH 06.B3	3.0793
25	DH 07.B1	2.1693
26	DH 07.B2	2.3700
27	DH 07.B3	2.6606
28	DH 08.B1	2.8668
29	DH 08.B2	3.0587
30	DH 08.B3	3.2737
31	DH 09.B1	1.9918
32	DH 09.B2	2.0106
33	DH 09.B3	2.8731
34	DH 10.B1	3.2800
35	DH 10.B2	3.3612
36	DH 10.B3	4.2762
37	DH 11.B1	3.5581
38	DH 11.B2	3.6818
39	DH 11.B3	4.3093
40	DH 12.B1	4.0543
41	DH 12.B2	4.6181
42	DH 12.B3	4.7275

Table 2Fe quality from test pits

No	Sample Code	Fe (%)
1	Sample 1	2.1020
2	Sample 2	3.7950
3	Sample 3	4.1893
4	Sample 4	4.6437
5	Sample 5	1.4310
6	Sample 6	4.4718
7	Sample 7	2.7700
8	Sample 8	4.1525
9	Sample 9	4.1487
10	Sample 10	3.0187
11	Sample 11	2.8325
12	Sample 12	2.2475
13	Sample 13	2.1737
14	Sample 14	2.8668
15	Sample 15	1.5362
16	Sample 16	1.5862
17	Sample 17	3.3525
18	Sample 18	1.7381
19	Sample 19	1.4175
20	Sample 20	1.2237
21	Sample 21	2.1137

From the results of this drilling activity, it is very clear that the dispersal of iron sand deposits is not too far away. In the first phase drilling activities are conducted along the coastline with a distance of 10 meters from sea water with conditions on the tides. From this activity, the iron sand has been found at a depth of 0.3 meters or 0.5 meters below the sand surface. When viewed in plain iron sand found in black color and when inserted into the sample bag of 0.5 kg will be heavier than the sand beach that is inserted into the sample plastic bag with the same amount. For those along this coastline, drilling is done as much as 6 points with distances ranging from 100 meters to 300 meters. This is done to anticipate the loss of a layer of iron sand. In the second phase drilling activities are done to the east with a distance of 130 meters from the shoreline and just 3 meters from the path of paved residents. In this activity for a depth of 0 - 0.8 meters found top soil, and at a depth of 1 meter to 2.5 meters found

the fine to medium sand. At depths of 2.5 meters to 5 meters are not found also deposition of iron sand.

In the third stage drilling activities to the sea by narrowing the distance of the drill of the beach is ± 40 meters. From this drilling activity at a depth of 0 - 0.5 meters found top soil is blackish brown. For the depth of 0.5 meters to 2.5 meters found the fine to medium sand. At a depth of 2.5 meters to 3 meters found fine sand with little mixed with water. And at a depth of 3 meters to 5 meters drilling activity is a little difficult because it has found water and caused drilling holes to collapse. And on drilling activities with a distance of 40 meters from the beach is not found iron sand.

In the fourth stage, the drilling distance from the shoreline is narrowed by 20 meters from the first drill point. At a depth of 0 - 2 meters found fine to medium sand and new iron sand found at a depth of more than 2 meters. The condition of passion iron layer from 20 meters distance is not very good compared with a distance of 10 meters from sea water (waves), which for a distance of 10 meters from the sand beach that is found very dominates the meaning of the condition of iron sand layer is inserted by a little fine sand until while if for a distance of 20 meters from the beach coating fine sand until moderately inserted by iron sand.

The model of cross-section of the parallel layer of coastline can be seen in Fig.5, 6, 7, 8, 9, 10, and 11.
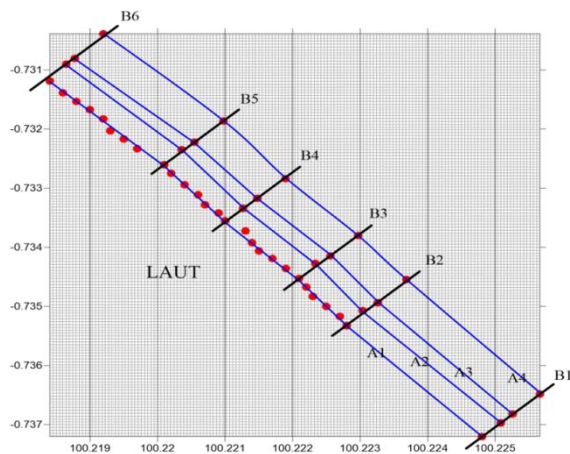
Fig.4 Measurement design
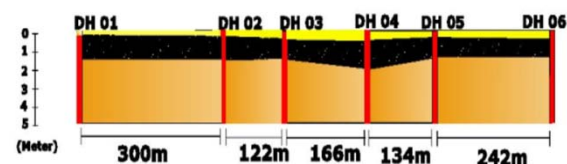
Fig.5 Section 1Parallel coastline line 1
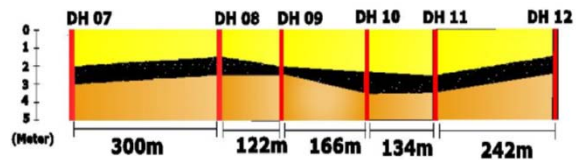
Fig.6 Section 2 Parallel coastline line 2
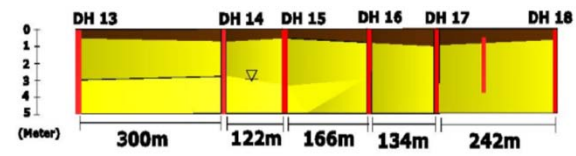
Fig.7Section 3 Parallel coastline line 3
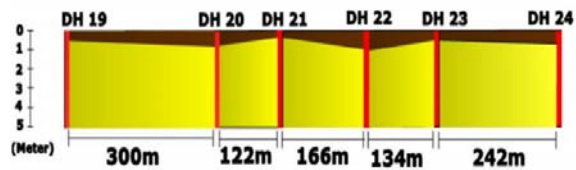
Fig.8 Section 4 Parallel coastline line 4
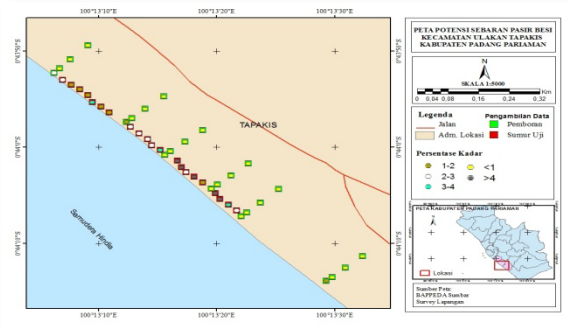
Fig.9 Map of the potential of iron sand distribution at Depth 0,3 - 2 meters
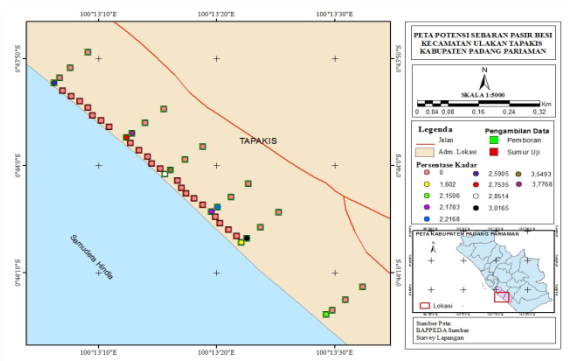
Fig.10 Map of the potential of iron sand distribution at Depth 2 - 5 meters

7. CONCLUSION

The area of investigation Geologically prospects for iron sand deposits from West to East. Research area lithology consists of top soil, fine to medium sized sand, pumice stone, and iron sand. The iron sand is found only in line 1 and 2, and the iron sand deposit is not found any more at a distance

of more than 30 meters to the east. Fe quality of iron sand using atomic absorption spectrophotometry method has the average about 2.38892%.

8. ACKNOWLEDGMENTS

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Optimize of Least-Square Inverse Constrain Method of Geoelectrical Resistivity Wenner-Schlumberger For Investigation Rock Structures in Malalak Districts of Agam West Sumatra

Akmam[1], Amir Harman[2], Putra, Amali[3]

[1]Faculty of Mathematics and Science, Universitas Negeri Padang, Indonesia

[2]Doctoral Student, Technology and Vocational Education Faculty of Engineering, Universitas Negeri Padang, Indonesia

ABSTRACT: Numerous studies have been conducted on an inversion method, focus on constraining factor, singular value, the speed of convergence. However, the result of inversion is not unique and bivalent. In this research, we optimize of Least-Square constrain by using damping factor. This method used for interpretation of the volumes and rock structure in Malalak District of Agam West Sumatra. This is undertaken because Malalak districts of Agam West Sumatra that passed by highway Padang and Bukittingi is a frequent area of the landslide. Furthermore, the frequency of the landslide depends on the type of rock and the angle of the slope. The depth of the slide surface can be predicted by using the least squares inversion constrain method of Geoelectric Resistivity. Landslides resulted in disruption of transportation between the city of Padang and another district in Sumatra. Based on the above, to determine the rock's structure, the depth, and tilt angle of the slide surface in Malalak districts Agam West Sumatra has to take place. Data obtained through Geoelectrical exploration using automatic resistivity meter equipment. Constrains were obtained using the Marquat inversion method. The result of the research is first, the damping factor for structures which have wide range resistivity is 0.02 and the smallest damping factor is 0.015. Second, the rock structure in Malalak of Agam consists of clay, sandstone, andesite, and limestone and dolomite. Implementation this research can be used to develop mitigation of landslide deserter.

Keywords: Investigation, Slide surface, Geoelectrical Resistivity, Least-Square Inverse, Constraint

1. INTRODUCTION

The Geolectrical resistivity method is one of the oldest geophysical techniques which is intensively used for the investigation of the deep and shallow structure of the subsurface. By introducing the electrical current directly into the ground through a pair of current electrodes, the difference of the resulting voltage can be measured between the other pair of potential electrodes. The apparent resistivity of the subsurface can be calculated in this way in order to get the resistivity variation with depth. The depth of the penetration depends on the distance between the current electrodes. Increasing the depth of the penetration can be carried out by enlarging the distance between the current electrodes from a small distance in the beginning to larger distances at the end of the array.

This problem needs to get attention and scientific studies to avoid landslide recurrence. If repeated how the distribution of rock point locations that have the potential of landslides. The research can be used for landslide mitigation study in West Sumatera. The boundary between an avalanche material and the hard rock beneath which acts as a base is called the slip plane. The soft layer acts as a landslide material. Avalanche material is characterized by low resistivity value and landslide fields characterized by high resistivity material [1]. Electrical slip is characterized by the presence of two soil layers of highly contrasting resistance values [2],[8],[4],[5]). The slip field usually consists of low permeability and solid rock. Assistance in the field of type resilient slip (200-100) Ωm [6]. Thus, electrically sloped field structures can be known based on the resistivity of these rocks.

In general, the slip surface has the following characteristics: first, the existence of the plating of the rock such as the surface of contact between the ground cover and the bedrock. Second, the presence of contact fields between rocks cracked with strong rocks. Third, the existence of contact fields between rocks that can pass water with rocks that cannot pass water (impermeable). The depth of the slide surface which is the boundary between the moving and the fixed mass of the soil surface is essential for the description of avalanches [6]. The depth of a plane is useful to know how big the risk of a landslide that occurred. Thus, the active landslide always moves on the plane at all times or throughout the season, while the old landslide can re-activate as long as there are trigger factors for landslides. The sliding surface is formed by the saturation of the water that accumulates and moves laterally above the surface of the soil layer or the rock that is difficult to penetrate with water called the waterproof layer [7]. If water penetrates to a waterproof layer, then the waterproof surface of the waterproof layer will decay, thus becoming slippery. This slippery layer is called the slide

surface. Layers that located over the plane of the slip will move along the slope and out the slope. As a result, excessive volume of water will cause soil or rock instability on the slope.

The study used the geoelectrical method to map the landslide potential areas that many researchers did before this research. The study of rock various of resistivity each location can be used to determine the slide surface since the resistivity at the sounding point that contains clay can be related to the location where the weathered plane [8]. The surface of the slide surface is a layer of water-containing clay having a resistivity between (19.3 - 36.6) Ωm, there is at a depth between (1.7 - 17 meters) and at a depth (8,9 - 16,4) meters [9]. The 2D resistivity modeling [10], showed that the slide surface was at a depth between (6 - 8) meters in the form of rotted Breccias with resistance type (30 - 118) Ωm.

Slide surface structure using profiles Tomography Multichannel Geolistrik method and drill hole found the material to compose the slide surface has low Resistivity (i.e. ± <80 Ωm)[11]. Based on least-square inversion method optimized Geoelectric data interpretation found the slope of 33-6-45 ° and 19.3 meter depth with a translational slip type in Bukitlantik Padang[12]. The range of the rocks resistivity in situ in Bukitlantik Padang vulnerable areas between (4.55- 94.1) Ω m using a time-lapse approach[13]. The surface of a slope field having a 300 Ωm type of resistance is a limestone block surrounded by Clay and Clayed Soil (Marl) having a lower resistivity [27].

The obsolete part of the Cretaceous Rock block is where the mass of wheels (slip plots) or triggers of collapsed rocks [14],[15]. Zone with type resistance (<10 ohm-m) at the depth (1100 - 1500) meters is a combination of Clay's and Chinshui Shale is a fault zone [16],[35]. This shows that in the weathered zone has a low resistance type. The subsurface rock type resistance can be explored by the geometrical method of resistance of the Wenner-Schlumberger configuration type. Interpretation of field data measurement data can be done by an inversion method. Problems encountered in interpreting data by inversion method are unique of results [17],[18] and yield stability [19], but to date, the inversion method is still the best for interpreting the Geoelectric measurement data. In order for the results of interpretation to approach a unique and stable result need to be optimized factors that influence it, such as damping factor inversion. Inversions can display the same response from three or more different models. This can cause errors in the parameter interpretation. This problem can be significantly reduced by using the Joint Inversion methods [17], [18],[20] which are then perfected by providing a lateral constraint [21],[22], but the results are still not optimal. One alternative solution to overcome

the above problem is to optimize the damping factor on the least-squares smoothness-constrain inversion method.

Geolistrik method can be used to estimate the condition of subsurface geology such as rock types in the form of rock type resistance values below the surface [23], [24], [25]). Earth is not a structure that has a calculated equation [26], [27]

$$\rho_a(x) = x^2 \int_0^\infty T(\lambda) J_1(\lambda x) \lambda d\lambda \tag{1}$$

which ρ_a is an apparent resistivity.

where s is half the current electrode spacing in Wenner-Schlumberger electrode configuration, J_1 denotes the first-order Bessel function of the first kind and λ denotes the integral variable. The resistivity transform function, T(λ), is given by the recurrence relationship[12], [28] as follows:

$$T_i(\lambda) = \frac{T_{i+1}(\lambda) + \rho_i \tanh(\lambda h_i)}{\left[1 + \frac{T_{i+1}(\lambda) + \rho_i \tanh(\lambda h_i)}{\rho_i}\right]}, i = n-1 \ldots 1 \tag{2}$$

where, n denotes the number of layers, ρ_i and h_i is the resistivity and thickness of the ith layer, respectively.Non-linear least-squares inversion scheme iteratively updates the model parameters in each step with the use of a correction vector which is the solution of a set of normal equations. Inversion of geoelectrical data is an ill-posed problem[[17],[29].Singular Value Decomposition (SVD) is a well-known technique used in many areas of applied sciences including the earth sciences [28]. It can be easily applied to small-scale geophysical problems.However, it must be noted that the use of SVD is not logical for large-scale problems. The large-scale problems can be solved either explicitly or implicitly using iterative methods like conjugate gradients to solve by using SVD in the inversion scheme. The damped least-squares solution has been modified by ([18]

$$\Delta \mathbf{m} = \mathbf{V} \, \text{diag}\left\{\frac{1}{\lambda_i^2 + \varepsilon^2}\right\} V^T V S U^T \Delta d \tag{3}$$

and the parameter correction vector can be expressed as:

$$\Delta m = V \, diag\left\{\frac{\lambda_i}{\lambda_i^2 + \varepsilon^2}\right\} U^T \Delta d \tag{4}$$

So, because of this correction was not getting the optimal result, equation (4) is modified by using empiric approach, we get damping factor as follow

$$\Delta m = V \, diag\left\{\frac{0.92\lambda_i}{\lambda_i^2 + \varepsilon^2}\right\} U^T \Delta d \tag{5}$$

2. METHODOLOGY

This research is an explorative research. Interpretation results using the least-squares smoothness-constrained inversion least-residence method Geolistrik Type Resistivity data are used to obtain the slope and depth of the slip surface area in the potential landslide area. The collection of exploration results is used to estimate the

distribution of potentially landslide disaster areas in Malalak Agam West Sumatra. The location of the measurement is the long song-prone area in Malalak Agam of West Sumatra with coordinates (00.22.488 S, 100.16.593 E) - (00.25,496 S, 100,17,214 E). Perta location measurement as

Figure 1

Figure 1: Measurement Locations in Kecamatan Malalak Agam West Sumatra (Google Map, September 23, 2017, [5]).

The arrangement of electrodes in the Wenner-Schlumberger configuration is shown in Figure 2
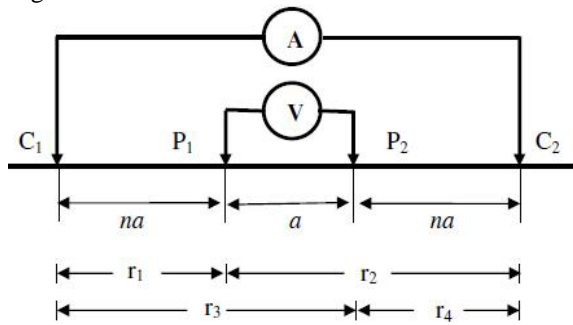
Figure 2. The configuration of Wenner-Schlumberger configuration electrode.

The apparent resistivity of measurement is calculated by the equation:

$$\rho_a = 2n\pi a(n+1)\frac{\Delta V}{I}$$

The main equipment used to obtain apparent resistivity is the multichannel Automatic Resistivity System GF Instrument (ARES) with the Ares-G4 model specification of Cheko production, belonging to the FMIPA UNP Padang. The analyzed data are interpreted by comparing the resistance value of the type obtained from the processed data with the type resistance table based on the reference and also compared with the geological condition in the direction of the measurement. The apparent resistivity data are interpreted using a Least-Square inversion in order to obtain a 2D resistivity cross-section. The 2D section of resistivity obtained is divided into several grids. The resistance types of some obtained are interpreted by the optimized Least-Square inversion method using damping. Based on the obtained 2D cross-section, it is known that the location where

the layer has a true resistivity value is contrast. Based on the true resistivity price obtained, the geological structure of the disaster-prone area and the reference type reference table are estimated to be the type of rock or mineral prone area of the landslide. Based on the 2D cross-section, it is known to estimate the slope and depth of the slip-prone area in West Sumatera. Damping inversion used is a factor that has been obtained through cutting the value of singular (Equation 5)

3. RESULTS AND DISCUSSIONS

a. Damping factor. Damping factor to optimize the result of interpretation method Inversion least-squares smoothness-constrain Geolistrik resistivity data is designed using a method of intersecting singular (SVD). Base on equation (5), we get the damping factor for the wide and minimum range resistivity of 0.2 and 0.003 respectively. Then, the value of the damping factor for the first layer is 30 that we call (0.3, 0.003 and 30).

b. Characteristics of the slide surface at (00'22.259 S, 100'17,300 ') up to (00'25.488 S, 100'16,412', 100'16,318 '). 2-D cross-section resistivity in the first location as shown in Figure 3 dan Figure 4
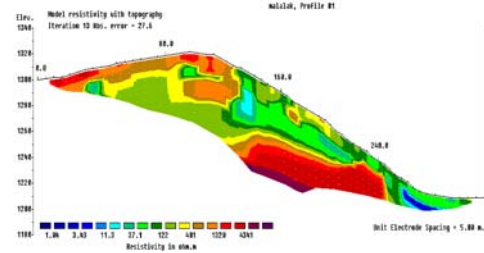
Figure 3: A 2-D cross section of the slide surface at (00'22.259 S, 100'17,300 ') up to (00'25.488 S, 100'16,412', 100'16,318 ') with general the damping factor ((0.02, 0.013 and 5)
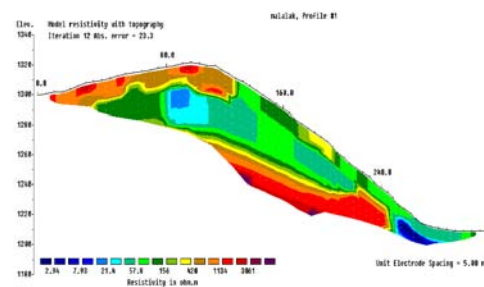
Figure 3.b

Figure 4: A 2-D cross section of the slide surface at (00'22.259 S, 100'17,300 ') up to (00'25.488 S, 100'16,412', 100'16,318 ') with optimization damping factor (0.2, 0.003 and 20)

Figures 3 and 4 show that the cross-section obtained through the use of optimized damping factors provides a description of the rock structure and clear boundary plane. However, both

approaches produce the same type and structure of rocks. The rock structure in the Malalak Agam regency of West Sumatra consists of Clay, Limestone Sandstone, Andesite Dolomite, and Gravel. Clay (Resistivity = 22.3 Ohm-30 Ohm) is found between the Andesite rocks (Resistivity = 481 Ohm-meters - 3267 Ohm-meters, [24],[25]. This type of coating shows the presence of a slide in this position [30], [8]. The boundary between the mass of moving material and the stationary is called the slide surface [31]. The material that moves above the slide surface is called the landslide. So, Material movement is caused by disruption of soil stability or slope constituents.

The comparison of resistivity results allows us to determine the critical landslide criterion level, where this condition contributes to developing a landslide early warning system using the Geoelectrical method [32]. A low-type resistivity zone that forms a sloping arch consisting of clay and has a high degree of saturation is a plane, as observed in the borehole [33]. At the location of large avalanche possibility, if in this region washed down with a large volume [34]. Rock resistivity anomalies in this area are estimated due to Dolomite rocks. Dolomite is a rock solid and hard which is a waterproof rock, but easy to experience weathering. The sliding surface of this track has a slope of 43,420, with a layer thickness of 15 meters (Figure 3) [5]. Based on Figure 4, we got the slope of the slide surface was 42,350 and layer thickness was 13 meters. This data shows that slide surface that we found by high damping factor produced the clear of slide surface. The effects of Clay on Dolomite's aid areas sliding surface [35],[6]). This is what triggers this area is often landslide when washed down by heavy rain.

c. Characteristics of the slip plane at (00'22.259 S100'17,300 ') to (00'24.576 S, 100'16,596'). 2-D cross-section resistivity at the second location as shown in Figure 4
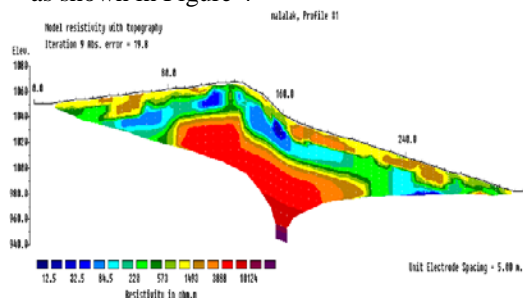
Figure 5: A 2-D cross-section of the slide surface at (00'22.259 S100'17,300 ') to (00'24.576 S, 100'16,596') with general the damping factor ((0.02, 0.013 and 5)
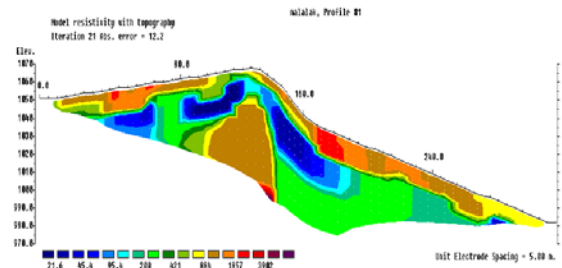
Figure 6: A 2-D cross-section of the slide surface at (00'22.259 S100'17,300 ') to (00'24.576 S, 100'16,596') with optimization damping factor (0.2, 0.003 and 20)

Figure 5 and Figure 6 show that there is Gravel (Resistivity = 297 Ohm-meters - 1653 Ohm-meters) found between Andesite rocks (Resistivity = 481 Ohm-meters - 3267 Ohm-meters, Telford, et al., 1975, Reynold, 1997). At Figure 5, there is no slip field because it does not comply with the requirements of the landslide (Bari, 2011, Joab & Andrews, 2009, Akmam, et al., 2014, Akmam, et al., 2015). Landslides with large volumes are expected to occur rarely at this location. However, this field of inactivity is inactive because at this location which acts as a field of slip is Gravel is not water-resistant. Small-scale landslides may occur at this location because the hill at this location is quite steep. However, in Figur 6, the 2D resistivity cross-section is the result of least-square inversion with optimized damping factor resulting in a 2-D cross-sectional interpretation showing the presence of a slip plane. So, we can say that in there is the slip surface at (00'22.259 S100'17,300 ') to (00'24.576 S, 100'16,596') which have the depth and the angle of slide surface are 43.210 and 23 meters. This is not the active slide surface.

4. CONCLUSIONS AND IMPLEMENTATION

a. Damping factor to optimize results of interpretation method Inversion least-squares smoothness-constrain data Geolistrik resistivity in this research earn respectively, for wide range resistivity and minimum factor damping are 0.2 and 0.003. Then, the value of the damping factor for the first layer is 30.
b. The rock's structure in Malalak Agam District West Sumatra consists of consists of Clay, Limestone Sandstone, Andesite Dolomite, and Gravel.
c. The depth and the angle of the slip surface at (00'22.259 S100'17,300 ') to (00'24.576 S, 100'16,596') are 40.380 and 16.5 meters. This is the active slide surface. 4. The depth and the angle of the slip surface at (00'22.259 S100'17,300 ') to (00'24.576 S, 100'16,596') are 43.210 and 23 meters. This is not the active slide surface.

d. The implementation of the results of this study is at coordinates (00'22.259 S100'17,300 ') to (00'24.576 S, 100'16,596') must be planned mitigation of the landslide disaster well. Mitigation that can be done is to make a landslide dam with a depth of 17 meters. Dams that must be able to pass water, so that the ground masses do not push the dam during heavy rain.

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CLUSTER ANALYSIS DISTANCE INTER DISTRICT USING SINGLE LINKAGE METHOD FOR DETERMINATION OF MPLIK CAR OPERATION ZONE IN MEDAN CITY

Ali Ikhwan[1], Yasmin Mohd Yacob[2], Solly Aryza[3]

[1]Faculty of Sains and Technology, University Of Islamic North Sumatera, Student PhD School Of Computer and Communication Engineering, Pauh Putra Campus, Arau, Perlis; School Of Computer and Communication Engineering, Pauh Putra Campus,Arau, Perlis; [2,]Student PhD School Of Computer and Communication Engineering, Pauh Putra Campus, Arau, Perlis[3]

ABSTRACT: The rapid growth of many piles of data has created a rich state of data but minimal information. So much data will be difficult to mine information on the data. Data mining is the mining or discovery of new information by looking for certain patterns or rules from a large amount of data that is expected to overcome the condition. By utilizing data obtained from the Office of Communications and Informatics for the operation of MPLIK car that is useful to divide the area that will be visited by MPLIK car through data mining clustering techniques. Category of destination or district area divided by single linkage is to take the closest distance between the districts located in the city of Medan, it will be easier and efficient to visit the area using the agglomerative hierarchy method.

Keywords: Using Euclidean Distance Method, including also using agglomerative hierarchy method

1. INTRODUCTION

The existence of data mining is increasingly required by many business firms as well as research institutes. Data mining is often termed Knowledge Discovery In Database is not a new discipline. Data mining is a field of several fields of science that unites techniques from machine learning, pattern recognition, statistics, databases, and visualization for problem handling and decision-making whose source data has a large capacity. The end result of the application of the concept of data mining is to find interesting information from a number of existing data hoard. One of the techniques used in data mining is clustering that aims to identify a group of objects that have similar characteristics that can be separated with a group of other objects, so that objects that are in the same group is relatively more homogeneous than objects that are in different groups.

The technique used in this analysis using cluster technique, the cluster is a well-known technique and widely used in data mining. Until now scientists in the field of data mining are still making efforts to improve the cluster model because the method developed now is still heuristic.

The main purpose of the cluster technique is to group a number of data or objects into a cluster or group so that in each cluster will contain as closely as possible data. In clustering, we attempt to place similar clusters (close proximity) in one cluster and make the distance between clusters as far as possible. This means the objects in one cluster are very similar to each other and are different from the objects in the other clusters.

2. HEADINGS

Many people use the term data mining and knowledge discovery in database (KKD) in turns to explain the process of extracting hidden information in a large data set. However, both terms have different concepts but are related to each other. "One of the stages in the KKD process is data mining" (Han and Kamber in Baskoro, 2010: 20).

2.1 Knowledge Discovery In Database (KKD)

Knowledge Discovery in Database (KDD) is the process of determining useful information and patterns that exist in the data. This information is contained in a large, previously unknown and potentially useful database. Data Mining is one step of a series of iterative KDD processes Stages of KDD process consists of:

2.1.1 Data Selection

In this process, the selection of the data set, creating the target data set, or focusing on the subset variable (sample data) in which the discovery will be performed. Selection results are stored in a file separate from the operational database.

2.1.2 Pre-Processing and Cleaning Data

Pre-Processing and Cleaning Data is done to remove inconsistent data and noise, duplicate data, correct data errors, and can be enriched with relevant external data.

2.1.3 *Transformation*

This process transforms or incorporates data into a more appropriate way to perform the mining process by performing a summary (aggregation).

2.1.4 *Data Mining*

Data Mining process is the process of finding patterns or interesting information in selected data by using certain techniques, methods or algorithms in accordance with the purpose of the KDD process as a whole. e. Interpretation / Evaluation Process to translate patterns generated from Data Mining. Evaluate (test) whether the pattern or information found matches or contradicts previous facts or hypotheses. The knowledge gained from the formed patterns is presented in the form of visualization.

3. DATA MINING

Santosa (2007: 22) states that data mining is an activity that includes the collection, use of historical data to determine the regularity, pattern or relationship in large data sets. One of the main tasks of data mining is clustering where the grouped data have no group examples.

3.1 The purpose of Data Mining

Baskoro (2010: 22) states that as for the purpose of data mining are:
a. Explanatory, that is to explain some observation activities or a condition.
b. Confirmatory, ie to confirm an existing hypothesis.
c. Exploratory, that is to analyze new data on a strange relationship.

3.2 Data Mining Grouping

Tan. (2005: 23), states: In general, data mining can be grouped into 2 main categories:
a. Descriptive mining, which is a process to find the important characteristics of data in a database. Data mining techniques included in descriptive mining are clustering, association, and sequential mining.
b. Predictive mining, the process of finding patterns from data by using some other variable in the future. One of the techniques contained in predictive mining is classification.

3.3 Clustering Definition

Clustering or cluster analysis is the process of grouping a set of physical or abstract objects into the same object class "(Han and Kamber, in Baskoro, 2010: 26) states that:

Clustering or clustering is one tool in data mining that aims to group objects into clusters. A cluster is a group or a set of data objects that are similar to each other in the same cluster and dissimilar against the different objects cluster.

3.4 Methode Clustering

Broadly speaking, there are several methods of data clustering. The choice of the clustering method depends on the data type and the purpose of the clusterization itself. The methods along with the algorithms included include (Baskoro, 2010: 13)
a. Partitioning Method Build various partitions and then evaluate the partition with several criteria, including this method include K-Means, K-Medoid, PROCLUS, CLARA, CLARANS, and PAM algorithms.
b. Hierarchical Methods Create a hierarchical parsing of the data set by using several criteria. This method consists of two kinds, namely Agglomerative which uses bottom-up strategy and Decisive using top-down strategy. These methods include BIRCH, AGNES, DIANA, CURE, and CHAMELEON algorithms.
c. Density-based Methods This method is based on connectivity and density function. These methods include DBSCAN, OPTICS, and DENCLU algorithms.
d. Grid-based Methods This method is based on a multi-level granularity structure. This clustering method includes the STING, Wave Cluster, and CLIQUE algorithms.
e. Model-based Methods A model is hypothesized for each cluster and an idea to find the best fit of the model for each other.

4. FIND CLUSTERING

The research method used in this writing is an experimental method. "The experimental method is a research design that identifies the casual relationship" (Sudaryono: 2005: 45). The stages of research conducted by the author in this research process are as follows:
1. Library Studies. By collecting and studying literature relating to the concept of hierarchical clustering, which uses the Euclidean distance algorithm. Sources of literature include textbooks, papers, journals, scientific papers, and supporting sites.
2. Archive data collection. To know the required information, the authors collect archived data (APBD report from 2006-2011).
3. Proposed data. Proposes of data includes: a. Data selection To select the data (dataset) that will use in this writing, the data districts of the city terrain contained in the Office KOMINFO. b. Cleaning To clear data, that is complete the data, remove duplicate data, remove noise. c. Data transformation To format the data to be ready in the cluster.

4. Clustering using hierarchical methods Stages of data processing where data that has been processed in the cluster by using the workings of Euclidean distance.

5. Analysis of clustering results Stages to analyze the results already processed in the clustering process.

6. Done As in this discussion with hierarchical clustering, which uses Euclidean distance algorithm. That is by calculating the distance between the sub-district one with another in the city of Medan.

4.1 Data Analysis

Steps to completion:

1. Search for objects with minimum distance L and P have the closest distance, that is 0.97 then object A and A join into one cluster

2. Calculate the distance between clusters LP with other objects.

1) $D(LP)A= min \{dLA,dPA\} = dLA = 4.34$
2) $D(LP)B= min \{dLB,dPB\} = dLB = 3.04$
3) $D(LP)C= min \{dLC,dPC\} = dPC = 2.25$
4) $D(LP)D= min \{dLD,dPD\} = dLD = 4.12$
5) $D(LP)E= min \{dLE,dPE\} = dLE = 23.28$
6) $D(LP)F= min \{dLF,dPF\} = dLF = 9.05$
7) $D(LP)G= min \{dLG,dPG\} = dLG = 4.13$
8) $D(LP)H= min \{dLH,dPH\} = dPH = 6.92$
9) $D(LP)I= min \{dLI,dPI\} = dPI = 3.81$
10) $D(LP)J= min \{dLJ,dPJ\} = dLJ = 1.51$
11) $D(LP)K= min \{dLK,dPK\} = dLK = 17.36$
12) $D(LP)M= min \{dLM,dPM\} = dLM = 16.02$
13) $D(LP)N= min \{dLN,dPN\} = dLN = 3.81$
14) $D(LP)O= min \{dLO,dPO\} = dLO = 3.99$
15) $D(LP)Q= min \{dLQ,dPQ\} = dPQ = 5.18$
16) $D(LP)R= min \{dLR,dPR\} = dPR = 6.63$
17) $D(LP)S= min \{dLS,dPS\} = dLS = 4.21$
18) $D(LP)T= min \{dLT,dPT\} = dLT = 5.69$
19) $D(LP)U= min \{dLU,dPU\} = dPU = 7.75$

5. CONCLUSION

Based on the research that has been conducted about the determination of distance between sub-districts of municipality for the operation of MPLIK car located in the Department of KOMINFO, it can be concluded that the grouping system to divide the district area supported by a mining data mining using single loop method will be very useful in determining the district in several groups. For analysis and discussion conducted on a grouping, it can be concluded as follows:

With use data mining techniques with a single linkage method based on the closest distance between districts for the operation of MPLIK car located in the Department of KOMINFO will be more optimal in the operation of the car, because the number of clusters that have been adjusted by the number of MPLIK car that will be operated in each sub-district Medan city. To generate an information picture about the sub-district located in Medan City for the operation of MPLIK car with clustered or clustered. The use of the concept of data mining using single linkage method is to see from the closest distance between the districts with one another by analyzing the data of large distances and requires precision and high accuracy as well.

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EFFECT OF MIND MAPPING LEARNING METHODS ON LEARNING OUTCOMES

Almasri

Department of Electronic Engineering, Faculty of Engineering,
Universitas Negeri Padang

ABSTRACT. This study aims to analyze the effectiveness of Mind Mapping learning method compared with Problem Based Learning. This research is experimental with quasi-design method through posttest control analysis. The number of samples used in the study were 55 students with two different classes. The first class is the experimental class while the other class is the control class. Survey data would be analyzed using homogeneity test, normality test and hypothesis test. The results showed that mind mapping method is more effective than problem based learning method with significance level 0,05. The average value of student learning outcomes rose from 76.7 to 83.2 to become method in the application of learning

Keywords: Mind Mapping, Quasi Experimental, increase learning outcomes

1. INTRODUCTION

Vocational High School (SMK) is an educational institution that strives continuously and programmed to conduct self-improvement in various fields both facilities and infrastructure, administrative services and information and the quality of learning as a whole. SMK is a school that educates students with skills and skills, as well as educating students to be able to choose a career, competence and develop a professional attitude in the field of expertise.

Vocational High School as a learning environment has a system of teaching theory and practice for the field of productive study, where the learning process involves several factors including teachers, students and infrastructure facilities. In general, some of the subjects in SMK are related to each other and are a requirement to move on to the next lesson. One of them is the subjects of Electrical Engineering. Each student is required to attend the subject and must pass for each subject that has been studied.

In order for the subject matter to be more easily understood, the teacher must be able to choose the right method in the learning process. Method is a way or a path that must be passed to achieve a certain goal [5]. By choosing and applying appropriate learning methods in the learning process will be able to improve student learning outcomes. Learning outcomes are the abilities students have after they have received their learning experience [3]. To assess and know the achievement of learning outcomes, the educational unit must establish Learning Completeness Learning Completeness is a minimal level of attitudinal competence attainment, knowledge competence, and skills competencies [4]. The completeness of Learning is set at 80.

Table 1. Value of Semester Test of Electrical Engineering in Audio Video Technique

No	class	The number of students	UAS value		Average Class
			≥80	<80	
1	X AV-A	33	13	20	73,01
2	X AV-B	33	12	21	73,94
3	X AV-C	33	14	19	72,58
amount		99	39	60	
Persentase		100%	39,39%	60,61%	73,18

Based on table 1, as many as 60.61% of students whose value is under Learning Completeness and 39.39% are above it. This shows that the value of learning outcomes is still much under the Completed Learning.

To improve learning outcomes requires the right method. One method that can be applied is the method of mind map learning (mind map). The mind map is a technique of utilizing the entire brain by using visual imagery and other graphical infrastructure to form an impression [2]. Mind map is the easiest way to put information into the brain and retrieve information out of the brain. Mind map is a creative, effective, and literally creative method of mapping out thoughts [1]

With the mind map learning method, students will more easily understand the material given, because in this method the material is presented in the form of full drawings, symbols and colors of interest. so as to motivate students in learning and can improve student learning outcomes towards the better.

2. RESEARCH METHODOLOGY

This research is a quasi experiment research using design pattern (Posttest Only Control Design). The research was conducted at SMK Negeri 1 Padang. This research begins by making observations on the place and subject of research, sampling and data collection.

Population is a generalization area consisting of subjects and objects that have the qualities and characteristics set by the researchers to be studied and drawn conclusions [6]. The population in this research is the students of class X SMK Negeri 1 Padang, which consists of 3 classes namely X AV-A, X AV-B and X AV-C.

Table 2. Number of Students of Class X Audio Video Technique

No	class	The number of students
1	X AV-A	33
2	X AV-B	33
3	X AV-C	33
	amount	99

The sample is part of the number and characteristics possessed by that population [6]. All the characteristics of the population are reflected in the samples taken. In this research we need 2 sample class that is experiment class to apply Mind Map method and control class for scientific approach of Problem Based Learning.

The sample selection was done by nonprobability sampling technique with purposive sampling. Sampling purposive is sample determination technique with certain consideration. Requirements are taken classes that the average value is almost the same. The average class acquisition of almost the same is the class X AV-B and X AV-C. Then a homogeneity test was conducted to see the second sample homogeneous data and normality tests to see if data is spreading normally.

Table 3. Sample Research

class	The number of students	Average Class
X AV B	25 students	76,60
X AV C	30 students	75,17

The variable is an attribute or the nature or value of the person, object or activity that has certain variations set by the researcher to be studied and then drawn the conclusion

2.1. Variable Free
The independent variable is a variable that influences or becomes the cause of the change or the incidence of the dependent variable [6]. The independent variables in this study is the treatment given to the experimental group students ie learning by using the method of learning with the mind map.

2.2. Dependent variable
The dependent variable is an influenced variable or a result, due to the independent variable [6]. The dependent variable in this study is the result of the student's learning on the Electrical Engineering subject after being given the treatment.

The instrument used in this study is an objective test of multiple choice questions. instruments that have been made directly tested try other class who have studied this material. The test results are tested for validity, reliability, differentiation and difficulty. Problems that have been tested, used as an instrument for data retrieval in the experimental class and control class.

After the final test is given to the experimental class and control class, the learning results of each meeting are obtained. The test results are then analyzed to be tested statistically. Data analysis is used to prove hypothesis. Data analysis techniques include: Descriptive analysis and inductive analysis.

The research instrument is based on learning device. Learning tools used in this study consist of syllabus, learning implementation plan, teaching materials, and learning media. The test given is an objective test. The material tested in the test corresponds to the material provided during the study.

2.3. Mean
The mean is obtained by summing the data of all individuals in the group, then divided by the number of individuals in the group.

$$\overline{X} = \frac{\sum X}{N}$$

Where: Mean, X: Individual data, N: Lots of observational data

2.4. Standard Deviation
As a prerequisite hypothesis test performed some testing:

2.5. Normality test
Normality test aims to determine whether the sample data is normally distributed or not. This is done by Liliefors test.
formulated by step:

a. Data $X_1, X_2, X_3 .... X_n$ obtained from the smallest data to the largest data.

b. The data $X_1, X_2, X_3.......X_n$ are made into raw numbers $Z_1, Z_2, Z_3......Z_n$ by the formula:

$$Z_i = \frac{X_i - \overline{X}}{S}$$

Where:
Xi = score earned by the students
$\overline{X}$ = average score
S = standard deviation

c. Using the standard normal distribution list, then calculated the probability F (Zi) = P (Z <Zi)

d. By using a proportion $Z_1, Z_2, Z_3......Z_n$ smaller than or equal to Zi if this proportion is expressed by S (Zi) then:

$$S(Zi) = \frac{banyaknya Z_1, Z_2, Z_3...Z_n \, yang \leq Zi}{n}$$

e. Calculate the difference (F (Zi) - S (Zi) then specify the absolute price.

f. Taken the largest price among the absolute price of the difference L_o

g. Compare the value L_o with the critical value L that is at the real level $\alpha = 0,05$

The test criteria are as follows:

If $L_o \leq$ L, then the data is normally distributed, If $L_o >$ L, then the data is not normally distributed.

2.6. Test homogeneity
Homogeneity test aims to see whether the two homogeneous samples that have the same or no variance, to test it is done F test as follows:

a. Looking for the variance of each data then calculated the price of F [6] by the formula:

$$F = \frac{Varians \, Terbesar}{Varians \, Terkecil}$$

b. Compare the price F calculated with the price F contained in the distribution list F at the significant tariff of 0.05 and the degrees of freedom denominator (dk) = n-1 and the degree of freedom of the numerator (dk) = n-1. If the price of F arithmetic <F table, then both groups of samples have homogeneous variance. Conversely, if F arithmetic> F table means both groups of samples have heterogeneous variance.

2.7. Hypothesis testing
There are several possibilities that will be chosen to be used as hypothesis test formula is:
   a. If the number of sample members is different and the two groups are homogeneous, then in testing the

statistical hypothesis used is t test with Polled variant [6]:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\left[\frac{(n_1 - n_2)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}\right]\left[\frac{1}{n_1} + \frac{1}{n_2}\right]}}$$

Where:
$\overline{X}_1$ = average of experiment class grade1, $\overline{X}_2$ = average of experiment class grade2, s1: standard deviation of experimental class student grade1, s2: standard deviation of student grade of control class, n1: number of experimental class students, n2: number of control class students.

There are several considerations in choosing the t test formula:

1) If the number of sample members $n_1 = n_2$ and variant homogens $\sigma 1^2 = \sigma 2^2$, it can be used t test formula, both for separated and polled. To know t table used dk the magnitude dk = n1 + n2 - 2

2) If $n_1 \neq n_2$, homogens variance $\sigma 1^2 = \sigma 2^2$ can be used t test with polled variance. Large dk = n1 + n2 - 2

3) If $n_1 = n_2$, the variance is not homogeneous $\sigma 1^2 \neq \sigma 2^2$ can be used separated or polled formulas, with dk = n1 -1 or dk = n2 - 1. Thus degrees of freedom (dk) instead of n1 = n2 - 2.

4) If $n_1 \neq n_2$ and variants are not homogeneous $\sigma 1^2 \neq \sigma 2^2$. For this is used separated formula, price t as a substitute price t table is calculated from the difference in price t table with dk = n1 -1 and dk = n1 -1, divided by two and then coupled with the smallest t price.

b. Price t arithmetic compared with t table, contained in table t distribution. Testing criteria required if - ttable ≤ titung> + ttable then the null hypothesis (H0) is rejected while the working hypothesis (H1) is accepted, and if - ttable ≤ titung ≤ + ttable then the null hypothesis (H0) is accepted, while the working hypothesis (H1) rejected.

3. RESEARCH RESULT AND DISCUSSION

3.1. Research result
The results obtained in this study in the form of data. This data is obtained through post-test technique after an application of mind mapping learning method in experiment class and Problem Based Learning model in control class. This study aims to determine how much influence the method of learning Mind Map Against Learning Results

Electrical Engineering Class X Audio Technique Video SMK Negeri 1 Padang.

3.1.1. Implementation of Learning

Prior to the research activities undertaken, the researcher determines the subject matter and subject matter and develops the lesson plan. The subject chosen is to apply a series of inductors in the electronics circuit and to apply, manage the electrochemical energy source.

3.1.2. Descriptive Analysis

This analysis aims to describe the state of what data is collected from the two sample groups. The results of the research data were obtained from the post-test results of each meeting, the sample class consisted of 25 students of AV-B X which was the experimental class and 30 students of X AV-C for the control class. After being given different treatment, in both of these classes, we got each post-test difference value from both groups of samples.

1) Average ()

For the experimental class

$$\overline{X} = \frac{\sum (f.Xi)}{N} = \frac{2079}{25} = 83,2$$

For control class

$$\overline{X} = \frac{\sum (f.Xi)}{N} = \frac{2299}{30} = 76,7$$

2) Variance (S2)

For the experimental class

$$S2 = \frac{\left(174509 - \frac{(2079)^2}{25} \right)}{25 - 1}$$

$$S^2 = \frac{174509 - 172889,64}{24} = \frac{1619,36}{24} = 67,473$$

For control class

$$S2 = \frac{\left(178113 - \frac{(2299)^2}{30} \right)}{30 - 1}$$

$$S^2 = \frac{178113 - 176180}{29} = \frac{1932,967,16}{29} = 66,654$$

3) Standard Deviation(S)

For the experimental class

$S = \sqrt{67,473} = 8,21422$ dibulatkan 8,21

For control classes

$S = \sqrt{66,654} = 8,16419$ dibulatkan 8,16

3.1.3. Inductive Analysis

1) Normality Test Result

Terms of hypothesis testing using parametric statistics is normal distribution, therefore before

this data is tested hypothesis using t test statistic, previously done first test data normality. In this research, normality test is done by Lilliefors test at alpha level 0,05, done on average value data of expriment class and control class cover posttest of each group. The sample group data is said to be normally distributed if the lilliefors (L0) count is smaller than the lilliefors table (Ltabel) (L0count ≤Ltabel) and is in the normal region. Based on the normality test of the data the average value of expriment class and control class can be seen in the following table:

Table 4. Normality Test Results

class	A	L_0	L_t	distributed
expriment	0,05	0,0422	0,1726	normally
control	0,05	0,0516	0,1590	normally

Based on table 4, it can be seen that Lo <Lt for both sample classes, means that data in both classes is normally distributed.

2) Homogeneity Test Result

Homogeneity test aims to know both groups of data have a homogeneous variant or not. To find out the homogeneity of the two sample groups, the test was conducted using F test. One of the requirements to know the variance is homogeneous when,

If Fcount ≥ Ftabel means not homogeneous

If Fhitung ≤ Ftabel means homogeneous.

Table 5. Homogeneity Test Value

Group	F_{hitung}	F_{tabel}	explanation
Expriment and control	1,01	1,90	homogeneous

In table 5, it turns out 1.01 <1.90 thus all the research group data is homogeneous.

3.1.4. Hypothesis testing

To test the hypothesis used t-test formula, which results as in table 6.

Table 6. Test Results with t-test

No	class	Average Class	t_{hitung} $\alpha = 0,05$	t_{tabel} $\alpha = 0,05$
1	expriment class	83,2	3,01	1,674
2	control class	76,7		

Seen in table 6, with a significant level α = 0.05. If compared thitung> ttable, so it looks that tcount> ttable (3.01> 1.674), then H0 rejected while Ha accepted. The results of this test provide an interpretation that there is a significant effect of learning methods Mind Map on student learning outcomes on the subjects Electrical Engineering

Class X Audio Technique Video SMK Negeri 1 Padang.

3.2. Discussion.

Based on result of hypothesis test, where Ha accepted indicate that there is difference of result of experiment class study and control class at real level 0,05%. The average post-test of experimental class learning outcomes was 83.2 higher than the post-test average of control grade learning outcomes 76.7

Based on the results of data analysis there is an increase in learning outcomes after the implementation of Mind Map Learning Method in class X AV-B. Learning using Mind Map Learning Methods is able to attract students' attention to pay attention to the subject matter delivered by teachers, students become more active in asking so that between students and teachers interaction occurs in teaching and learning process.

4. CONCLUSION

There is difference of mean value of result of student learning, where with mind map learning method get mean value 83,2 and with approach of Saintific Problem Based Learning get mean value 76,7 with difference value is 8,5% so mind map learning method give influence to student learning outcomes. This means there is an increase in student learning outcomes by applying mind-mapping learning methods. Hypothesis testing results, obtained t count> ttable ie (3.01> 1.6874). The results of this test provide an interpretation that Ho is rejected and Ha accepted, means there is Influence of Mind Map Learning Method

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DESIGN OF SKILL ASSESMENT IN COMPUTER NUMERICAL CONTROL PROGRAMMING SUBJECT

Ambiyar[1*], Febri Prasetya[2], Yufrizal[2]

Jurusan Teknik Mesin, Fakultas Teknik, Universitas Negeri Padang

ABSTRACT: During this time the assessment in the classroom is less able to describe the abilities and skills of the various students because the instruments used are less suitable and varied and the time limitations, so the assessment tends to be done by using instruments that further simplify the demands of student acquisition. Particularly in the assessment of CNC programming skills, teachers use the same form of assessment sheets of different subjects. Therefore, the assessment of CNC programming skills should be developed. The purpose of this research is to develop a skill assessment design on CNC programming subjects that are theoretical and practical. The research method used is Research and Development (R & D) by using Four D model (4D). This model consists of 4 development stages of Define, Design, Develop, and Disseminate. The results show that the design of the validity of course skills with a score of 0.600, this means the overall design of the assessment shows a valid result.

Keywords: Design Skill Assessment, CNC Programming Subject

1. INTRODUCTION

In line with the development of society today. One of the interesting challenges is the improvement of the quality of lower education in Indonesia. Various efforts have been made by education managers to obtain the quality of education, in order to improve student achievement or learners.

Likewise experienced in vocational education in Indonesia. Vocational education in Indonesia cannot be considered ready for graduates to be able to be absorbed in the world of work and industry. Sidi (2001: 20), earning the weakness of the old vocational education model on the concept and implementation. Various efforts have been made by the government to improve the image of vocational education. This is evidenced by the incessant advertising of SMK schools in the television media in recent times, even the Minister of National Education was immediately promoted.

In the process of teaching and learning, the expected learning outcomes can be achieved by students need to be known by the teacher, so that teachers can plan or design teaching precisely and meaningfully. But the reality in school teachers has not been fully able to prepare a good assessment sheet to assess students' abilities both from cognitive, affective and psychomotor assessments. This is often the case of data lessons that are practical or more precisely teaching that require skills / psychomotor assessment in it. Teachers usually use the same form of assessment sheets for different subjects. So sometimes the assessment made by the teacher is not effective against the substance of the students who he was. This is mostly found in vocational high school SMK, teachers usually use the same assessment sheet for different subjects. For example,

in the mechanical engineering department, the psychomotor rating sheets used by the teachers on the subjects of MMOD (Using Basic Operating Machines) is the same as the Welding Engineering subject sheets, although both subjects are practical the substance of these two subjects is different, so the assessment sheet different.

A similar case also occurs in the subjects of Computerized Numerically Controlled (CNC) Programming. In today's industrial world most of the companies in Indonesia have abandoned the use of conventional machines or manually operated machines, they have switched on the latest machines that are functionally operated computerized. The advantage of using this CNC machine in the industry is the ability of the machine to produce many products in a short time with good quality.

2. THEORY REVIEW

2.1 Skill Assesment

Another important aspect of managing teaching and learning is the process of evaluation or assessment. Evaluation or assessment in teaching is not solely done to the learning outcomes, but also to the teaching process itself. The assessment also serves to assess the relevant elements in the order of planning and implementation teaching. That is why evaluation or assessment occupies an important position in the design of curriculum and teaching design.

Danielson (1998) defines a skill assessment as a Skills assessment is a student learning assessment that encompasses all judgments in writing, products or attitudes except the multiple-choice, false, right-wrong, or short answer form. Performance appraisals are developed to test the ability of

students to demonstrate their knowledge and skills (what they know and can do) in real situations and certain contexts (Depdiknas: 2005). Skills assessment is not intended to test the students' factual memories, but rather to access or assess the application of factual knowledge and student scientific concepts to a realistic problem or task.

In a skill assessment test, it is generally done by having the test taker do something physical (practice). This form of deed test is particularly suitable for assessing in practical / skill lessons or lab work. The tool used to perform the assessment is generally an observation sheet. This form of deed test can generally be used to assess the process as well as the outcome (product) of a practice activity.

Skill tests can be used to evaluate the quality of a finished job, the skills, the ability to plan for a job and identify parts of a machine tool for example. The most important thing in skills assessment is how to observe and score the performance of learners. In order to minimize the factors of the subjectivity of justice in assessing the performance ability of learners, usually rater or assessor amount.

The things to note in the implementation of a skill test is the availability of equipment and other materials necessary for specific tasks, clarity, and completeness of instructions. Broadly speaking, the assessment of skills learning can basically be done on two things, namely: (1) job implementation process, which includes: work step and personal aspect; and (2) the product or work result.

2.2 CNC Programing Subjects

CNC programming subjects are advanced subjects from the branch of machining the process of machining machine workmanship which previously operated manually but on CNC machine operation has been assisted by computer
In general, the construction of CNC machine tools and their work systems is synchronized between computers and their meals. Compared to conventional machine tools such as CNC machine tools are superior, both in terms of accuracy, flexibility, and production capacity.

2.3 Effectiveness of CNC Programming Skills Assessment

The effectiveness of performance appraisal occurs when students are actively involved in organizing and finding information. Effective learning activities not only improve thinking ability. The effectiveness can occur when viewed from several aspects observed, including: (1) The ability of teachers in managing the methods provided (2) Student activities. The number of activities that students do follow the learning activities. Student activities can be viewed from the participation of

students in the learning process, such as actively asking, opinion, teamwork and sharing tasks. (3) CNC Programming learning results obtained. In principle, the ideal learning outcomes include all aspects, namely affective, psychomotor and cognitive as a result of experience and student learning process which includes all areas of creation, intention, and taste.
While student learning outcomes are the abilities students have after receiving their learning experiences influenced by several factors, among others: internal factors, for example, student health, intelligence, attitudes, talents, interests, and motivation. External factors, for example, family environment, school environment, and weather conditions: learning approach factors (strategies, methods). So the high level of learning outcomes, not only influenced by the level of student intelligence but also influenced by other factors, such as how the assessment of student skill.

3. DEVELOPMENT METHOD

The development model used is Four D (4D) model. According to Thiagarajan, et al (1974), this 4D model consists of 4 development stages: Define, Design, Develop, and Disseminate or adapted into 4-D models, defining, designing, developing, and deploying. One reason for choosing a 4D model is because the model with this system approach is in line with the underlying problem of this research. Given the needs analysis (needs analysis), see the characteristics of students or learners, and with the condition of existing school facilities, it is hoped that research with this model can develop a valid skill assessment design in improving the quality and efficiency of assessment techniques undertaken by teachers in programming subjects CNC.

3.1 Research procedure

In accordance with the 4D development model, the development procedure consists of four stages:

3.1.1 Define
Define stage is done to get an overview of conditions in the field. This stage of analyzing the needs (needs analysis) required for the process of developing the assessment design include (1) observation, (2) Analyzing and reviewing books as well as the CNC programming, (3) Studying the character of the students.

3.1.2 Design
The results of the analysis of the stage define are used for the next stage of the design stage, At this stage carried out the steps as follows:
a) Preparation of benchmark reference tests
b) Design an initial assessment design
c) Making a skill assessment design

3.1.3 Develop

At this stage, the following steps are carried out
a) The design validation stage of the skill assessment is designed in accordance with the constituent elements of the design of the assessment.
b) Stage The development trial is carried out to evaluate whether the initial design can be used in accordance with expectations and effectively attach quality to students' skills.
c) Procyclicality stages are performed to test one group and several teachers on the design of the penalty.

d) The effectiveness stage is carried out in the learning evaluation process using a skill assessment design in assessing student learning outcomes

3.1.4 Dissemination

The dissemination or dissemination stage is done by giving a short counseling about the design of CNC programming skills assessment skills to all students of the mechanical engineering department of SMK West Sumatra.
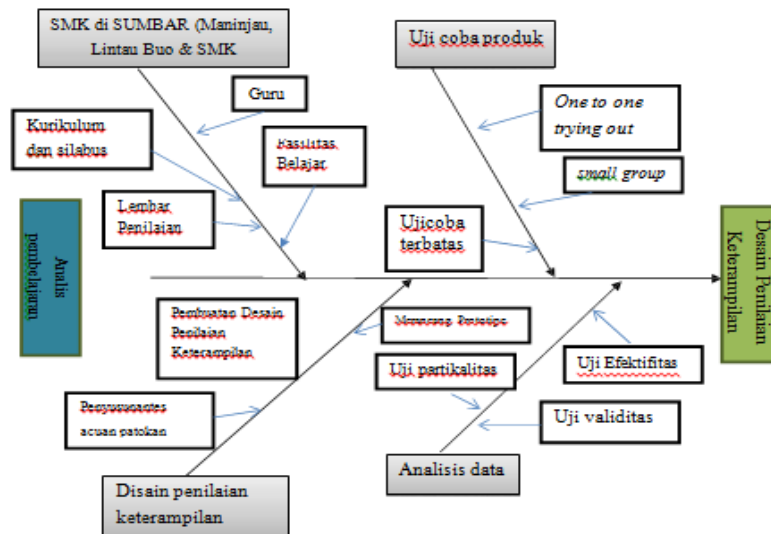
Fig 3.1. Research procedure

3.3 Data Type

The type of data used in the development of this skill assessment design is primary data, meaning that data obtained directly from research subjects are from expert/model experts, content learning experts, from students and teachers who perform a skills assessment

3.4 Data Collection Instruments

In this study the instruments used for data collection are:

3.3.1. Questionnaire of material assessment

The questionnaire contains some responses or aspects of the appraisal consisting of material conformity with the syllabus CNC class XI SMK programming, the correctness of the concept that can be accounted for, the suitability of the description with the indicators, the suitability of evaluation with teaching materials.

3.3.2 Questionnaire product validation

In this study validated data obtained through questionnaire containing expert responses on the assessment of aspects of attractiveness, clarity, and color composition of the display, the suitability of questions with learning objectives as well as on design skills assessment, language simplicity, and communicative aspects.

3.5 Data Analysis Techniques

Presentation validation is analyzed using the following steps:
a. Scored each item validated on a scale of 1-5 with the following conditions:
Value 5 = very good
Value 4 = good
Value 3 = good enough
Value 2 = less good
Value 1 = not good
b. Sums up the scores of each validator for all indicators
c. Aiken's V statistics are formulated as:
$V = \Sigma s / [n (c - 1)]$
Information :
$s = r - lo$
lo = The lowest validity score
(in this case = 1)
c = highest validity score

(in this case = 5)

r = Number given by a person assessment

Determining the validity and design of the CNC developed subject matter skills assessment, according to Azwar (2014: 113), the range of obtained V numbers will be between 0 and 1.00. Decision making when the value of ¥ 0.667 can be impressed as a coefficient high enough, so it can be categorized that the validity is in the category "valid"

According to the initial design of this research using 4-D development model, define, design, develop, disseminate. The results of the four stages are:

4.1 The Define stage

From observations made related to the problem, obstacles and the phenomenon of CNC programming learning is illustrated in the table below:

4. RESULT AND DISCUSSION

Table 1 This is the example of table formatting

Aspect	Condition
Problem	1. The teacher does not have a standard penial format 2. The evaluation of learning has not been effective 3. Students difficult concentrate in learning 4. Management of the classroom management is still weak 5. The learning outcomes of CNC programming are low
Obstacles	1. Limitations of practice facilities 2. Teachers' knowledge of learning evaluation is weak 3. The cost of the practicum is relatively expensive
Phenomenon	4. Students are not interested in CNC learning. 5. Student competence in CNC field is still low

The problems, phenomena, and obstacles found to be the initial reference in the development of this skill assessment design.

Following the review of the availability of CNC reference books in schools, the availability of reference books in schools is still small and there are only manuals for the operation of machines and there are no structured exercises and duties there. Reference books in school have not fully described the learning materials in accordance with the syllabus. References to references in the reference book have not fully illustrated the competence of the students' skills.

4.2 The design stage

After found the problem, obstacles, and phenomena regarding the subjects of CNC programming. Stages of planning to start from the preparation of benchmark reference tests compiled from the translation of the syllabus and then developed into a lattice test result learning. Likewise, the grid of the CNC programming skills test is:

Table 4.2 design assessment

Aspect	lattice
Planning	1. Designing engineering drawings 2. Program preparation 3. Calculation of CNC machine parameters 4. Calculation of the coordinate axis
Project assessment	1. Machine settings (Setting Up) 2. Setting tools 3. Check the program 4. Creation Phase (Execution Process) 5. The physical form of the product
Product Assesment	6. Originality 7. Innovation 8. Project report

From the lattice, the grid will be developed assessment design with various formats assessment and test results of learning results so as to assess various aspects related to student skills in learning CNC in order to more objective assessment. Format assessment is made in the form of the early prototype which will then be tested the validity, practicality, and effectiveness. While the learning result test was developed to measure students' cognitive abilities during the learning process.

4.2 Validity test

The validity process is done through a forum of group discussion (FGD) with experts in the field of

learning evaluation, lecturers and teachers who are experts in the field of CNC, language experts on improvements to the draft of design assessments made. Validity results are also assessed using a validation questionnaire to see its validity. From the questionnaire test the validity of design skills

assessment is obtained:

No.	aspect Assessment		Indicator of Assessment	Validity Score
1	The content of design sheet assessment	a)	Aspects design conformance with the syllabus contents	0,810
		b)	Material	0,830
		a)	Completeness of presentation	0.750
2	Language	a)	Straightforward	0.770
		b)	Communicative	0.780
		c)	Dialogic and interactive	.750
		d)	Easy to understand	0,750
		e)	Use of terms, symbols, and icons	0.800
3	Graphics	a)	Easy to understand	0,800
		b)	Attractive	0,800
		c)	colors match the original	0.750
4	Modules format	a)	Aspects format Modules	0.800
		b)	aspects Characteristics Module	0.850

The four aspects of the validation evaluation The design of the CNC programming skills programming skill indicates an average score above 0.600, meaning that the overall assessment shows valid results by the validating experts.

5. CONCLUSION

This research resulted in a design of CNC programming skills skill for vocational students majoring in Mechanical Engineering. Design This assessment has passed the test phase of validity, practicality, and effectiveness.

Validity test is done by requesting expert opinion through validation sheet. The validated aspects of the design of the CNC programming skills are the material/content aspects, the design format aspect, and the design presentation aspect. From the validity test conducted got the result that the whole aspect is a valid value.

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MODIFICATION OF INPUT PUSHER ASSEMBLY OF LASER MARKING MACHINE

Arif Rahman Hakim

Student of Doctoral Program UNP Padang

ABSTRACT: Laser marking process is one of the process steps in Integrated Circuit (IC) assembly manufacturing. This process is to mark the IC unit with the device information, assembly information and product brand. One type of lead frame used for IC assembly is an open-end lead frame which caused the individual lead on end unit prone to damage due to hard mechanical contact. A laser mark process, the lead frame will be pushed into the laser chamber by using a solid input pusher. The existing design of input pusher will push the lead by making contact with the edge of the lead frame. Production section keeps observing the damage lead problem occurred when process the open end lead frame. Damage lead was 54% of the defect occurred at laser mark process. This problem causing low yield and high rework. The team has been established to analyze the problem and found the solution. Through investigation and analysis, the team found the root cause of the problem and takes the appropriate corrective action. Design modification of input pusher from the previous design which was the solid type to be U-type significantly reduces the damage lead at laser mark process. Initial observation showed that the new design able to reduce 98% of damage lead.

Keywords: Design modification, Laser Machine, Damage Lead

Introduction

Integrated Circuit (IC) is a vital electronic component that is used widely in electronic application. This component is used in a consumer product, telecommunication, computer and automotive industry. Global competition and market-driven have motivated the multinational company which produces IC to subcontract the IC assembly manufacturing to the Asian country. One of the countries selected by the industry to be the offshore site of assembly manufacture is Batam island of Indonesia.

There is one IC assembly manufacture located in Batamindo Industrial Park Muka Kuning, Batam. This is one of top 10 IC assembly subcontractors in the world. In this factory, ICs are assembled starting from wafer chip up to the final IC component. The process steps to assemble the IC is started from wafer saw process. At this process, the wafer will be sawn to be single chip called as die. The single die then attached to a copper lead frame using conductive epoxy glue. To strengthen the bonding, the workpiece will be cured at 125°C. The next process is to connect the die to the lead frame using gold wire by ultrasonic welding. This process is called as wire bonding. All these processes are classified as front-line production. Wire bonded die then goes to molding process where the workpiece will be covered by using epoxy mold compound plastic that categorized as thermoset plastic. The process then continued by solder plating process where the copper lead frame will be coated with tin (Sn).For device identification, the IC package will be marked using laser process. The information written on the package contains device name, manufacturing code, and product brand. After completion of the laser marking process, the workpiece will be trimmed and formed to be single IC unit, then the final IC component is ready to ship to the customer, the owner of the product.

In this paper, it will be elaborated the process of laser marking. At this process, workpiece will be loaded into the input track of the machine then the workpiece will be pushed into the laser chamber using a pusher assembly called as input pusher. Inside the laser chamber, a laser system will mark the IC package. Then finally, the

marked workpiece will be pushed out of the chamber and unloaded to the carrier bag. Production section observing quality issue of the product such as marking defect, package defect, and lead defect. Production data showed that the lead defect contributed 54% of total defects. This quality issue is concentrated on open end lead frame type.
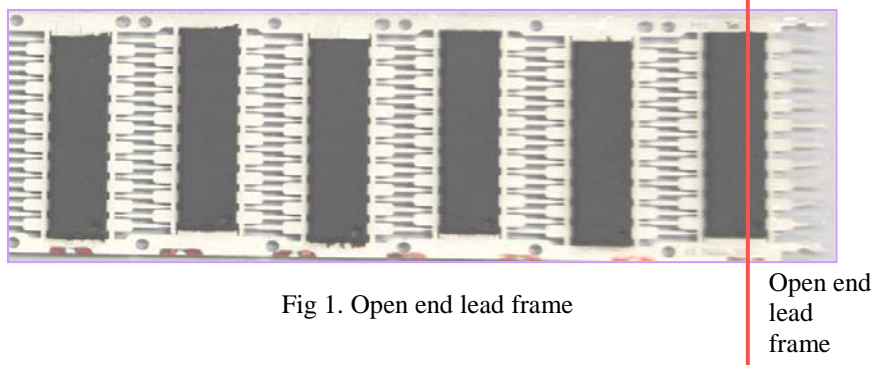
Fig 1. Open end lead frame

Open end lead frame

Methodology for Improvement

To address the quality problem, need to establish a cross-functional team. The team members are from a multidiscipline function in the organization such as process engineering, equipment engineering, quality assurance, production.

Table 1. Steps for improvement

Activities	Method
1. Problem identification	Production data analysis. Process observation.
2. Problem analysis	Brainstorming. Team discussion
3. Potential cause verification	Simulation.
4. Solution development	Brainstorming, discussion. Benchmarking, Simulation.
5. Solution effectiveness	Simulation.
6. Solutions implementation	Action

Problem identification

Data for the quality problem at laser marking process collected for last one month indicated that damaged lead is top defect. Further observation and analysis on the defect mapping showed that 54% of damaged lead occurred at pusher section of laser marking machine.
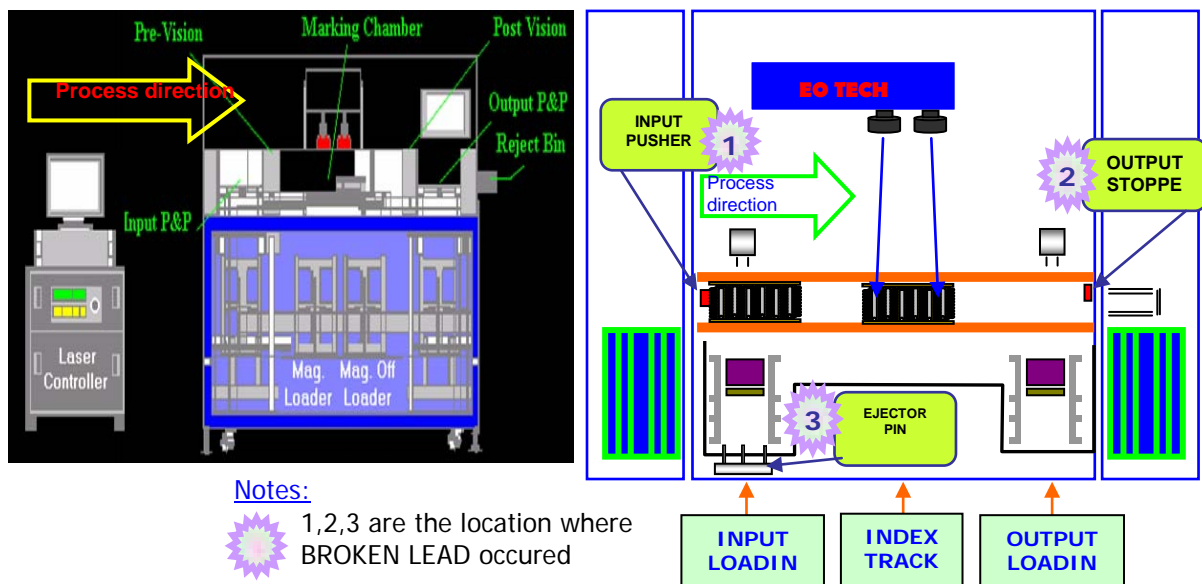
Fig 2. Schematic of laser marking process
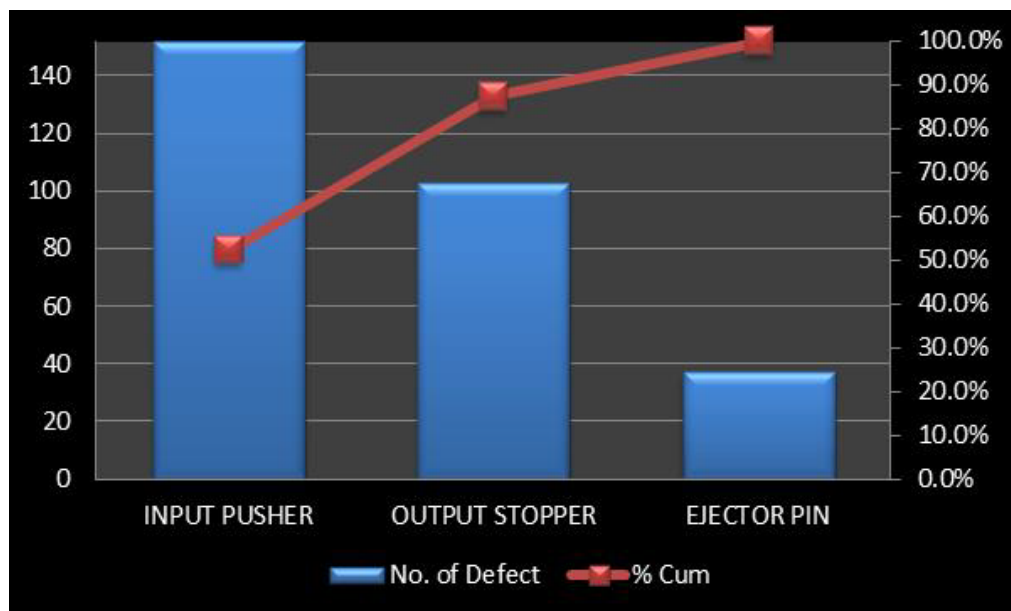
Fig3. Pareto of damage lead occurrence in the laser mark machine

Analysis the problem

Referring to Pareto of the damage lead (fig. 3), the team did further analysis on input pusher assembly. Fishbone diagram method is used to analyze the potential cause of the problem that will be verified to find the root cause of the problem.
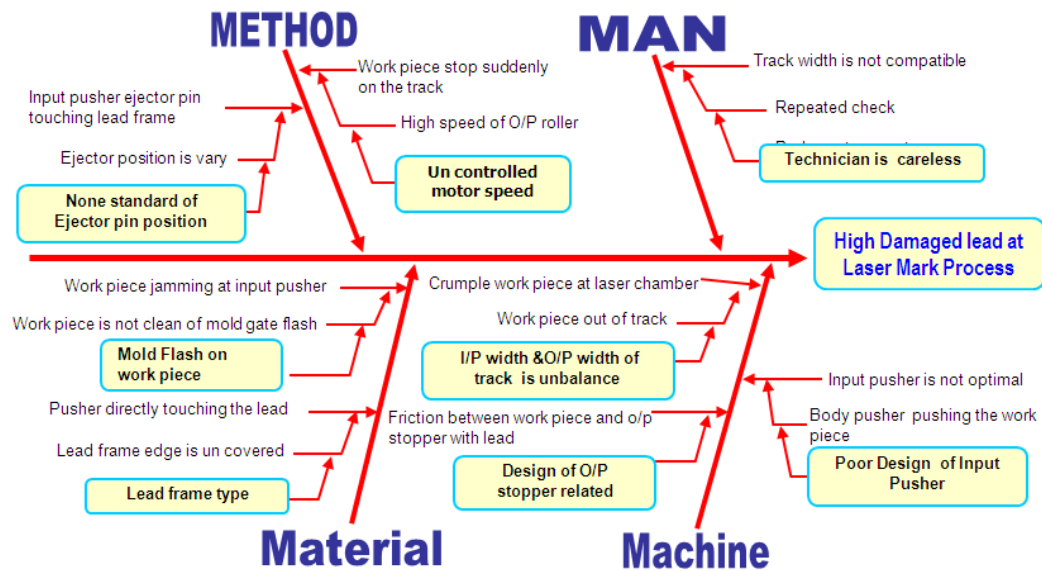
Fig 4. Fishbone diagram

Verification of the potential causes derived from fishbone diagram revealed that few potential causes are not confirmed.

Table 2. Potential causes verification

NO	POTENTIAL CAUSE	Verified by	Result
1	Technicians are careless when checking the track width.	Adi	Not confirmed
2	Poor design Input Pusher	Tarno	Confirmed
3	Unbalanced width of i/p & o/p track	Sugi	Not confirmed
4	Poor design of output stopper	Adi	Confirmed
5	Mold flash on the workpiece	Tarno	Not confirmed
6	Type of lead frame which is open lead frame	Sugi	Confirmed
7	None standard position of Ejector Pin	Sugi	Confirmed
8	Uncontrolled output roller motor	Tarno	Not confirmed

The original design of input pusher directly touches the lead frame edge. If the workpiece having abnormal mold gate end flash as poor quality of molding process, then the workpiece will abnormally bend that called side bent. This condition can disturb the smoothness of workpiece sliding on the track such as high frictions. To keep the workpiece moving, the input pusher will push the workpiece with higher forces. Due to the input pusher touching the lead with higher force, therefore the lead contacted with pusher will damage.
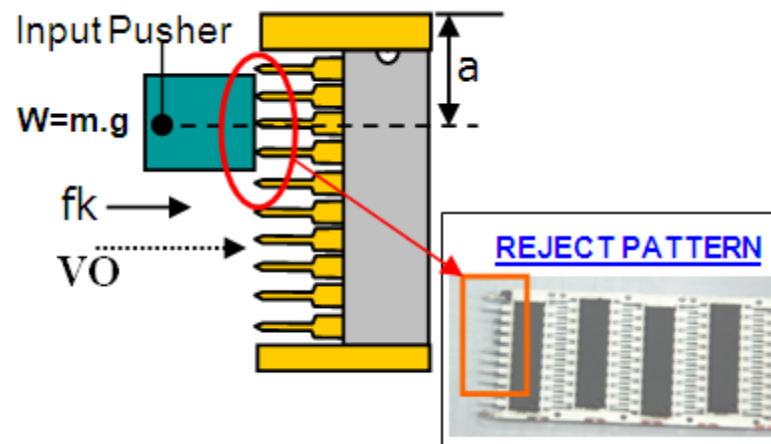
Fig. 5 Input pusher directly contact with lead

Output stopper is a machine part that has a function to stop the movement of the workpiece on the track. If workpiece moves to fast on the track, it will hit the stopper hardly and this prone to cause damage lead.
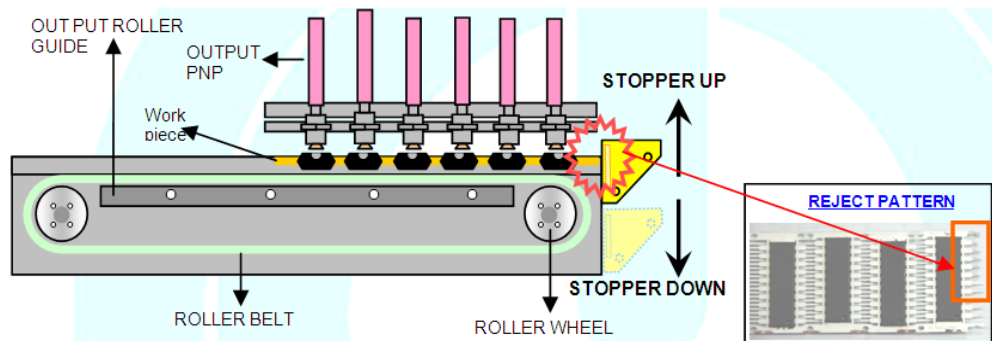
Fig 6. Workpiece hit the stopper hardly

The stopper mechanism moving up and down. The original design of output stopper having a flat surface facing the lead. This design provides the high possibility of the lead to be damaged when there is hard contact.

Corrective action

Four out of eight potential causes were verified and confirmed causing the problem. The team conducts brainstorming to develop corrective actions.

1. None standard position of ejector pin is confirmed as a potential cause. To address this potential causes, the standard position of ejector pin is defined and classified as a critical item to check when doing the machine set up. The working document is revised to document the standard position. All technicians are required to use the word document as a guideline when setting up the machine.

2. Type of lead frame with an open end is confirmed. However, modification of lead frame requires high cost since vendor involvement is required. The team considered this potential cause as the last potential cause to address.

3. Team focus on the poor design of input pusher and output pusher which is confirmed

as potential causes. Then, the corrective actions to improve the design are considered.

Methodology in improving the design of input pusher and output pusher:

Upon the confirmation of poor design of input pusher and output pusher, the team develops ideas for modification of the existing design.

1. Modification of input pusher.

There are 2 alternatives to design modification for input pusher;

Table 2. An alternative design for improvement of input pusher.

Alternative modification	Correlation to the potential cause	Effectiveness verification
ALTERNATIVE 1		
Redesign input pusher to be U-shape	With this design, the pusher will not directly contact with the lead edge.	Computer simulation indicates this design is effective
ALTERNATIVE 2		
Enlarge the cross-section of input pusher.	With this solution, then pusher is wider enough to push more leads that resulting in less force transmitted the lead.	This modification still has direct contact between the pusher and the leads and prone to damage the lead in case the workpiece jamming.

The first alternative is selected as corrective action for input pusher since the simulation indicates its effective.

a). Original design b). Modified design
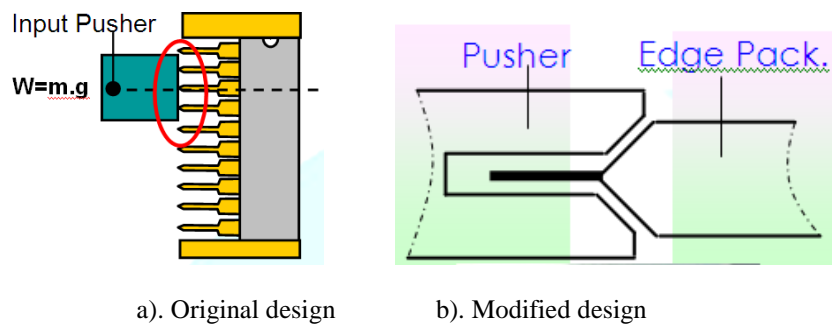
Fig 7. Difference between original design and modified design

2. Modification of output pusher.

Two 2 alternatives of design modification for output pusher were developed.

Table 3. An alternative design for output stopper.

Alternative modification	Correlation to the potential cause	Effectiveness verification
ALTERNATIVE 1		
Change the flat surface of the stopper to be chamfer and make the stopper wider.	Wider cross-section of the stopper and chamber design will reduce the possibility of lead damage when there is a hard collision between workpiece and stopper.	Computer simulation shows that the possibility of damage lead can be reduced.
ALTERNATIVE 2		
Change stopper material from stainless steel to be Teflon	Teflon will reduce the impact when collision happen.	If the stopper design still the same with the existing design, the change of material will not significantly reduce the damage lead.

Upon verification, both alternative solution were combined. Teflon will be used to replace the stainless steel and stopper surface will be chamfered.
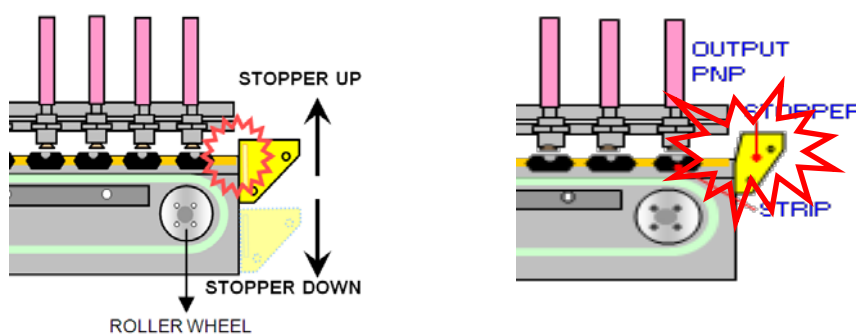
a) Original design   b) Modified design

Fig 8. Difference between the original design and modified design of output stopper.

Solution effectiveness

Upon verification of the effectiveness of design modification of input pusher and output stopper, production data has been collected. Comparison between previous data (before design modification) and new data (after design modification) will be used to justify the effectiveness of the solution.

Further data collection is required to confirm the effectiveness of design modification. The previous data is monthly average of damage lead defect while the new data were collected for one week period only. However, the available data may be used for initial review of the effectiveness. Data showed that the damage leads are reduced significantly.
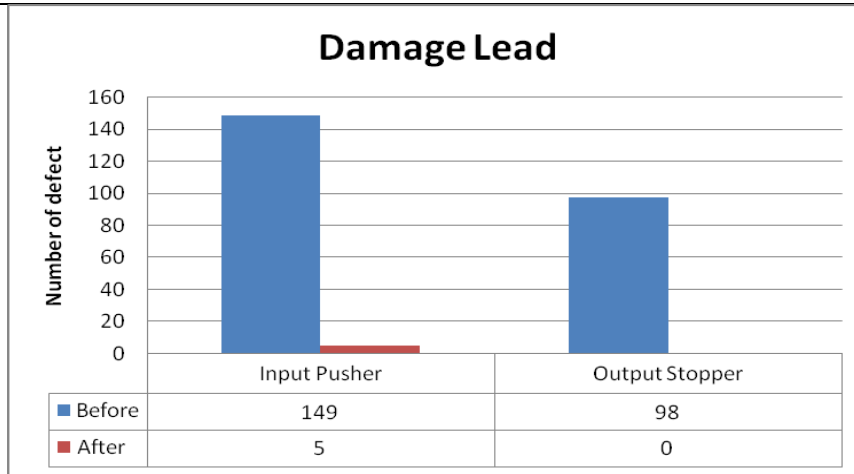
Fig 9. Comparison before and after

Conclusion

Modification of input pusher and output stopper of laser marking machine has been taken as a solution to reduce damage lead problem during laser marking of Integrated Circuit assembly manufacturing.

In this case, modification of input pusher and output stopper has reduced 98% of damage lead.

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COLLABORATIVE PROJECT-BASED LEARNING: AN INSTRUCTIONAL DESIGN MODEL IN THERMODYNAMICS ON TECHNICAL VOCATIONAL EDUCATION AND TRAINING (TVET)

Arwizet K[1], Nizwardi Jalinus[2], Krismadinata[3]

Fakultas Teknik, Universitas Negeri Padang, Padang, Indonesia

ABSTRACT: This paper explains a collaborative project-based learning in mechanical engineering diploma program on technical vocational education and training (TVET), in Padang. This test is validated through Focus Group Discussion (FGD) and measured by Aiken coefficient 0,840 and limited test to student learning outcomes. Collaborative project-based learning model in thermodynamics consisted of: curriculum analysis and student characteristics; classifying students and provide problems; solve problems together by students in experts group; group students to presentation about problem solving; evaluate learning process of by lecture; plan the project tasks and determine of the project task objectives; making of the project tasks schedule; monitor of the project tasks execution; assessment of the project results and conduct final evaluation of learning outcomes. The result of this research was obtained a collaborative project-based learning (CPJBL) model as a appropriate instructional design in thermodynamics on technical vocational education and training (TVET) with nine syntax and supporting product that validation, practical and effective.

Keywords: Collaborative Project-Based Learning, Instructional Design Model, Thermodynamics, Technical Vocational Education, and Training

1. INTRODUCTION

The 21st century is often referred to as the era of globalization. In this era of vocational education, graduates are required to always be able to adapt to changes in work environment and rapid technological developments in the industry to remain exist and excel. This condition makes the vocational education providers to always seek the formation of competence in vocational education oriented to 21st-century learning skills by developing creative and innovative learning process that emphasizes higher order thinking skills and application of literacy skill development as well as strengthening character education [1]. This is in accordance with the purpose of geared up workforce to accomplish job duty [2]. [3] Vocational education as "organized educational program" which is related to the preparation of individuals for paid or unpaid employment, or for additional preparation for a career requiring.

Thermodynamics is one of the subjects that must be given to students at the Mechanical Engineering Diploma Program, Faculty of Engineering, State University of Padang. But it was based on the observations conducted by the students that it took thermodynamics in Mechanical Engineering Diploma Program were founds that most of the students felt it was difficult to master thermodynamics teaching by well. Whereas the implementation of thermodynamics was often found in the industrial worlds as steam power plants, propulsion and gas power plants, hydro power plants, geothermal power plants, pump installations and piping systems, combustion engines, fluid engines, geothermal power plants, heat exchanger and so on. To understand the concepts and principles of thermodynamics requires the ability of high-level thinking by the students because they are abstract. This is what makes the students difficult to mastering the subject of thermodynamics quickly, turning something abstract into real conditions in the field.

There should be an effort to develop a model of learning that can help students to be able to take thermodynamic material quickly that could to improve motivation, thinking power and creativity of students. The same is explained [4] that quality education can be achieved through improvements in the learning process. Further [4] states that the success of the learning process can not be separated from the role of a teacher. [5] A learning model-material books, films, tapes, and computer-mediated programs and curriculums. Learning model developed should be in accordance with the characteristics of the course, facilitate students in mastering the teaching materials and provide knowledge and skills about the implementation of teaching materials.

The learning model is a reference used by lecturers in delivering teaching materials. [6] a learning models is a plan or a tutorial setting and to shape instructional material-including books, films, tapes, and computer-mediated programs and curriculums (long-term courses of study).

Collaborative project-based learning (CPjBL) is a learning model that can provide reinforcement on cognitive, cognitive and affective aspects to learners. The CPJBL model is a combination of a collaborative learning model with a project-based learning model. Application of learning model by combining several precise methods can be the solution to the problems that occur. One of the effective learning methods to facilitate students in mastering the material was the collaborative learning model. Collaborative learning (CL) model was an umbrella term used for a variety of educational approaches involving a joint intellectual effort by student or teacher [7]. A situation in which two or more people learn or attempt to learn something together [8]. Learning collaboratively in groups refers to an instructional method where the work together toward a common goal [9]. Model of collaborative learning will strengthen student's cognitive competence theoretically.

To provide a complex competence about the applicability of the theories studied in the collaborative learning model was to use a project-based learning model. The model of project-based learning (PjBL) is a constructivist pedagogy that intends to bring about in-depth learning by the learner to use an inquiry. PjBL is well suited to helping students become active learners because it situates learning for their learning [10].

Looking at the advantages of CL model and PjBL model above, then the combination of these two learning models called collaborative-project based learning (CPjBL) is suitable for use in thermodynamics learning. The CL model to strengthen student cognition by studying in groups solve the problem given and the PJBL model will train students to think critically to find solutions.

2. VOCATIONAL EDUCATION AND LEARNING MODEL

2.1. Definition of Vocational Education

Vocational education is that part of education which makes an individual more employable in one group of occupations than in another [5]. Vocational education is also designed to develop skills, abilities, understanding, attitudes, works habits and appreciation. [7] also states that vocational education is any education that provides experiences, visual stimuli, affective awareness, cognitive information, or psychomotor skills, and that enhances the vocational development process of exploring, establishing, and maintaining one self in the world of work. Whereas according to [12] vocational and technical education is a program of specialized studies designed to prepare the learner for employment in a particular

occupation or family of occupation. It can be concluded that vocational education is education that leads learners to enter the world of work.

2.2. Learning Model and Collaborative Project-Based Learning (CPjBL) Model

The learning model is a plan or a tutorial setting and to shape instructional material-including books, films, tapes, and computer-mediated programs and curriculums (long-term courses of study [13] collaborative project-based learning (CP$_J$BL) is a learning model combined between a collaborative learning model and a project-based learning model.

[14] Collaborative learning (CL) affords students enormous advantages not available from more traditional instructions because a group - whether it be the whole class or a learning group within the class - can accomplish any meaningful learning and solve problems than any individual can alone.

While project-based learning (PjBL) is well suited to helping students become active learners because it situates learning in real-world problems and makes them responsible for their learning [15]. P$_j$BL helps students to see that learning and life take place in contexts, context that effect the kind of solutions that are available and possible. The use of the CPjBL model involves students in an active, collaborative, student-centered learning process that develops the problem-solving and self-learning skills needed to meet the challenges of life and careers, in today's increasingly complex environment.

3. RESEARCH METHODS

This research is research and development. [17] Educational Research and Development (R & D) is a process used to develop and validate the educational product. The steps of this process are usually referred to as the R & D cycle, which consists of studying research findings pertinent to the product to be developed, Developing the products based on these findings, field testing it in the setting where it will be used eventually, and revising it to correct the deficiencies found in the field testing stage. In more rigorous programs of R & D, this cycle is repeated until the field test data indicate that the product meets its behaviorally defined objectives.

The method of developing Collaborative Project-Based Learning (CPjBL) model in thermodynamics on technical vocational education and training (TVET) at this research was developed using learning descriptions of ADDIE. The ADDIE model is a development model

through the five stages: analysis, design, development or production, implementation or delivery and evaluation. In more detail step of developing model of ADDIE can be seen in figure 1.
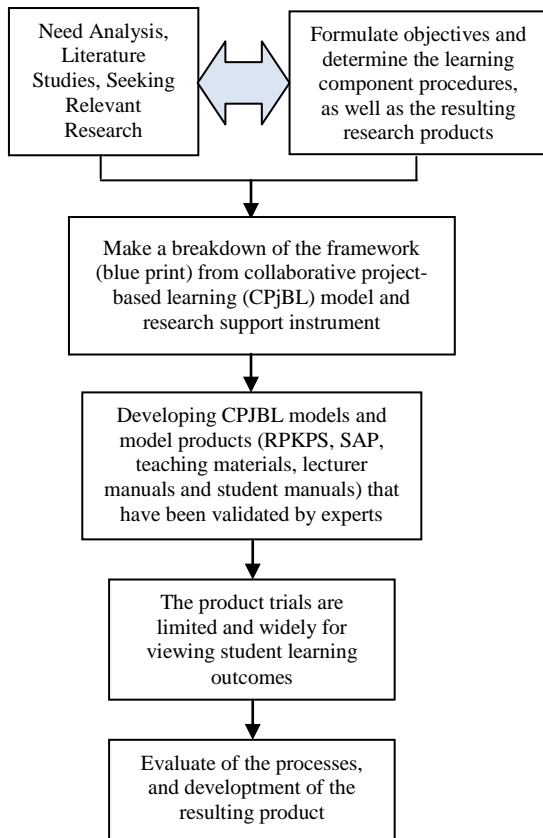
Fig 1. The procedures for developing the ADDIE model

4. RESULTS OF RESEARCH

The result of this research was obtained syntaxs of collaborative project-based learning model in thermodynamics learning process on technical vocational education and training (TVET). The syntax of collaborative project-based learning model (CPjBL) model consists of (1) identifying problems and determining learning objectives; (2) provide problems and create student groups (original and expert groups); (3) solve problems together by students in experts group; (4) group students to presentation about problem solving; (5) lecturers evaluate learning process; (6) plan the project tasks and determine of the project task objectives; (7) making of the project tasks schedule; (8) monitor of the project tasks execution; (9) assessment of the results project and final evaluation of learning outcomes. In the form of flow chart can be explained as in figure 2.
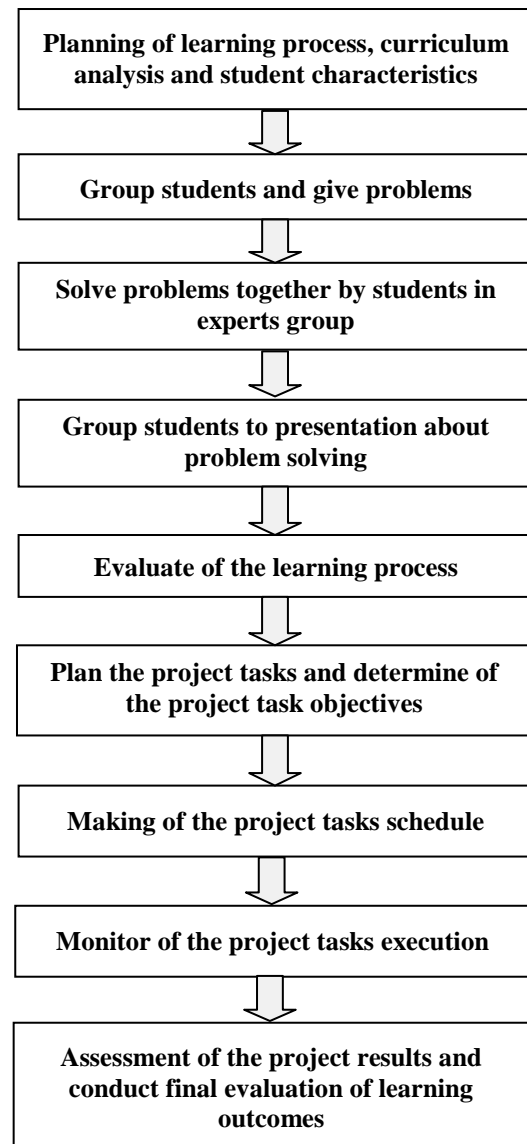
Gambar 2. Nine syntax model CPjBL in thermodynamics on technical vocational education and training (TVET)

5. DISCUSSION

Based on the results of the research of syntax of the collaborative project-based learning (CPjBL) model in thermodynamics on technical vocational education and training (TVET). Implementation of the CPjBL model in thermodynamics was done systematically step as such as:

a. Planning of learning process, curriculum analysis, and student characteristics

The planning of the learning process and curriculum analysis are two of the most important steps. At this stage, the effort is to plan the learning process that will be given to the students. The CPJBL and adapted curriculum are in the Engineering Engineering Diploma Program, Faculty of Engineering, Universitas Negeri Padang. [18] stated that planning is the process of goal setting and that goal. The curriculum analysis aims to identify the teaching materials (problems) that will be distributed to the students [14]. Knowing the characteristics of the students that will be accomplished during the process.

b. Group students and give problems

At this stage, students are grouped into multiple heterogeneous study groups of 4-6 people using a pattern of origin groups and expert groups and each receives problems related to teaching materials [12]. Furthermore, each member of the original group is given a problem that will be solved on this group of experts [13].

c. Solve problems together by students in experts group

At this stage, students in the expert group discuss the same learning materials section, as well as devise a plan how to convey to a friend if they return to the original group [12]. Lecturers facilitate groups of origin and group of experts as long as they learn together to solve problems in the form of provision of teaching materials, study guides and guidance [13]. Each group of experts discussed the problem and sought answers to the teaching materials given after the study guide. Once the problem is solved then they return to the original group to share the results of problem-solving with other members of the original group. Present the problem-solving results in front of the class [14]. Lecturers ask the representatives of each group of origin to present the results of problem-solving that has been obtained according to the given problem.

d. Evaluate the learning process

Lecturers give an evaluation in the form of small test for individual students about teaching materials that have been studied. The process of giving a small test is done at each meeting for 11 weeks. Stages of the learning process from the beginning to the stage of this small test is called a collaborative learning model whose goal is to strengthen students' cognitive competence [15].

e. Plan the project tasks and determine the project task objectives

At this stage, the lecturer assigns project assignments to each group [19]. The lecturer explains the project task framework and determines the objectives to be achieved in the project task. This step is an important step, the task of the project can work well if the purpose of the project task is clear and understood by the students. Making of the project tasks schedule [20].

At this stage lecturers and students jointly develop a project assignments schedule. Preparation of project assignments implementation stages by considering the complexity of the steps.

g. The monitor of the project tasks execution

This stage lecturers always monitor the project tasks assigned to the students. Lecturers help find solutions, if students experience obstacles in doing project tasks [21]. At this stage, the lecturer should also know how far the project work has been done by the students in terms of finding industry relevant to the project task, the achievement of the project tasks, the process of collecting data, analyzing the data and making the final report on the project task.

h. Assessment of the project results and conduct final evaluation of learning outcomes

At this stage, the lecturer facilitates the student in making the project task report, presenting the result of the project task in front of the lecturer and other students. All groups present their project, discuss, and draw the final conclusions of the given project task.

Lecturers and students reflect on the activities and results of project assignments undertaken by students. The reflection process is done both individually and in groups. Lecturers also provide an assessment of the project tasks undertaken by students either individually assessments or group assessments.

Finally, the lecturers give a final evaluation to all students, to measure the mastery of course material by the students during the learning process in the form of final test or also called post-test.

6. CONCLUSION

Collaborative project-based learning (CPjBL) model is an alternative to the instructional design model which is appropriate to TVET. By using this instructional design model, it is expected that the learning process in TVET is more motivating, creativity, innovative and more

fun for students in learning (the learning will be more meaningful).

Further model CPjBl model which has been applied in TVET so as to help students in improving their competence and facilitate them enter the world of work (enter the world of work). Besides this CPjBL model be able to develop of students critical thinking, and having good morale

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8. AUTHOR'S BIOGRAPHY

Dr. Ir. Arwizet K, MT is a lecturer in Department of Mechanical Engineering, Faculty of Engineering, State University of Padang. Currently a lecturer at Postgraduate Program PTK FT UNP. He obtained his MT from Institut Technolgy of Bandung (ITB) and Dr of Postgraduate Program PTK FT UNP 2017. His research interests include energy conversion, thermodynamics and development of learning model in thermodyanmics. His contact e-mail is arwizet1969@gmail.com

9. AUTHOR'S CONTRIBUTIONS

This section should state the contributions made by each author in the preparation, development and publication of this manuscript.

1. **Prof. Dr. Nizawardi Jalinus,M.Ed**i: conception, model design, and interpretation of model to enhance student's learning outcomes and drafting the article.

2. **Krismadinamata, Ph.D**: critical reviewing and final approval of the version to be submitted.

10. ETHICS

This article is original and contains

unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved.

DEVELOPMENT OF EMPLOYEE INFORMATION SYSTEM -BASED WEB IN MAN 1 PADANG

Asrul Huda[1], Rendy Harisca[2]

[1,2]Faculty of Engineering, Universitas Negeri Padang, Indonesia

ABSTRACT: Information Systems have a role as a tool to manage service in organization to be more accurate, effective and efficient. In MAN 1 Padang chief of TU still difficult to manage employee data because there is no database management that can store, process, and maintain integrity of employee data. To improve service in MAN 1 Padang needed employee Information System-based web that is able to manage employee services, start from employee data input process, employee leave process, employee mutation process, and employee retirement process are mutually integrated as a whole. This design implemented by PHP programming language with MySQL database and CodeIgniter framework. In system design involved Use Case diagrams, Activity diagrams, Context Diagrams, flow map, Normalization and Entity Relationship Diagram. This system involves 3 users namely: Employee, Admin (administrator), and Principal. The three levels that registered have a private account to enter into a system that is username and password for the admin and principal while the employee enters used NIP and Password with MD5 encryption. Employee information system produced applications - based web that can help Administrative Officers in improving the effectiveness and efficiency in the implementation of employee management activities as well as displaying actual information in the form of employee data reports, employee retirement information, history of employee mutation and employee leave history.

Keywords: Employee Information System, PHP, MySQL database, CodeIgniter framework.

1. INTRODUCTION

Information technology and computer technology now, growing very rapidly. The needed increasingly demand by all of society, both ordinary people and intellectuals people. This is related to activities that are often done by a human who usually done manually and traditionally, now will be more quickly and precisely if do with help with machines that is computer technology.

Development of information technology has generated many systems and applications that are very useful. One of them is the internet. The popular Internet is often referred as web or often also called software based-web that has grown rapidly in terms of use, size, language used and complexity. Web applications were originally just static sites but now many dynamic and interactive that used in information systems and telecommunications.

Advances in information technology and computer technology have resulted in the growing understanding of the importance of technology aspects in a company, agency, or organization. So in today's information technology has also been widely used by companies, educational institutions and organizations for media publications.

Development of communication technology is a base for the development of an information system. The information system implies an organized data collection and with usage arrangements that include more than just a presentation. The information system is an integrated system capable of providing useful information for the users.

The use of information systems in helping organizational performance is increasingly needed. Supported by the sophistication of information technology, has enabled the development of an increasingly reliable information system. Information Systems is one of the most important resources in modern management. Many strategic decisions depend on information.

Structuring information that is done by regularly, clearly, precisely and quickly and can be presented in a report definitely supports the smooth operation of the organization and make a decision appropriate.

Administrative Section (TU) in the school has a task to carry out of employee administration including processing mutation process, leave, and employee retirement. MAN 1 Padang applied a manual system in providing information services for user needs, so it is less able to answer the challenges of the times and seem left behind by modernity. Based on the observations results and based on interviews conducted with the leader of TU MAN 1 Padang that the school is unavailable an information system that can be accessed anywhere and anytime such as employee information system. The manual system is no longer relevant to MAN 1 Padang is more growing and with the number of employees who continue to increase. This manual system has many disadvantages: used of time longer, the manpower that much, the cost required is very large as well more risk of error. The school administration management personnel such as employee data, leave, mutation, and retirement in MAN 1 Padang

not yet use the database as a storage medium employee data, it can be seen in presenting the report used computerization is limited to typing all data that has been prepared before by using the application Ms. Word and Ms. Excel, so that in producing all the right reports relatively longer and less complete in the report resulting then slow information received by employees from the administration MAN 1 Padang.

It needs an employee data processing concept with employee data processing features, retirement data, mutations, leaves, and reports provided according to the administrative requirements of MAN 1 Padang in form website.

System design in this application used UML modeling (Unified Modeling Language) which consists are Use Case Diagram, Context Diagram, and Activity Diagram.

According Leman (1998: 3) information system is "A system made by humans consisting components within the organization to achieve a goal that is presenting information".

Based on Kadir (2013: 71) an information system there are components such as: "Hardware includes physical devices such as computers and printers then Software or program that set of instructions that allow by hardware to be able process of data , the third is a procedure is set of rules that used to realize data processing and generation of desired output, then the fourth is the person is all the parties responsible for the development of information systems, processing, and use the information of system output and the fifth is the database is set of tables, relationships, and others related to data irregularities, and the last computer network and data communications is a system that allows connections to resources that used together or accessed by a number of users".

According to Kadir (2013: 4) the main capabilities of information systems are as follows: "Implement numerical computation, large volume and with high speed, and provide communication within organizations or inter-organizations are cheap, accurate and fast, storing information in a very large amount small, accessible space allows quick access to information around the world, improves the effectiveness and efficiency of people working in groups in a place, presents clear information that inspires the human mind, automates semi-automated business processes and tasks that are done manually and speed up typing and editing and then financing is cheaper than manual ".

The last Rosa opinion (2011: 118) about UML: "UML is a visual language for modeling and communication of a system by using diagrams and supporting texts". UML only works for modeling. So UML usage is not limited to certain methodologies, although in reality, UML mostly used in oriented object methodology ".

2. METHOD DESIGN

System design in this application used UML modeling (Unified Modeling Language) which consists of Use Case Diagram, Context Diagram, and Activity Diagram.

2.1. Analysis of Current System

The following document flow diagrams define the relationships between parts (process actors), processes (manual) and data flow (in the form of output and input documents). The flow of documents in running system can be described with the system flow map as shown in the picture below:

Figure 1. *Current System*

Figure 1 describes the running process, where in the process uses manual way.

2.1. Analysis to be developed
   a. User Analysis

Users are actors who will play a role in the system. In this system, the users involved are employees, admin/administration, and principal. Here are the details of the task or thing that users can do in the system:

   1) Employee

In this system, employees have the right to apply for leave, mutation, and retirement, including the number of teaching hours and duties of education and see the history of the leave, retirement reports and mutation reports.

   2) Admin / Administration

In this system, the admin/administration is positioned as a system manager and granted full system access rights to:
a) Checking employee data.
b) Keep employee data.
c) Acc Format employee data.
d) Check employee data and check completeness, leave application, retirement, and mutation.
e) Save, SK Request for leave, SK retirement, and SK Mutation.

3) Principal
   The Principal is a leader in a school, who is in charge of:
   a) Acc Format employee data after Acc by the administrator.
   b) Sign the data completion of the application for leave, retirement, and mutations that have been examined by the administration, have access rights to add admin on the system.

b. Process Analysis

Employee information system at MAN 1 Padang makes the process of storing employee data which will then be stored in employees' database. In employee information systems at MAN 1 Padang in addition to the process of data collection of new employees, there is also the process of application for leave, employee mutations, and retirement.

c. System Design
Here's the proposed flow map:

Figure 2. *System flow map that proposed*

The new system to be built is not much different with old system, the difference only from a manual system and does not have a database in the end in this new system to be computerized and has a database for data that can be stored neatly and to facilitate in input data process employees and other processes associated with employee data.

d. Hardware Requirements Analysis
1) *Processor* : Intel Atom or above version
2) RAM : 1GB or more
3) *Hard disk* : 40 GB or more

e. Software Requirements Analysis

Software	Function
Windows 7, 8 and 10	Computer operation system
Atom	Text Editor
Mozilla Firefox/Google Chrome	Web browser
XAMPP	Web server
MariaDB	Database server
CodeIgniter	Framework PHP
Materialize	Framework CSS

f. System planning
System design for illustrating, plan, and make sketches or arrangement of some separate elements into one unified whole and functioning. System

design is the result of the transformation from analysis into a design that will be implemented.

1) Context Diagram

A context diagram is the highest level in the data flow diagram and only load the process, showing the system as a whole. Context diagram shows the relationship and boundary between a system with an external entity.

Figure 3. *Context Diagram*

In the context diagram above seen, admin/administration have full access rights in the system. Where admin/administration has task management system, then Principal look out that report based on information input by admin/administration and also duty add admin and have a duty for input the data needed for process required.

2) Use Case Diagram

Use Case diagram is a scenario of the interaction between users with the system. A use case diagram illustrates the relationship between actors and activities that can be performed in the application. The following is the use case design diagram Employee Information System MAN 1 Padang:

Figure 4. *Use Case Diagram*

Figure 4 shown that each actor has different levels, admin/administration has a task to manage the system, then the principal reviewed reports based on the information infected by the admin/administration and also in charge of adding admin and have duties to input the data needed for the required process.

3. DESIGN RESULTS

Implementation is a process that interpreted the design results into a software form as a whole. The implementation of the interface is to interpret the layout that has been made on the interface design into the form of the system interface display intact. Implementation this system interface applied to determine the system has been designed run properly in accordance with a design that has been designed previously.

3.1. Home Page

The home page is the first page when the user opens the website employee information system http: // localhost/employee /. Display the home page shown in the picture below:
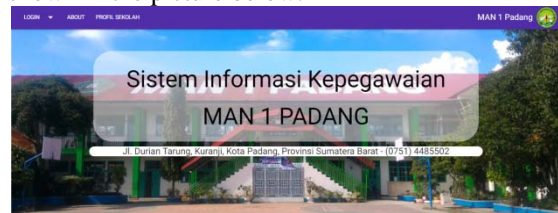
Figure 6. *Home Page*

3.2 Employee page
a. Employee Login page

Login page is the page where the employee login. The appearance of the employee login page is as follows:
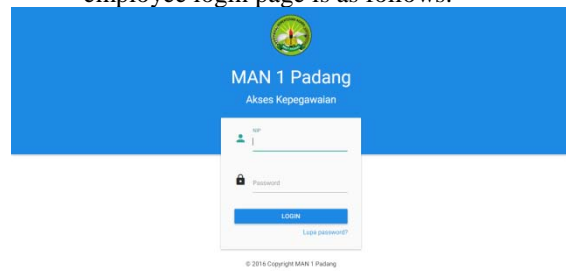
Figure 7. *Login page*

b. Employee Home Page

The main home page is the main page after employee login account. The main employee page is shown in the picture below:

Figure 8. *Home Employee*

c. Input Form Page

Input Form Page is a page where employees input the data required in manage of leave, mutations and retirement. Here is an example one of the input leave form, input form like shown in the picture below:

Figure 9. *Leave Input Form*

d. Status page

Status page is page to see the process submission of leave, mutation and retirement submitted by the employee after filling in the necessary data contained in the input form. In this page employee can see the submission is being processed acc by administration after it that acc by principal and then the employee gets notice on the status page, that the submission has been acc by the administration and principal. Here is an example one of status page views the leave status page as shown in the image below:

Figure 10. *Leave Status*

e. Teaching History Page

Teaching history page is a page where employees can see the history of the teaching hours that input by employees at MAN 1 Padang. In this page employees also add teaching history data as specified in each semester and academic year, the added data includes the school year, semester, level, subject and number of teaching hours. The history of teaching page views is as follows:

Figure 11. *Teaching History*

f. Task of Educational Force Page.

Task educational force page is history page the educational employee where employees can see history of tasks employee that inputted by structural employee in MAN 1 Padang. In this page employees can add task data accordance that decided in each semester and academic year, the added data include year of teaching, semester, and task of educational force. The history of teaching page views is as follows:

Figure 12. *Task of Educational Force Page.*

g. Report page

Report page is a page where employees can see history of leave, mutations and retirement filed by all employees at MAN 1 Padang. In this page employees can search other employee names about leave, retirement and mutations and then employees also can print report as needed. Here is an example one of page views report, this report about leave page as shown in the picture below:

Figure 13. *Leave Report*

3.3. Admin page

Admin page is a page where admin has rights access to look out and print all employee data, process submission of leave, mutation and retirement, printed SK of leave, mutation and retirement required by employee, and can look out and print report history of leave, mutation and retirement. On the administrator page there

are 2 admin levels: administrative as main admin and principal.

a. Admin Login Page

Login page is main page when admin opens website. In order to enter the next menu page admin must enter a username and password. Implementation of admin login page is as follows:

Figure 14. *Admin Login*

b. Admin Home

Administrator's home page is the first page that appears when login in admin page. The main administrator page views are as follows:

Figure 15. *Admin Home Page*

c. Master Data Menu

Employee master data page displays Employee MAN 1 Padang data and there is sub-menu click to add data if admin wants to add Employee data, and there is a useful action button to view details, edit and delete data, and there is a menu to print entire employees data. Employee data are separated based on employee type that is Structural and Functional employees. Here is an example one of the master data display, which is master data of structural employees such as shown in the picture below:
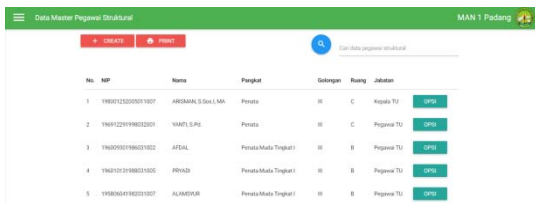
Figure 16. *Structural Employee Data Display*

d. Process Menu

In display below is that display from page of leave process, process of leave is a process to find out data entered by employee has been approved by administration and principal.
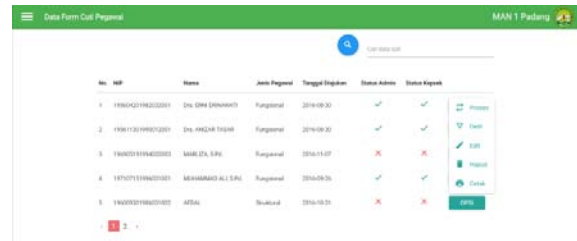
Figure 17. Display Page of *Employee Leave Data*

e. Report Menu

Menu page of Employee report contains a page listing the structural and functional employee list report of MAN 1 Padang applying for leave. Here is an example one of the report menus leaves report as shown in the picture below:
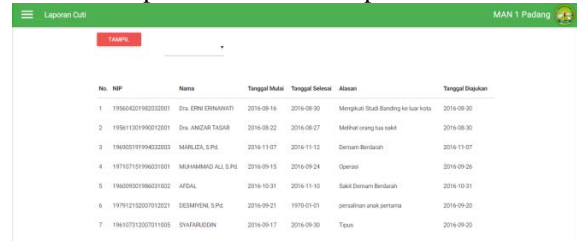
Figure 18. *Display of Employee Leave Report Page*

f. Account Menu

Account menu page is page that appears when the admin wants to change the password and exit from system. Page display to change the password as follows:
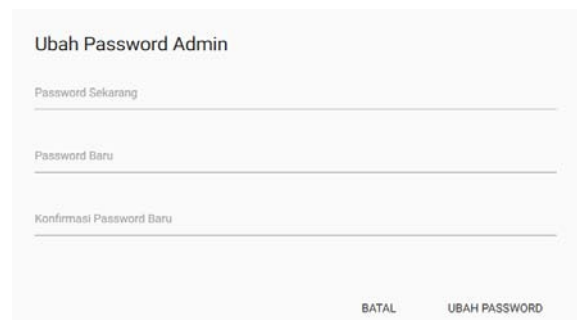
Figure 19. *Display In Change Admin Password*

4. DISCUSSION

The process flow of the system has been designed in accordance with analysis that has been applying primarily in employee administration process in MAN 1 Padang in integrated and systematic through employee information system.

Functionality system has been running smoothly without any technical errors that caused tendency system or process failure to handled user requests and needs. Interaction between users, admin, principal and employees with system running

properly. The main features for data processing employees, number of teaching hour's data, data of educational tasks, retirement data, mutations, leave and reports provided according needs of employee administration MAN 1 Padang in websites form.

User design interface in employee information system developed to friendly for users and responsive web in order to adapt to various platform sizes. The display is also designed to be informative for users and offers a complete information requirement.

According to Leman (1998: 3) information system is "A system made by humans consisting of components within organization to achieve a goal that is presenting information".

5. CONCLUSION

Based on the results of design and discussion, concluded as follows:

a. With implement of computerized systems in manage employee data with databases that created by used *MySQL* can apply quickly so that errors in entering and calculating data relatively can be avoided. Then efficiency of time in progress and completion of a report will be better.

b. The results from made this employee information system can support the smooth implementation and function in field employee administration that effectively and efficient, such as administration in processing employees data, submission of leave, mutation and retirement.

c. Improving services and need in employee information more accurate and relevant.

d. Employee Information Systems has been successfully designed used PHP programming language, Codeigniter Framework, software development code generator or editor used Atom, MySQL / MariaDB as DBMS for database, materialize.css to design and Xampp as servernya

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DECISION SUPPORT SYSTEM (DSS) WITH WP AND MFEP METHODS IN SELECTION OF BEST BABY CLOTHES

Asyahri Hadi Nasyuh[1], Rahmat Sulaiman Naibaho[2], Saniman[3]

[1,2,] Mahasiswa Program Doktor Pascasarjana FT UNP,[3]STMIK Triguna Dharma

Abstract: In providing the best baby clothes, warehouse managers have a problem in determining the best brands of baby clothes that will be marketed to increase their selling power and make profits and make procurement properly so that sales continue to run well. To overcome the existing problems, it is necessary to do research in decision making by using method Weighted Product and Multi-Factor Evaluation Process that can produce decision-based on the criteria of baby clothing brand to be marketed. the results of the implementation concluded that using the Weighted Product method and Multi-Factor Evaluation Process can help the decision making process of choosing the best baby clothing brand to be marketed so as to increase the selling power because using both methods that can produce the same decision so as to provide a better level of confidence in making the best choice of baby clothes.

Keywords: DSS, Weighted Product, and Multi-Factor Evaluation Process

I.   Introduction

The business world is full of competition, the intensity of which is increasing day by day, including in clothing sales business. In this sales venture, anyone who has a strong network system will last longer and win the market competition. Marketing factor is a matter of great concern because marketing is the final process that must be done to provide value and success of a product that we market. At this time the US Group does not yet have a system that can know the best clothing brand in order to increase sales, because consumers generally have knowledge of the materials and clothing brands they are looking for so that it can affect the level of sales. This is to be more careful in making the addition of stock sales of the best brands that have been selected based on the system designed.

II   Literature Review

2.1 Decision Support System (DSS)

Decision Support System is an interactive system that supports decisions in the process of decision making through the alternatives obtained from the data processing, information, and model design. Decision-making is the process of selecting alternative actions to achieve a particular goal or goal. Decision-making is done with a systematic approach to the problem through the process of collecting data into information and coupled with the factors - factors that need to be considered in decision making. The goal is to assist decision-making in choosing various decision alternatives that are the result of information processing obtained by using decision-making model.

DSS is a combination of individual intelligence resources with component skills to improve the quality of decisions. Decision support systems are also computer-based information systems for decision-making management that address semi-structural problems. Decision support systems are not a decision-making tool, but rather a system that helps decision makers by equipping them with information from data that has been processed with relevance and is needed to make decisions about a problem more quickly and accurately. So this system is not meant to replace decision making in the decision-making process. decision making is a process of selecting the best alternative from several alternatives systematically to be followed up as a way of decision making. Here is a decision-making process, namely

1. Search (Intelligence)
   This stage is the process of searching and approaching from the scope of problematics and the introduction of problems. The input data is obtained, processed and tested in order to identify the problem.
2. Design (Design)
   This stage is a process of finding, developing and analyzing alternatives that can be done. This stage includes the process of analyzing the problem, lowering the solution and testing the feasibility of the solution.
3. Election (choice)
   A selection process is made between possible action alternatives. The election results are then implemented in the decision-making process.
4. Implementation (implementation)
   This stage actually includes the third stage, but some argue that this stage needs to be viewed as a separate section to describe the relationship between phases more broadly.

2.1 Weight Product (WP) Method

The Weight Product (WP) method is one of the simplest methods with multiplication to attribute rating, where each attribute rating must be raised by the attribute weights. This is called normalization. Weight Product completion steps are as follows:

1. Determine the criteria in advance which will be used as a benchmark in decision making.
2. Normalize each alternative value with weight improvement Σ Wj = 1 is by the formula:
   $$W_j = \frac{W}{\Sigma W}$$
3. Calculating the value of the preference weight of each alternative with the variable W is a positive rank for attribute profits and a negative value for the cost attribute. Preferences for Si alternatives are given as follows:
   $$S_i = \prod_{j=1}^{n} x_{ij}^{wj}$$

   Where :
   Si = value of each alternative
   n = number of criteria
   x_{ij} = the value of each row and column
   wj = attribute value owned by each criterion
   Π = product
4. Perform ranking obtained from the largest value selected as the best alternative. With the formula:
   $$V_i = \frac{si}{\prod_{j=1}^{n}(X_j^*)wj}$$

Where :
V: Alternative preferences are analogous to vector V
X: Criteria Value
W: Weight criteria
i: Alternative
j: Criteria
n: Number of criteria

2.2 Multi-Factor Evaluation Process (MFEP)

The best alternative selection process using weighting system, where the method is a quantitative method, referred to as the method of MFEP. In multi-factor decision making, decision makers subjectively and intuitively weigh various factors that have an important influence on their choice of alternatives. For strategically influential decisions, it is more advisable using a quantitative approach such as the Multi-Factor Evaluation Process (MFEP). In a Multi-Factor Evaluation Process (MFEP), first, all criteria that are important factors in making consideration are given the appropriate weighting. The same steps are also taken against the alternatives to be selected,

which are can then be evaluated in relation to those factors of consideration.

For example, the Multi-Factor Evaluation Process (MFEP) will be used in selecting a computer. In the implementation of Multi-Factor Evaluation Process (MFEP), the first thing to do is to determine the factors that are considered important in the selection of the required computer. In this example, it is determined that these factors are hardware, software and vendor support.

III. Discussion And Result

3.1 Design and Analysis

Problems that arise at the time of the addition of clothing stocks that were done was still not able to approach the right target because of the many brands that are provided while not about the consumer market, resulting in the remaining number of other brands that are not sold out. System analysts systematically assess how the system functions by observing the process of input and data processing and information output process to help improve operational processes. System analysis is a process for collecting and interpreting existing realities, diagnosing problems and using both to improve the system. Systems analysts are also people who have the ability to analyze a system, choose alternative troubleshooting and solve problems using a computer.

3.2 System Algorithm

The system algorithm can be defined as the decomposition of a complete information system into its component parts in order to identify and evaluate the problems, opportunities, constraints and expected needs so that proposals can be proposed. The determination of the best clothing brand affects the increase of market interest. With the design of this system is expected to know what brands are most interested in consumers so as to increase sales. The method used is WP and MFEP which is the field of decision support science in the determination of the best clothing brand. To obtain the result / output we need several stages, firstly determining the selected criteria and the weights, determining the evaluation factor weights, calculating the weight factor using WP and MFEP formula, calculating the weight factor of the whole criteria and making the decision of the number of factors weight was to know the feasibility of becoming the best clothing brand to be selected.

Table 3.1 Weighting Criteria

Criteria	Weight
Price	5
Quality	4
Ingredients	3
Motive	2
Color	1

Table 3.2 Alternate data

Alternate	Price	Quality	Ingredients	Motive	Color	Symbol
Libby	350.000	Sangat Baik	Sangat Lembut	Bordir Sablon	Terang	A
Velvet	300.000	Sangat Baik	Lembut	Print	Terang	B
Chiyo	250.000	Baik	Lembut	Sablon	Terang	C
Moms Gift	200.000	Sedang	Sedang	Polos	Sedang	D
Boboho	150.000	Sedang	Kasar	Corak	Terang	E

At the time of observation the data has been given initial weight in the selection of clothing brand as follows:

Initial Weight or W = 5 4 3 2 1

The formula of weight improvement in the WP method is as follows:

$$Wj = \frac{wj}{\sum wj}$$

Information :

Wj = Weight

$\sum wj$ = sum of all weights

Then the weighting process is done

For price :

$W1 = \frac{5}{5+4+3+2+1} = \frac{5}{15} = 0.33$

For Quality :

$W2 = \frac{4}{5+4+3+2+1} = \frac{4}{15} = 0.27$

For Ingredients:

$W3 = \frac{3}{5+4+3+2+1} = \frac{3}{15} = 0.2$

For Motive :

$W4 = \frac{2}{5+4+3+2+1} = \frac{2}{15} = 0.13$

For Color :

$W5 = \frac{1}{5+4+3+2+1} = \frac{1}{15} = 0.07$

From the weighting process above we get the final weight as follows:

For price: 0.33
For Quality: 0.27
For Ingredients: 0.2
For Motive: 0.13
For Color: 0,07

Table 3.3 WP Criteria Weight Value

No	Criteria	Factor Weight
1.	Price	0.33
2.	Quality	0.27
3.	Ingredients	0.2
4.	Motive	0.13
5.	Color	0.07
	Total	1

1. Factor Evaluation

For Factor Evaluation obtained from the observation of some brands of clothing. For example, there are 5 brands that entered the selection in the selection of Libya, Velvet, Chiyo, Moms Gift, Boboho. As for giving the value of price criteria can be seen based on price assessment table as below:

Table 3.4 Rating Price

No	Price	Value
1.	0 – 100	90 – 99
2.	100 – 200	80 – 89
3.	200 – 300	70 – 79
4.	300 – 400	60 – 69
5.	400 – 500	0 - 59

Table 3.5 Table Rating Quality

No	Quality	Value
1.	Very low	0 - 59
2.	Low	60 - 69
3.	Medium	70 – 79
4.	High	80 – 89
5.	Verry High	90 - 99

Table 3.6 Table Rating Ingredients

No	Ingredients	Value
1.	Very rough	90 – 99
2.	Rude	80 – 89
3.	Medium	70 – 79
4.	Soft	60 – 69
5.	Very soft	0 – 59

Table 3.7 Table Rating Motive

No	Motive	Value
1.	Plain	50 - 59
2.	Shooting	60 - 69
3.	Embroidery	70 – 79
4.	Screen printing	80 – 89
5.	Embroidery Sablon	90 - 99

Table 3.8 Table Color Rating

No	Color	Value
1.	Very opaque	50 - 59
2.	Blur	60 - 69
3.	Medium	70 – 79
4.	Bright	80 – 89
5.	Very bright	90 - 99

These five brands have scored on the selection process that has been done, and for the cost is for the criteria of price and materials, for Neptunian is for the criteria of quality, motive, and wara. The list of the five brands is as follows:

Table 3.9 Assessment of Any alternative

Alternatif	Criteria				
	Price	Quality	Ingredients	Motive	Color
Liby	65	95	65	95	95
Velvet	65	90	65	80	90
Chiyo	75	85	65	80	90
Moms Gift	75	90	80	60	75
Boboho	85	70	80	60	90

Do the stages Normalization of each alternative value (vector value) as follows:

Liby(S1) = $(65^{-0,33}) * (95^{0,27}) * (65^{-0,2}) * (95^{0,13}) * (95^{0,07}) = 0,930$

Velvet(S2) = $(65^{-0,33}) * (90^{0,27}) * (65^{-0,2}) * (80^{0,13}) * (90^{0,07}) = 0,893$

Chiyo(S3) = $(75^{-0,33}) * (85^{0,27}) * (65^{-0,2}) * (80^{0,13}) * (90^{0,07}) = 0,839$

Moms Gift(S4)= $(75^{-0,33}) * (80^{0,27}) * (80^{-0,2}) * (60^{0,13}) * (75^{0,07}) = 0,753$

Boboho (S5) = $(85^{-0,33}) * (70^{0,27}) * (80^{-0,2}) * (60^{0,13}) * (90^{0,07}) = 0,706$

After doing the normalization step then do the calculation of the value of preference weight of each alternative, as follows:

Vi Preference Value for Liby Brand
$$= \frac{0,930}{0,930 + 0,893 + 0,839 + 0,753 + 0,706}$$
$$= \frac{0,930}{4,122} = 0,225$$

Vi Preference Value for Velvet Brand

$$= \frac{0,893}{0,930 + 0,893 + 0,839 + 0,753 + 0,706}$$
$$= \frac{0,893}{4,122} = 0,217$$

Vi Preference Value for Chiyo Brand
$$= \frac{0,839}{0,930 + 0,893 + 0,839 + 0,753 + 0,706}$$
$$= \frac{0,839}{4,122} = 0,203$$

Vi Preference Value Moms Gift Brand

$$= \frac{0,839}{0,930 + 0,893 + 0,839 + 0,753 + 0,706}$$
$$= \frac{0,839}{4,122} = 0,183$$

Vi Preference Value Boboho Brand
$$= \frac{0,706}{0,930 + 0,893 + 0,839 + 0,753 + 0,706}$$
$$= \frac{0,706}{4,122} = 0,171$$

From the results of calculations performed based on the WP method obtained the value of the five brands of clothing as follows,

Table 3.10 Ranking by Preference

No	Alternatif	The value of the preference	Ranking
1.	Liby	0,225	1
2.	Velvet	0,217	2
3.	Chiyo	0,203	3
4.	Moms Gift	0,183	4
5.	Boboho	0,171	5

3.3 Multi-Factor Evaluation Process

Table 3.11 Value Criteria

No	Criteria	Value
1.	Price	5
2.	Quality	4
3.	Ingredients	3
4.	Motive	2
5.	Color	1

In this case, the same data will be used as Table 3.2 At the time of observation the data has been given initial weight in the selection of clothing brand as follows:

Initial Weight or W = 5 4 3 2 1

The formula of weight improvement in the WP method is as follows:

$$Wj = \frac{wj}{\sum wj}$$

Information :

Wj = Weight

$\sum wj$ = sum of all weights

Then the weighting process is done

For price :

$W1 = \frac{5}{5+4+3+2+1} = \frac{5}{15} = 0.33$

For Quality :

$W2 = \frac{4}{5 + 4 + 3 + 2 + 1} = \frac{4}{15} = 0.27$

For Ingredients :

$W3 = \frac{3}{5 + 4 + 3 + 2 + 1} = \frac{3}{15} = 0.2$

For Motive :

$$W4 = \frac{2}{5+4+3+2+1} = \frac{2}{15} = 0.13$$

For Color :

$$W5 = \frac{1}{5+4+3+2+1} = \frac{1}{15} = 0.07$$

From the weighting process above we get the final weight as follows:
For Price: 0.33
For Kulitas: 0.27
For Material: 0.2
For Motives: 0.13
For Color: 0.07

After the final weight is obtained, then the next step is to do the calculation by MFEP method as follows:
1. Determining the Weight Criteria (Factor Weight).
Factor Weight is obtained based on initial weight.

Table 3.12 Weight Factor

Factor	Weight
Price	0.33
Quality	0.27
Ingredients	0.2
Motive	0.13
Color	0.07
Total	1

1. *Factor Evaluation*
For Factor Evaluation obtained from the observation of some brands of clothing. For example, there are 5 brands that entered the selection in the selection of Liby, Velvet, Chiyu, Moms Gift, Boboho. The five brands have scored in the selection process that has been done. The list of the five brands is as follows:

Table 3.13 Alternate Data

Alternatif	Criteria				
	Price	Quality	Ingredients	Motive	Color
Liby	65	95	65	95	95
Velvet	65	90	65	80	90
Chiyo	75	85	65	80	90
Moms Gift	75	90	80	60	75
Boboho	85	70	80	60	90

2. *Weighted Evaluation*
Perform multiplication calculation between weight (criterion value which has been determined during observation and has done weighting with WP method) with a value of weight evaluation (value of evaluation result of a brand of clothes). The calculation of Weight Evaluation can be written by the formula:

Weight Evaluation = Factor Weight . Factor Evaluation

The calculation of weight evaluation will be done on each brand that has received value based on predetermined criteria, the weight evaluation calculation will be described as follows:

Table 3.14 *Weight Evaluation* Liby

Factor	Weight Factor	Evaluation Factor	Weight Evaluation
Price	0,33	65	21,45
Quality	0,27	95	25,65
Ingredients	0,2	65	13
Motive	0,13	95	12,35
Color	0,07	95	6,65
Total			79,1

Table 3.15 *Weight Evaluation* Velvet

Factor	Weight Factor	Evaluation Factor	Weight Evaluation
Price	0,33	65	21,45
Quality	0,27	90	24,3
Ingredients	0,2	65	13
Motive	0,13	80	10,4
Color	0,07	90	6,3
Total			75,45

Table 3.16 *Weight Evaluation* Chiyo

Factor	Weight Factor	Evaluation Factor	Weight Evaluation
Price	0,33	75	24,75
Quality	0,27	85	22,95
Ingredients	0,2	65	13
Motive	0,13	80	10,4
Color	0,07	90	6,3
Total			77,4

Table 3.17 *Weight Evaluation* MomsGift

Factor	Weight Factor	Evaluation Factor	Weight Evaluation
Price	0,33	75	24,75
Quality	0,27	90	24,3
Ingredients	0,2	80	16
Motive	0,13	60	7,8
Color	0,07	75	5,25
Total			78,1

Table 3.18 W*eight Evaluation* Boboho

Factor	Weight Factor	Evaluation Factor	Weight Evaluation
Price	0,33	**85**	28,05
Quality	0,27	**70**	18,9
Ingredients	0,2	80	16
Motive	0,13	**90**	11,7
Color	0,07	**60**	4,2
Total			78,85

From the results of calculations performed on the basis of the MFEP method obtained the value of the five brands of clothing as follows,

Table 3.21 Ranking Based on the Total Weight of Evaluation

No	Alternatif	Total Weight Evaluation	Ranking
1.	Liby	79,1	1
2.	Velvet	75,45	2
3.	Chiyo	77,4	5
4.	Moms Gift	78,1	3
5.	Boboho	78,85	2

From the calculation of WP and MFEP methods obtained calculations with different results. In the WP method, the selected clothing brand is Libby with a value of 0.2257 and the calculation of the MFEP method The selected clothing brand is Libby with a value of 79.1. With the same data obtained the results of calculations WP and MFEP methods that produce the same decision but with different numbers.

3.4 Modeling with Flowchart System

Flowchart system is a flowchart that describes a computer equipment system used in data processing and the relationship between the equipment.
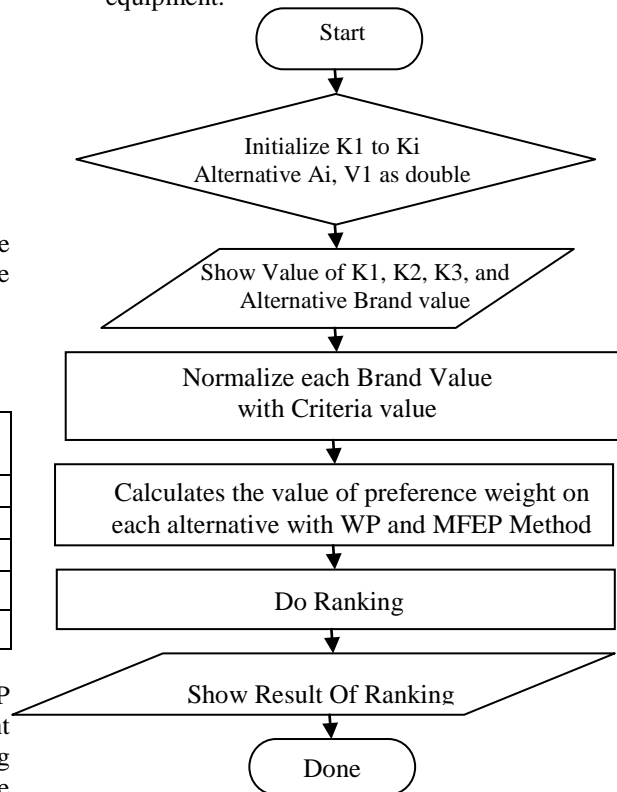
Picture 3.1 Flowchart Methods Of WP and MFEP

From the results of the above calculation, it is known that the value of the result for Liby = 0.2257 on the calculation of WP and Liby method = 79.1 on the MFEP method, thus Liby has the highest value equal to the result of the alternative manual chosen as the best outfit of the calculation with WP method and calculation by MFEP method. Thus the results of the comparison analysis of both methods show similar results in determining the best clothing selection.

4 CONCLUSION

The conclusion of the Thesis entitled Decision Support System Comparative Analysis of Weighted Method Products and Methods Multifactor Evaluation Process In Selection Brand Best Clothing

1. Decision Support System is made by analyzing system needs Comparison Analysis of Weighted Product Method and Multifactor Evaluation Process Method In Selection of Best Clothing Brand.
2. Weighted Method Products and Methods Multifactor Evaluation Process can be implemented in assisting decision making to determine Best Clothing Brand

3. The system assists managers in providing clothing brand recommendations according to the criteria to get the best brand.

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IMPROVING LEARNING MOTIVATION THROUGH IMPLEMENTATION PROBLEM SOLVING LEARNING STRATEGY

Budi Syahri[1*], Primawati[2], Syahrial[3]

[1,2] Fakultas Teknik, Universitas Negeri Padang, Padang, Indonesia.
[3] Fakultas Ilmu Sosial Budaya, Universitas Bung Hatta, Padang, Indonesia
*Corresponding author: budisyahri.90@gmail.com

ABSTRACT: The problem of research is the low motivation to learn the students to lesson the auxliary driving machine has not run as expected. The purpose of research on the implementation of problem solving learning strategies in SMK N 10 Padang. This type of research is a classroom action research model using strategy. The research subjects of class X TKN amounted to 23 students. The research instrument is a questionnaire. Data were analyzed by using T-Test. Guidelines for decision making in this study if significance > 0.05 then H_0 accepted and vice versa if significance < 0.05 then H_0 rejected and H_a accepted That is a difference between learning motivation cycle 1 with cycle 2 and the application of problem-solving learning strategies managed to improve student learning motivation from cycle 1 to cycle 2. Data processed by using SPSS 17 program. The results obtained significance $0.00 < 0.05$ which means H_0 rejected and H_a accepted, be the difference motivation learning cycle 1 with cycle 2 and implementation of learning strategy problem solving successfully increase student learning motivation from cycle 1 to cycle 2.

Keywords: Learning Motivation, Problem Solving, Solso

1. INTRODUCTION

The process of teaching that occurs in the classroom is very decisive results that will be achieved by students in a learning. Many factors influence the learning process. One important factor is the motivation of students to follow the learning process.

This is because the motivation to learn is an internal and external encouragement that is in students who are learning to make changes in behavior. In principle, motivation gives reinforcement, encouragement, direction to the actors who are closely related to the principles in learning that have been encountered by learning sciences experts. With the motivation from within the students make the rise of desire and desire of students to succeed, hope and future ideals, encouragement and needs in learning to change towards the better.

While observing Problems that often arise in class X TKN SMK N 10 Padang is in the students there is no impulse desire in learning, motivation in self is felt less, when the teacher explain the lesson students tend to do activities that are not related to the lesson, disturbing friends, speaking in class. So the willingness to learn does not exist. Observations seen in the learning process of teachers are still using conventional teaching methods in teaching, lecture methods used are considered less effective in the learning process of auxiliary engine. This method causes the motivation in students is very less. This will be the cause of low student learning

outcomes so that it takes a method or learning strategy that can generate student learning motivation of class X TKN SMK N 10 Padang especially on the subject of ship propulsion engine. Increased student motivation can be started from the activities undertaken by students while learning so that students will experience activities that cause students are happy in learning. from the activities of the students we can apply a learning strategy that can encourage student motivation, one of them is using problem solving learning strategy. The problem solving learning strategy is supposed to be able to develop and improve the students 'motivation, activity and understanding in learning, to run the students' reason and to think in learning to a lesson concept. Problem solving is one way that can create a student-centered learning process. Students can develop reason, skills, creativity in solving problems experienced by students. In the implementation of problem solving learning strategies students must think, identify problems, gather facts and theories that support and develop a deep understanding of the problems faced by students [4] problem solving is a learning process that emphasizes more active, more inductively oriented engagement than deductive and discovery by the students themselves.

In the learning process students are required to analyze a condition or problem faced in the field of engineering, ship machining activities are very demanding a solution to the constraints or problems faced ship propulsion engine. It requires students to think scientifically so that the problem is solved. [2]

"Learning activities need to prioritize problem solving because by dealing with problems learners will be encouraged to use the mind creatively and work intensively to solve the problems faced in life".

In this study the researcher will use the problem solving learning strategy which is enclosed by solso which has the following steps [3]:
1. Identification of Problems
2. Representation / Presentation of Problems
3. Planning Solutions
4. Implementing Planning
5. Assess Planning
6. Assess the results of the solution

The characteristics of the problem-solving strategy are as follows: learning begins with a problem, the problems given must relate to the real world of the students, organize learning around the problem, not around the discipline of science, give great responsibility in forming and running directly their own learning process , using small groups and demanding students to demonstrate what they have learned in terms of products and performance. By using problem solving learning strategy (Problem Solving) is expected to increase student motivation.

Motivation is perceived as a boost that can help the learning process. The word motivation comes from the word "motiv" which can be interpreted as the strength contained within the individual, which causes the individual to act and do. Motives can not be observed directly, but can be interpreted in his behavior, in the form of stimulation, encouragement or generating the emergence of a certain behavior. Motive is the driving force from within and within the subject to perform certain activities in order to achieve the goal. Even the motive can be interpreted as an internal condition (preparedness).

Motivation is all the power that drives a person to do something. With a self-motive someone will be compelled to act on something. The power that drives a person to do so because of a strong desire that affects him. [6] "motivation is as a driving force that transforms energy within a person into a form of real activity to achieve a particular goal".
[1] Some indicators of learning motivation are as follows:
1) The desire and desire succeed in students in learning so that students try in learning in order to obtain good learning outcomes.
2) There is encouragement and need in learning as the spirit of the parents and make learning a need for the students themselves.
3) There is hope and aspiration of the future of the students. With these ideals can motivate students to learn well.
4) The existence of awards in learning when students are successful which is a plus for students so that students' motivation in learning to stay awake.
5) The existence of interesting activities in learning. With interesting activities, this is an encouragement for students to enter in these learning activities.
6) The existence of a conducive learning environment, allowing a student to learn well and not interfere with the motivation to learn that has been owned by students. The environment can also to foster student motivation so that with a good atmosphere will grow student motivation in learning.

It can be concluded that motivation is an impulse to the students to get their desires and desires to succeed in reaching their hopes and aspirations for the future.

2. METHOD

The type of research to be conducted is classroom action research (PTK) or Classroom Action Research, each cycle consisting of planning, action, observation and reflection. Classroom action research is intended to improve or improve the quality of learning. This research will investigate about learning activities by using problem solving learning strategy.

Location of learning process in this research that is at SMK N 10 Padang. The classroom action research time is carried out in even semester 2013-2014. Research subjects in this class action research is the students of class X TKN which amounted to 23 people who are all male.

The research instrument is used to measure the value of variables to be studied. The instrument used in this study is a questionnaire to motivate learning auxiliary driving machine.

Instrument testing is conducted to find out and select valid and reliable items. With this trial will be obtained the instrument of validity (validity) and reliability (reliability) so it is feasible to be a measuring tool in data collection. The results of the study using T-Test. Guidelines for decision making in this study if significance > 0.05 then H_0 accepted and vice versa if significance <0.05 then H_0 rejected and H_a accepted that there is an increase in learning motivation between cycle 1 to cycle 2 and the application of problem solving learning strategies managed to improve motivation to learn students from cycle 1 to cycle 2. Data is processed using SPSS 17 program.

3. RESEARCH RESULTS AND DISCUSSION

Based on the results of research, student motivation in cycle 1 can be defined:

Table 1. Description of Data Motivation Cycle 1

N	Valid	23
	Missing	0
Mean		118.61
Median		118.00
Mode		112[a]
Std. Deviation		10.470
Variance		109.613
Range		44
Minimum		94
Maximum		138
Sum		2728

Based on the description of motivation data cycle 1 obtained the result that the student's motivation in cycle 1 has an average of 118.61. Median of 118, Mode sebsar 112, Standard deviation of 10.470. Variance of 109.61 with a range of 44 mainimum values of 94 and maximum value of 138, the number of data cycle 1 of 2728. While for the description of data cycle 2 is:

Table 2. Description of Data Motivation Cycle 2

N	Valid	23
	Missing	0
Mean		134.70
Median		136.00
Mode		139
Std. Deviation		12.477
Variance		155.676
Range		51
Minimum		108
Maximum		159
Sum		3098

Based on the description of the data motivation cycle 2 obtained the result that the student's motivation on cycle 2 has an average of 134.70. Median of 136, Mode of 139, Standard deviation of 12.477. The variance of 155.67 with a range of 51 mainimum values of 108 and maximum value of 159, the sum of data cycle 2 of 3098.

The description of the histogram of learning motivation variable then first find the number of interval class by using the following formula:

Many Classes (K) $= 1+3,3 \log N$
$= 1+3,3 \log 23$
$= 5.49$
$= 6$ kelas

$\text{Interval} = \dfrac{\text{the highest value} - \text{the lowest value}}{\text{Many Classes}}$

$= \dfrac{138-94}{5,49} = 8,01 = 8$

With the help of SPSS 17 the frequency of each interval class is then tabulated to Table 3 below:

Table 3. Frequency Distribution of Cycle Learning Motivation 1

Motivation Value Learning	Frequency	Presentation (%)
94-101	2	8,69
102-109	1	4,34
110-117	7	30,43
118-125	8	34,78
126-133	2	8,69
134-141	3	13,07
Total	23	100
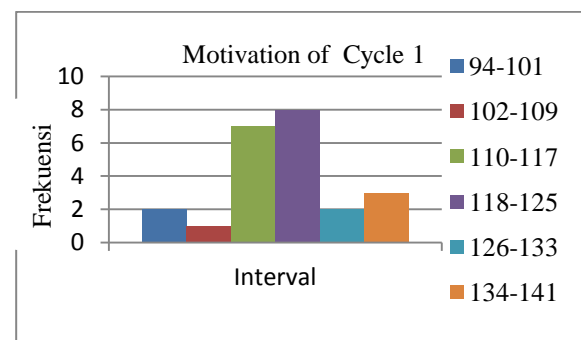
Figure 1. Histogram Frequency Distribution Cycle Motivation 1

Based on the frequency distribution of learning cycle motivation 1 students in cycle 1 can be made by dividing categories to five groups, ie groups are very good, good, moderate, not good, not good.

Very Good Category: (Mi + 1.5 Sdi)
Good Category: (Mi + 0,5 Sdi) s / d (Mi + 1,5 Sdi)
Medium Category: (Mi-0,5 Sdi) s / d (Mi + 0,5 Sdi)
Less Good Category: (Mi-1.5 Sdi) s / d (Mi-0,5 Sdi)
Not good category: ≤ (Mi-1,5 Sdi)

To calculate ideal Mean and ideal deviation standard using formula:

Mi = 1/2 (Ideal lowest value + Highest Ideal Value)
= ½ (33+165)
= 99

Sdi = 1/6 (The highest ideal value - the lowest Ideal Value)
=1/6 (165-33)
=22

The classification of the data can be seen in Table 4 below:

Table 4. Classification of Data Motivation Cycle 1

Category	Span	Total of Respondents	Percentage (%)
Very good	≥ 132	3	13,04
Good	110 – 132	17	73,92
Medium	88-110	3	13,04
Poor	66-88	0	0
Not good	≤ 66	0	0
Total		23	100

Based on the calculation, the grouping of motivation variables obtained as much as 3 respondents with very good category, 17 respondents with good category, 3 respondents with medium category. From these data indicate that student motivation is in good category.

The description of the histogram of learning motivation variable then first find the number of interval class by using the following formula:

Many Classes (K) = 1+3,3 Log N
= 1+3,3 log 23
= 5.49
= 6 kelas

$$Interval = \frac{the\ highest\ value - the\ lowest\ value}{Many\ Classes}$$

$$= \frac{159-108}{5,49} = 9,28 = 9$$

With the help of SPSS 17 the frequency of each interval class is then tabulated to Table 5 below:

Table 5. Frequency Distribution of Cycle Learning Motivation 2

Motivation Value Learning	Frequency	Presentation (%)
108-116	1	4,34
117-125	6	26,05
126-134	3	13,07
135-143	8	34,78
144-152	3	13,07
153-161	2	8,69
Total	23	100
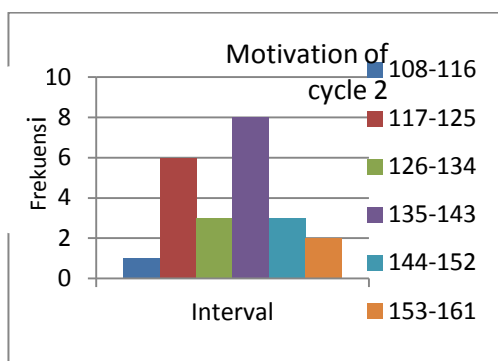
Figure 2. Histogram Frequency Distribution Cycle Motivation 2

Based on the frequency distribution of students' learning motivation 2 cycles in cycle 2 can be made by dividing the category to five groups, very good, good, medium, poor and not good.
Very Good Category: (Mi + 1.5 Sdi)
Good Category: (Mi + 0,5 Sdi) s / d (Mi + 1,5 Sdi)
Medium Category: (Mi-0,5 Sdi) s / d (Mi + 0,5 Sdi)
Less Good Category: (Mi-1.5 Sdi) s / d (Mi-0,5 Sdi)
Not good category: ≤ (Mi-1,5 Sdi)
To calculate ideal Mean and ideal deviation standard using formula:
Mi = 1/2 (Ideal lowest value + Highest Ideal Value)
= ½ (33+165)
= 99
Sdi = 1/6 (The highest ideal value - the lowest Ideal Value)
=1/6 (165-33)
=22
The classification of these data can be seen in Table 6 below:

Table 6. Classification of Cycle Motivation Data 2

Category	Span	Total of Respondents	Percentage (%)
Very good	≥ 132	13	56,52
Good	110 – 132	9	39,13
Medium	88-110	1	4,35
Poor	66-88	0	0
Not good	≤ 66	0	0
Total		23	100

Based on the calculation, then the grouping of motivation variables obtained as many as 13 respondents with very good category, 9 respondents with good category, 1 respondent with medium category. From the data shows that student's motivation in cycle 2 is in very good category. To see an increase in student learning motivation from cycle 1 to cycle 2 can also be used t test.

To see an increase in student learning motivation from cycle 1 to cycle 2 can also be used t test. before the t test done the researcher has done the normality and homogeneity test to the data of learning result in can the data of learning result of normal and homogeneous distribution. This t test serves to see the improvement of students' learning motivation from cycle 1 to cycle 2.

Tabel 7. T Test Motivation Learning
(Paired Samples Tes)

		T	Df	Sig. (2-tailed)
Pair 1	Cycle 1 - Cycle 2	-6.861	22	.000

The decision guide in this study if significance <0.05 then H_0 is rejected and vice versa if significance> 0.05 then H_0 is accepted. Based on Table 4.9 obtained significance value 0.00 <0.05 which means H_0 rejected and H_a accepted, that there is a difference in learning motivation cycle 1 with cycle 2 and the implementation of problem solving learning strategies managed to improve student learning motivation from cycle 1 to cycle 2.

The findings of the data in accordance with the author's observation during the learning implementation. This indicates that students who are taught with problem solving learning strategies make students happy and motivated in the learning process. Learning with students who have motivation in learning will be easier in understanding each subject matter given compared with students who are not motivated in learning. As is well known, learning motivation is "the overall driving force within the student that leads to learning, which ensures the continuity of learning" [5]. The statement shows that motivation is very instrumental in the learning process, a student must have a push and move himself to do the learning process.

4. CONCLUSION

Problem solving learning strategy can improve students' learning motivation. This can be seen from the increase in student motivation that occurs from cycle 1 to cycle 2. Problem Solving Learning Strategy can be used to improve student learning class X TKN SMK N 10 Padang on learning Driving Machine.

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THE MODELING OF MASSIVE LIMESTONE USING INDICATOR KRIGING METHOD
(CASE STUDIES OF MASSIVE LIMESTONE IN PT SINAR ASIA FORTUNA)

Dedi Yulhendra[1], Yoszi Mingsi Anaperta[2]

[1]Mining Engineering Department, Faculty of Engineering, State University of Padang, Padang 25171, Indonesia
[2]Mining Engineering Department, Faculty of Engineering, State University of Padang, Padang 25171, Indonesia

ABSTRACT: In the context of mining, the estimation is an attempt to estimate the value of block or point that expected to approach the true value. An accurate geological modeling will greatly assist in mining minerals that expected production in accordance with the company's production targets. Therefore, the research was conducted at PT Sinar Asia Fortuna to determine the geological model and resources. The geological modeling and resource's estimation of massive limestone was done using Indicator Kriging Method. The geological modeling of massive limestone was carried out by using SGeMS version 2.0 and Datamine Studio 3, while the limestone's resource was estimated by using Datamine Studio 3. This study categorizes the limestone to be 3 types, i.e. massive limestone, vuggy limestone and chalk. The estimation of percentage by using Indicator Kriging Method obtained the distribution of limestone massive proportion of 75%, 23% vuggy limestone and 2% chalk. The resource calculation respectively obtains 130.889.422 tons of massive limestone, 40.139.422 tons of vuggy limestone, and 3.490.384 tons of chalk. Total tonnage for the indicator kriging = 174 519 228 tons

Keywords: Limestone, Indicator Kriging Method, Resource, Geological Modeling

1. INTRODUCTION

Modeling is an early stage before the appraisal levels which could subsequently be calculated resource or reserve. A resource estimation should reflect accurately the geological conditions and the character/nature of the mineralization, and in accordance with the purposes of evaluation. This research was conducted at PT. Sinar Asia Fortuna where it is located in Desa Tahunan, Kecamatan Sale, Kabupaten Rembang, and it is located geographically at 06°51'50 " - 06°53'00 " LS and 111°30'55 " - 111°32'00 " BT. PT Sinar Asia Fortuna location can be seen in Figure 1 below:

Figure 1. Location of research area

To increase mining activities in the future, PT. Sinar Fortuna should make a modeling as an early stage before the cost of assessing the next level can be done. A resource estimate should be accurate and precise**.** The Modeling parameter consists of limestone rock type i.e. limestone massive, vuggy limestone and chalk. A method of estimation and interpolation is required to determine the geologic modeling and the distribution of quality limestone with a limited amount of data. In this method, an analysis is performed including the variogram indicator analysis that is used in the method of Indicator Kriging. Indicator Kriging is a method used for binary variables reflecting probabalistic models for an area that do not have a sample. Therefore, the aim of this study is to establish the geological domain model of limestone deposit with Indicator Kriging method.

2. METHODOLOGY

In conducting this research, several stages are compiled that began by the study of literature with collecting various reference regarding the genesis of limestone deposit, and studied the reports of research that has been done previously to determine the area of research in general. The secondary data were obtained as follows: drill log data, drill point of

distribution maps, topographic maps of research areas. The next stage is data processing. From the secondary data that have been collected, then a recapitulation of borehole data was done as a database that will be used for further data processing, where the processing of the initial data using conventional statistical methods. While, it was also calculated as the variogram indicator studies, determination of estimation's parameter, estimation by method of indicator kriging. Then, it's proceed with the limestones deposition modeling. The processing of the database is using the SGeMS Program (Stanford Geostatistical Earth Modeling Software) version 2.0, and deposition modeling is using Datamine Studio 3 which will generate an estimation on a block model that has been determined. The final stage is to analyze both qualitatively and quantitatively. The qualitative analysis was conducted based on the model of limestone deposit that created from secondary data. While, the quantitative analysis was conducted by statistical analysis, variogram study, and the parameters are determined in the process of estimation results with the method of Indicator Kriging in the research area.

3. ANALYSIS AND DISCUSSION

The drilling data was used from the results of drilling in PT Sinar Asia Fortuna for amount 31 Boreholes with various depth from each other. The drilling spaced is 100 m and an average depth of drilling is 70 m . PT Sinar Asia topographic map of Fortuna can be seen in Figure 2 below:
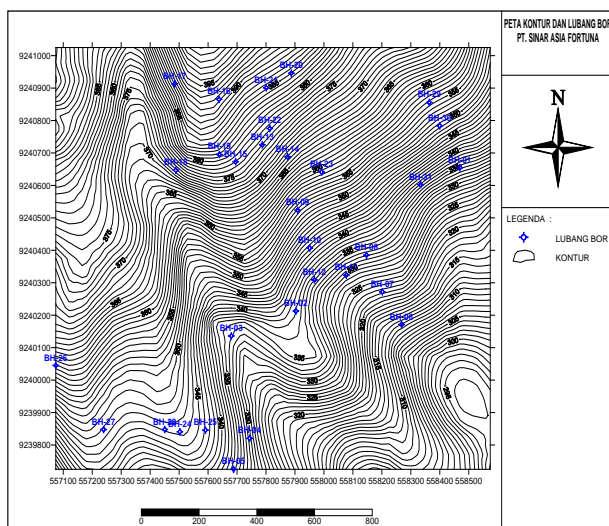
Figure 2. Topography and drill hole location map

3.1 The Experimental Variogram and a Variogram Fiting.

Variogram can be used to analyze the level of similarity or variability between each data. To determine the appropriate variogram, an experimental variogram indicator should be made. The process of making the experimental variogram indicator is done by SGeMS program, which done first with election of variogram constituent's parameters. Selection of this parameter is done by taking into account the pattern of data and samples used. Selection of good parameters will produce a good experimental variogram indicator to facilitate the process of fitting variogram in producing variogram model.

The process of making the experimental variogram indicator is done by SGeMS program, which done first with election of variogram constituent's parameters.

Table 1. Experimental Variogram Indicator Parameters for Each Rock Type

Rock Type	Azimuth	Dip	Angle Tolerance	Bandwith
Limestones	0	0	90	10000
	0	90	90	10000

While the search area of data on SGeMs program version 2.0 is expressed by the angle tolerance and bandwidth . Another parameter to consider in making the experimental variogram indicator is the distance between samples (lag) and lag tolerance. This process used a lag distance = 100 m, lag tolerance = 50 m towards the limestones to all directions (omnidirectional), and lag distance = 5 m, and 2.5 m lag tolerance for the vertical direction, where the objective is to get a pair of data and the variogram with spaced drilling. Number of lag was depent on the distribution and amount of available data.

Theoretical variogram models that is used for fittings on each rock type is a spherical models. Theoretical variogram models that is used for fittings on each rock type is a spherical models.
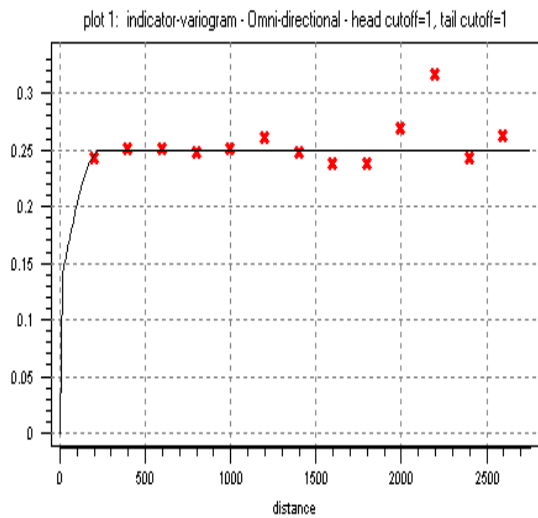
Figure 3. The variogram model of omnidirectional 3d horizontal for masive
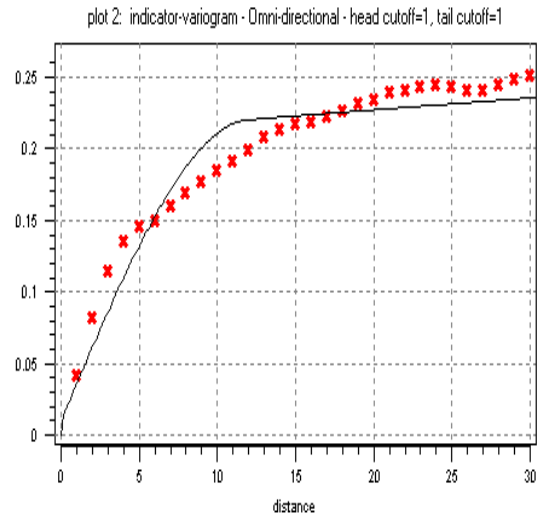
Figure 6. The variogram of vertical 3d omnidirectional for masive
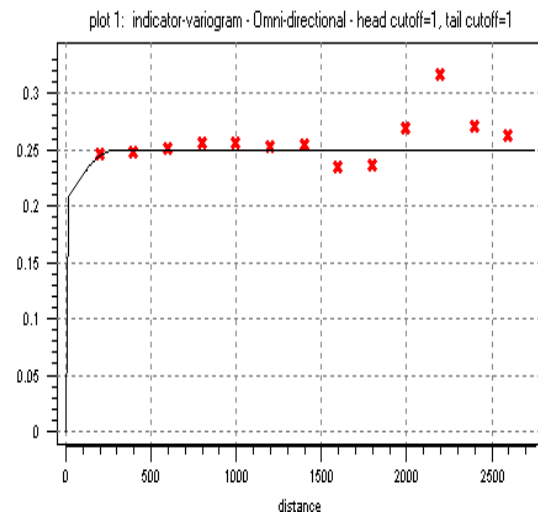
Figure 4. The variogram model of omnidirectional 3d horizontal for vuggy
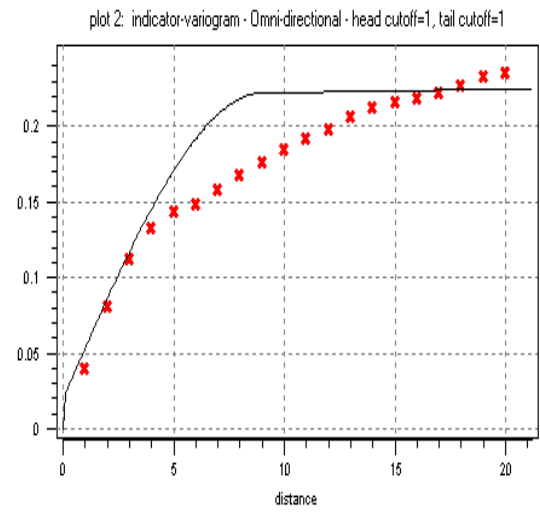
Figure 7. The variogram of vertical 3d omnidirectional for vuggy
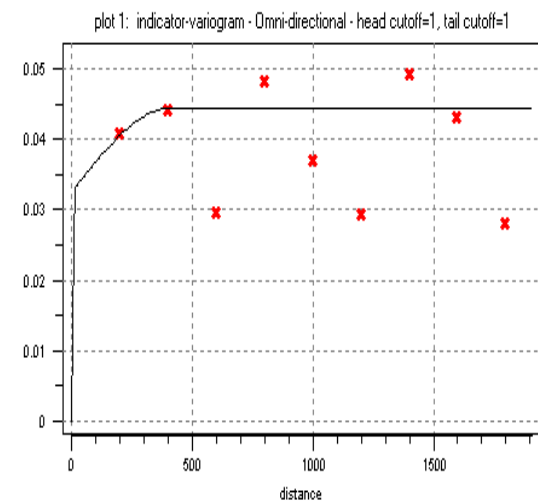
Figure 5. The variogram model of omnidirectional 3d horizontal for chalk
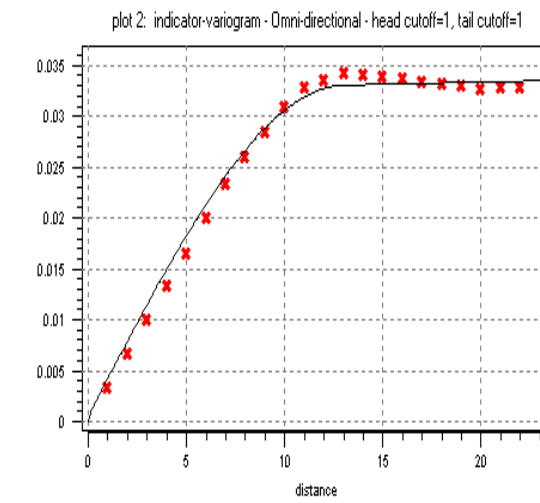
Figure 8. The variogram of vertical 3d Omnidirectional for chalk

Table 2. Value of variogram parameters for each category

Category	Struktur	Variogram type	Nugget effect	Sill	Range
Masive	Horizontal	Spherical	0.22	0.05	250
	Vertical	Spherical	0.02	0.2	12
Vuggy	Horizontal	Spherical	0.2	0.03	230
	Vertical	Spherical	0.02	0.2	9
Chalk	Horizontal	Spherical	0.035	0.01	150
	Vertical	Spherical	0.0005	0.032	13

3.2 The Geologic Modeling of Indicator Kriging Estimation Results

The Estimation Results was using an Indicator Kriging method, and then made a block model with a block size of 50 x 50 x 1 m . The modeling was made by using three rock types that there are massive limestones (blue) , vuggy limestone (light blue) and chalk (yellow).
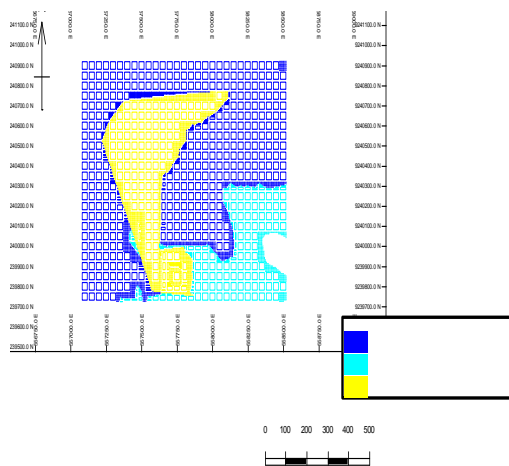
Figure 9. Plan view of model block with 300 elevation using indicator kriging method
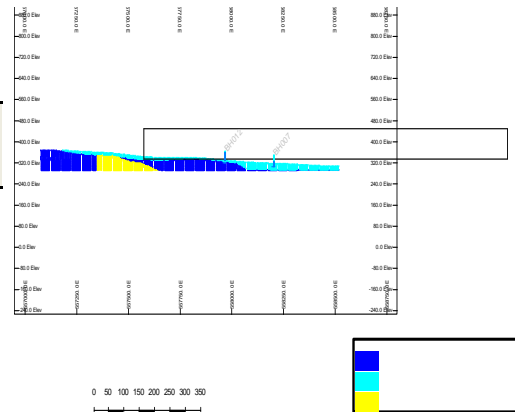
Figure 10. Plan view of model block with cross section 9240268 north indicator kriging method
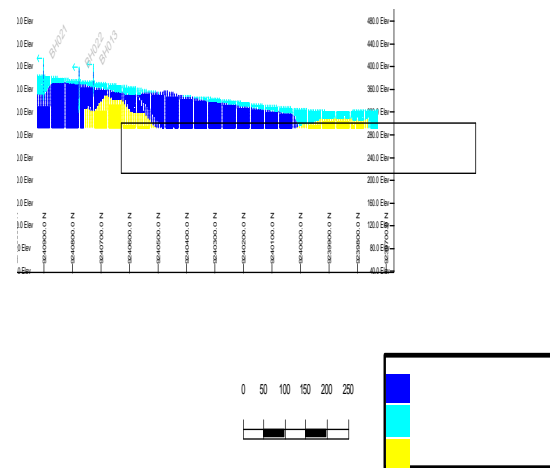
Figure 11. Plan view of model block with cross section 557800 east indicator kriging method

3.3 Manual Correlation

Manual correlation is done by making the cross section horizontally with the west-east and north-south direction. Manual correlation is done by connecting each existing drill hole according to the type of rock. The more drill hole data available to be correlated, the model will be better . Each person will produce a different form in every manual correlation, depending on the amount of data used and the different level of confidence for each person.

massive limestones

vuggy limestone

chalk
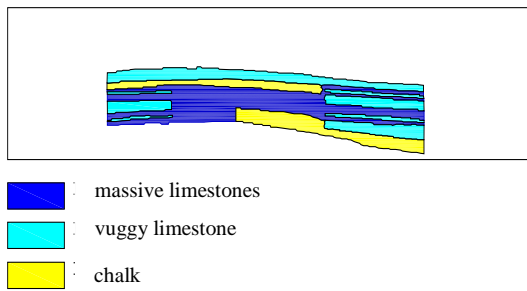
Figure 12. Cross section 557700 east
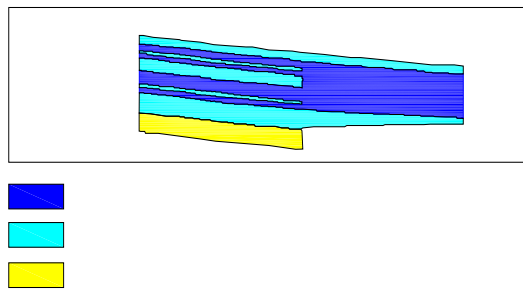
Figure 13. Cross Section 9240268 North

3.4 The Geostatistical Analysis

The geostatistical analysis was done by making the variogram indicator in horizontal and vertical directions . The goal is to determine the continuity of data in three dimensions and to get an approximation parameter which is representative for further data processing i.e. the assessment of the indicator kriging using 3-dimensional blocks. In the horizontal direction is observed four main directions, namely the direction of the N - S, NE - SW, E - W, and SE - NW. In the four main directions is known that there is a difference range in each direction. However, this difference was not significant, so it is assumed that the four directions of the isotropic variogram modeling in the four main directions represented by a single omnidirectional variogram. The variogram model used for the indicators massive limestones, vuggy and chalk are spherical models where data has initial linear behavior. For massive limestones with horizontal direction has nugget effect 0.22 %, while vuggy limestone has 0.2 % and 0.035 % of chalk limestone. It shows a variant of the massive limestone larger than massive limestone and chalk. As for the range of massive limestones has the greatest range of 250 m, 230 m for vuggy and 150 m for chalk. For massive limestones with vertical direction has a nugget effect of 0.02%, 0.02% of vuggy, and 0.0005 % of chalk. The nugget effect of chalk has the smallest value caused of the proportion of chalk rock type smaller

than the other two rock types i.e. massive limestone and vuggy limestone.

3.5 The Data Analysis of Rock Code

The statistical analysis was performed in order to determine the percentage of attendance of each rock code for each data, whether it's from the drill data of initial research, as well as data processed of Indicator Kriging. Statistics are done by finding the percentage of presence of the three groups of rock codes for each data, ie by dividing the total amount of data. Statistics are obtained by generating bar graphs, for each data from the initial drill data and data using the indicator kriging method. The percentage of distribution for each type of rock can be seen in Figure 14 and Percentage of Rock Code can be seen in table 3 below:
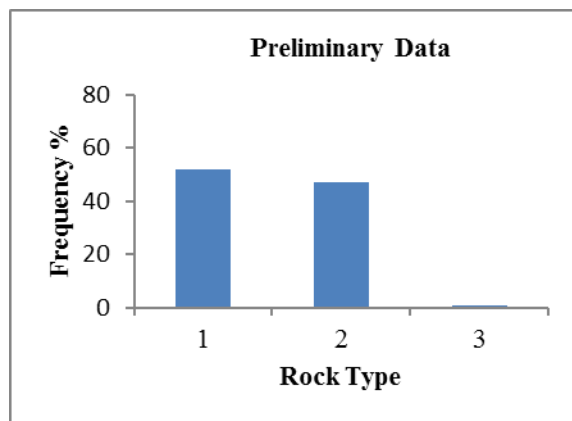
(a)
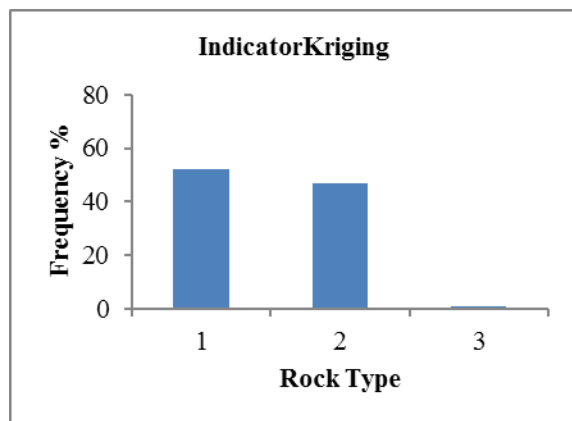
(b)

Figure 14. Histogram Rock Code for (a) Data of Bor Per Meters (b) Indicator kriging and

Table 3. Percentage of rock codes for each estimation result

Rock Code	Indicator Kriging		Initial Data	
	Rock Code	Percentage (%)	Rock Code	Percentage (%)
Massive Limestone	1	75	1	52
Vuggy limestone	2	23	2	47
Chalk	3	2	3	1

On the indicator kriging method, the massive limestones increased in the percentage of 23% and a decrease in the percentage of 24% of vuggy limestone. While, the percentage of chalk is relatively not much different in the amount of 1 %

3.6 Cross Validation

Prior to the calculation of resources, first cross validation to compare the results of the indicator kriging method to proportion of each rock type of Massive Limestone, Vuggy limestone, Chalk. The proportion of each rock type can be seen in figure 15, 16 and 17 below
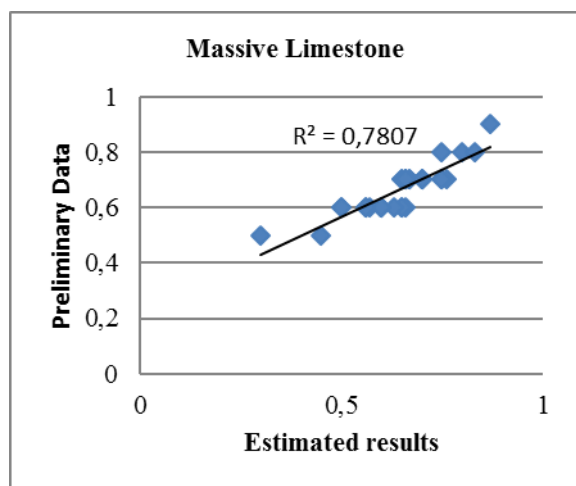
Figure 15. Comparison of proportion of rock type of massive limestone with estimation result of indicator kriging
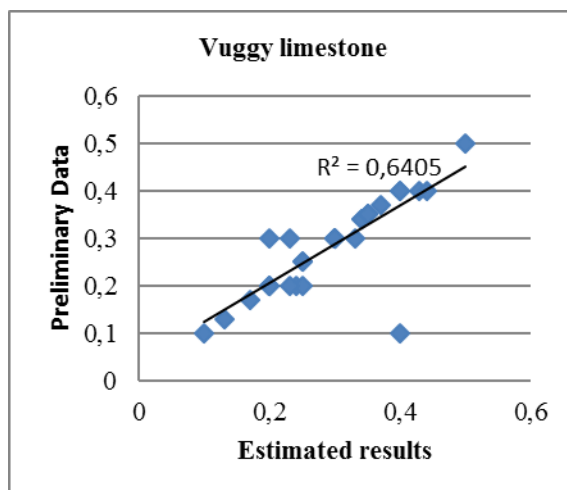
Figure 16. Comparison of proportion of rock type of Vuggy limestone with estimation result of indicator kriging
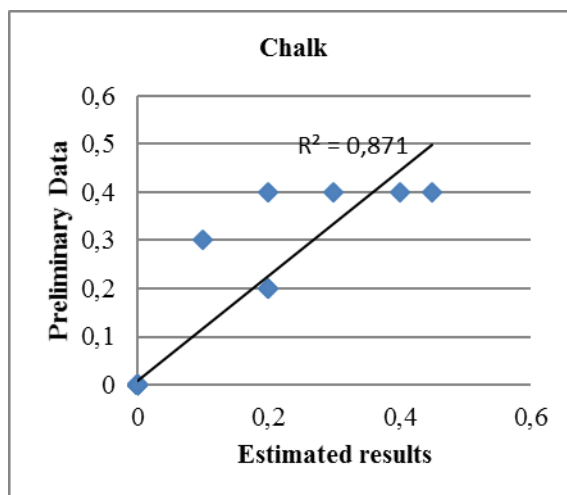
Figure 17. Comparison of proportion of rock type of Chalk with estimation result of indicator kriging

From the result of estimation of indicator kriging obtained the accuracy produced for rock type chalk is higher with value $R^2 = 0,871$. This is because the proportion of chalk attendance on the initial data is less than the two other rock types: massive limestones and vuggy limestones.

3.7 Calculation and Tabulation of Resource Calculation

The resource calculation was done using a grid model. Each grid has size of 50 x 50 x 1 m in accordance with a block of mining models created using Datamine program. Tabulation of each resources can be seen in Table 4 below :

Table 4. The resource tabulation of each rock type

Rock Type	Resource Tabulation Indicator Kriging (tons)
Massive	130.889.422
Vuggy	40.139.422
Chalk	3.490.384

Total tonnage for the indicator kriging = 174 519 228 tons

4. CONCLUSION

The analysis of the percentage of rock code from the estimation results are rock code 1 (massive by 75 %, rock code 2 (vuggy) by 23 %, and rock code 3 (chalk) by 2 %. Indicator kriging methods resulted in massive limestones resources as amount to 130 889 422 tons, 40.139.422 tons of vuggy limestone, and 3.490.422 tons of chalk. Total tonnage for the indicator kriging = 174 519 228 tons

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ELECTRONIC COMPONENT TESTER AS A LEARNING MEDIA FOR CLASS X STUDENTS AUDIO VIDEO ENGINEERING SMKN 1 SUMBAR

Delsina faiza[1], Thamrin[1], Ahmaddul Hadi[1], Yongki Saputra[1]

[1]Engineering Faculty, Universitas Negeri Padang

ABSTRACT: This research aims to produce instructional media in the form of Electronic Component Tester on Electrical and Electronics basic subjects of X class students majoring in Audio Video Engineering. The method used in this research, especially in designing electronic component tester is Research and Development (R & D) method, which consists of designing, validation, revision, product manufacture, and testing. manufacture of electronic component tester covering hardware and software. the hardware consists of Atmega328 microcontroller as a control center, LCD as component data display output, LED as indicator tool and three terminal as component test terminal to be tested. The next step is to test the percentage of success and the level of eligibility percentage. The percentage of success is done by comparing the test results of components tested using a component tester with physical data components, datasheet, and multitester measuring instruments and LCR Tester. The level of identification of successful test of the electronic component tester in conducting a test of passive and active electronics component yield average success percentage of 97,14%. The feasibility percentage level is measured using validation instruments with a presentation in terms of physical, technical and instructional design aspects that are tested by the teachers and media expert. The result of the feasibility percentage test based on the overall aspect according to the teacher on average is 89,93% with very feasible category and result of a percentage level feasibility test of an overall aspect according to media expert on average equal to 89,93% with category worthy to be used as medium of learning.

Keywords: Electronic component tester, Learning media, Product Based Learning, Electrical and Electronic Basic

1. INTRODUCTION

Sekolah Menengah Kejuruan (SMK) is one type of formal education institutions for students who want to gain expertise in a particular field. SMK was established to create graduates to be ready for work according to their interests and talents. The goal become the foundation for all SMK in Indonesia, one of which is SMKN 1 Sumatera Barat (Sumbar) which has seven expertise programs such as Audio Video Engineering, Mechatronics, Building Image Engineering, Engineering Technique, Automotive Engineering, Welding Technique and Electric Power Installation Technique.

Audio Video Engineering (Teknik Audio Video/TAV) expertise program is a new skill program that formed at SMKN 1 Sumbar. Based on the information of one of the teachers at SMKN 1 Sumbar, Dra.Hj. Enny Erita, M.Pd TAV expertise program became the favorite program in SMKN 1 Sumbar since the number of students enrolling exceeded the specified quota.

Basic Electrical Electronics is one of the productive subjects taught in the department of TAV. This subject is theoretical and practices given to students of class X with the number of meetings of $4 \times$ 45 minutes per week. The learning process is divided into 2x45 minutes for theory and 2x45 minutes for

practice. To give understanding to students before the practice begins, the teacher gives the theory of learning first.

On the subjects of Basic Electrical Electronics class X SMKN 1 West Sumatera academic year 2017/2018 using Curriculum 2013. Subject matter in Basic Electrical Electronics according to syllabus include:

Tabel 1. Basic competence of Basic Electrical Electronics subjects to be applied

Competency standards (SK)	Basic competencies (KD)
Basic Electrical Electronics	1. Identify passive and active electronics components 2. Describe the properties of passive and active electronic components. 3. Explain the concept of electronic circuits

Source: Silabus Teknik Audio Video kelas X

Each basic competency aims at providing knowledge and skills to students to lead to

competence standards on the basic principles of electronic components. Basic Electrical Electronics subjects included in the category of subjects who have difficulty high enough.

Class X TAV is divided into 2 groups which are group TAVA and TAVB, If the total student in a class X 32 students, they will be divided into 16 students per group. Arrangements are made to make it easier for teachers to monitor students while the learning process takes place. However, even with very few students, teachers are often less able to master the class. This is because the existing learning process has not been effective to provide an explanation that is easy to understand and make students less interested to learn it. Students also tend to be less motivated in following the learning activities which will make the students become difficult to understand.

Based on the data of student learning outcomes in the basic subjects of Electronic Element at the odd semester of the academic year 2016/2017 is still relatively low. It can be seen from the result of student learning which shows that 41% of X grade students are not able to achieve the value of learning mastery at least 78. In fact, a class is called thorough learning when in the class there are at least 85% of students who reach the value according to a minimal value.

Learning outcomes achieved by students are influenced by two main factors, and the factors are within students and the other come from outside the student or environmental factors. The first factor also includes the ability that the student has, the motivation to learn, interests and attention, attitudes and habits of learning, diligence, social economic, physical and psychological factors. Meanwhile, the second factor also includes the quality of teachers, methods of teaching teachers and learning tools (Sudjana, 2005: 39). Learning devices are facilities that support the learning process, be it the room, workshop, laboratory and learning media. Of the factors that exist, the most likely factor to note is the use of learning media.

The learning media used by teachers in the TAV skills program is the powerpoint presentation program. Whereas in Basic Electrical Electronics subjects a lot of abstract material that actually cannot be explained only with a writing but must be supported by other media that can describe the actual condition.

One of the solutions to solve this problem is with the Electronic Component Tester. This media is made in mini-form, making it more effective in explaining the concept of electronics components in theory learning. So that it is possible with real applications, the media becomes more interesting and can make the students better to remember the knowledge of each component of electronics. Learning is also focused on students, by applying the concept of demonstration learning to explore student ideas.

2. RESEARCH METHODS

This research is using two type method, where the first is Research and Development, the second method is experimental research. Sugiono (2013: 297) "The research method used to produce a particular product, and test the effectiveness of the product". In Sugiono's book, it is explained that the stages in R & D research begin from potential and problems. Problems faced by the low learning outcomes of students in the Basic Electrical Electronics, an abstract subject matter that actually cannot be explained only by a writing but must be supported by other media that can describe the actual condition, and there is no appropriate learning media to explain subject matter Basic Electrical Electronics.

The R & D strategy consists of Analysis, Product Design, Design Validation, Design Revision, Product Trial.

2.1 Analysis

This stage is done through field study and literature study. Field studies were conducted by direct observation to schools that will be used for research. Observations made is to interview the school teachers Electrical Electronics about the learning media used in learning Basic Electrical Electronics. The purpose of the observation to determine the needs of learning media Basic Electrical Electronics.

Subsequent analysis of literature study activities. Literature study is done by conducting the theoretical study through books and other sources of information related to learning media Basic Electrical Electronics which will be developed.

2.2 Product Design

2.2.1 Hardware Design

In hardware design is made by taking into consideration the needs of SMKN 1 Sumbar with the expertise program of TAV. Learning media is designed to be shaped like a portable measuring device. Product design is made using EAGLE Software for hardware design. As for graphic design is made using Corel Draw X6. Product design consists of Trainer and Module usage.

Designing in the manufacture of hardware and the main components that form the system is made. Figure 1 shows the block diagram of the system to be designed.
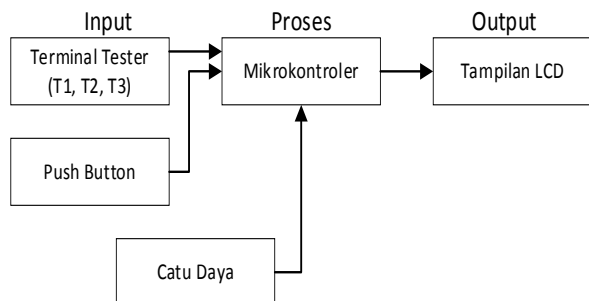
Figure 1. Block Diagram of the system design

2.2.2 Block Input Tester

Tester point has 3 terminal that serves as a detection of the type of component that is used. First, the components are placed on the terminal component of the tester. Then, the program will initialize based on the difference of voltage and current on each connection ports.

2.2.3 Minimum System Block

The minimum system serves as a basic set of microcontrollers that are used as the heart of the circuit system and the data processing program that we input through the downloader.

2.2.4 Display Block

The display block serves to display the measured data of detected components at the terminal tester. After component data obtained, then the data will be processed in accordance with the program that we have entered on the microcontroller and then displayed on the LCD screen.

2.2.5 Power Supply Block

The power supply circuit plays an important role in the activation of the tester component circuit. Besides acting as a supply voltage This power supply also acts as a voltage approximation regulator at Tester point terminals.

The following series of electronic component tester:
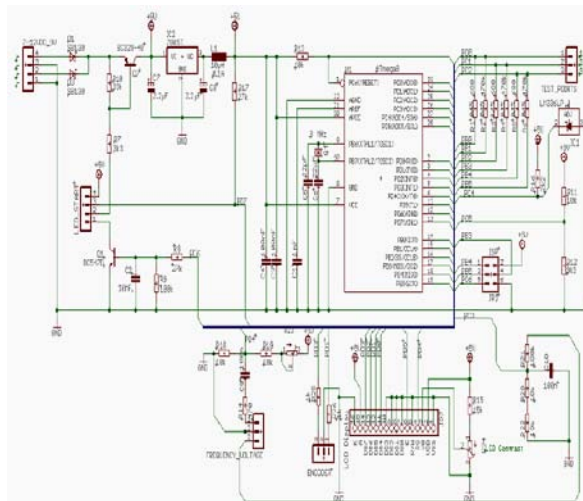
Figure 2. electronic component tester scheme

2.2.6 Software Design

Based on the working principle of the series above can be arranged in the form of the flowchart as follows:
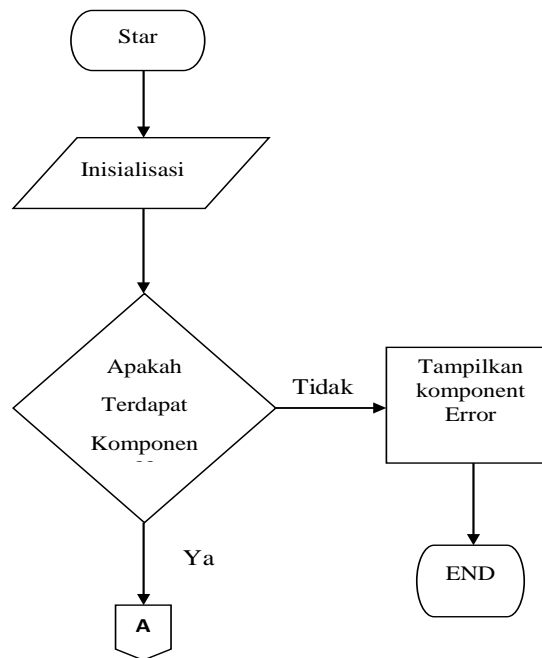
Figure 3. Flowchart part 1
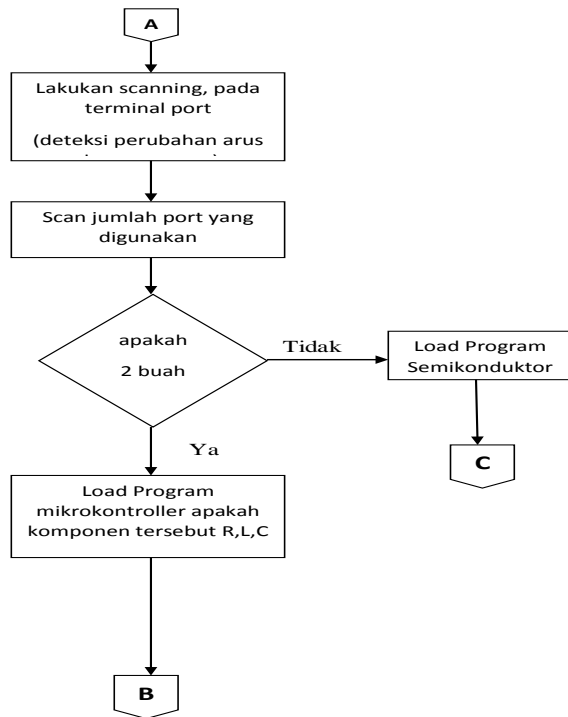
Figure 4. Flowchart part 2
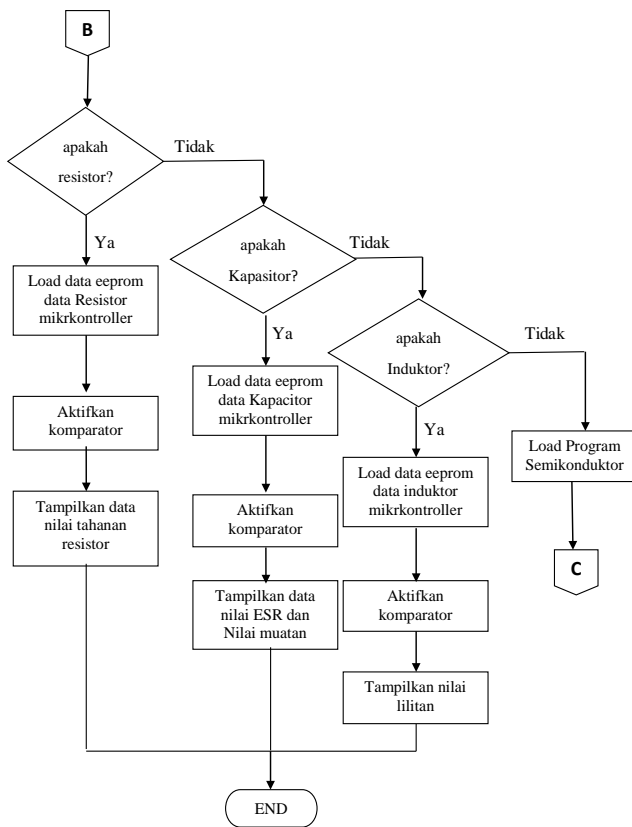
Figure 5. Flowchart part 3
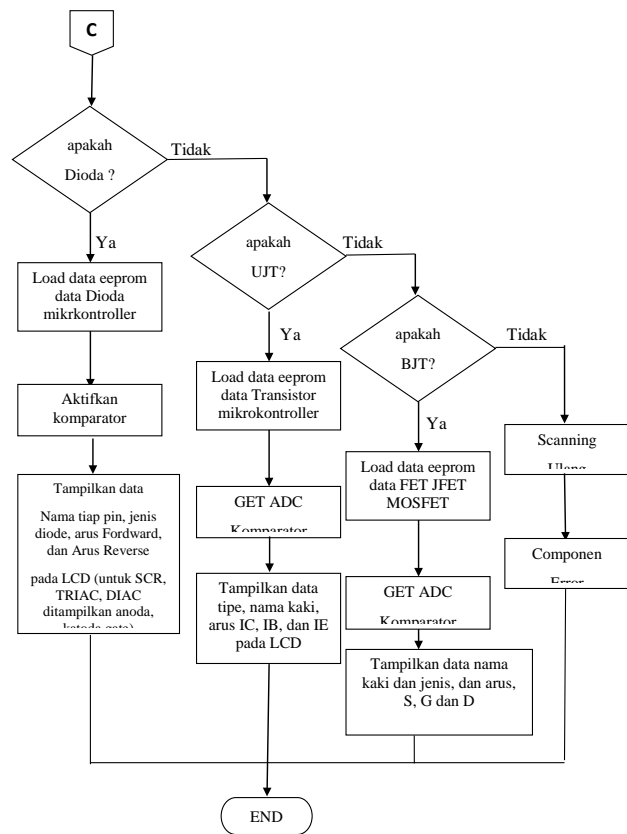
Figure 6. Flowchart part 4

a.   Product Validation
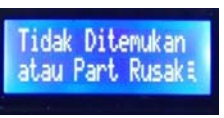
To test the validity of circuit layout, simulation was done using electronic software. After the results obtained in accordance with the theoretical then proceed to the next stage.

b.   Design Revision

The revised design is the use of a voltage source, in addition to using a battery can also use a power supply.

c.   Trial of Product

At this stage is done assembly of components, so the resulting physical form of the tool as follows:

No	Display Electronic Component Tester Condition	Notes
1		Off condition
2	Bat. 6.8V Lemah Menguji...	Battery Condition
3	Tidak Ditemukan atau Part Rusak	The tested component is damaged or the component has not been connected to the terminal probe
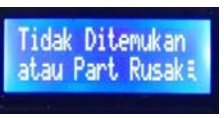
No	Display Electronic Component Tester Condition	Notes
1		Off condition
2	Bat. 6.8V Lemah Menguji...	Battery Condition
3	Tidak Ditemukan atau Part Rusak	The tested component is damaged or the component has not been connected to the terminal probe

Figure 7. The result of making the tool

To know the success rate of the tested electronic component tester. Some components will be tested by type using an electronic component tester. The reading result of the electronic component tester compared to the commonly used electronic component test instrument is multitester and LCR Tester then compared with the result of physical value calculation. The comparison result is processed to calculate the percentage of success rate of electronic component tester in conducting test of passive and active electronic components.

Questionnaire is a data collection technique that is done by giving a set of questions or written statement to the respondent to be answered. Questionnaire is used to determine the percentage level of media component tester eligibility. Respondents involved in data collection are subject teachers applying the basic of electronics and lecturer of electronics as media expert. The product will be applied in learning when it has been declared eligible by experts.

3. DISCUSSION

Through the process of collecting materials and theoretical basis to the work process, has made an Electronic Component Tester tool.

Tablel 1. Information on electronic component tester

The component tester tool is capable of testing some passive and active electronic components such as resistors, capacitors, inductors, transistors, diodes, FETs, and thyristors.

Table 2. Display component testing using electronic component tester

No	Components name	Display of Electronic Component Tester	Display Notes
1	Resistor		1 and 2 are the probes used to test the resistors and 21.62kΩ are the values of the resistors tested
2	Capacitor		1 and 2 are the probes used to test the capacitor. V loss is the percentage of voltage that is passed 3313nf is the value of the tested capacitor. ESR is the equivalent value of the resistance of the tested capacitor.
3	Inductor		1 and 2 are the probes used to test the inductor. 0.7 represents the value of the inductor resistance. L is the value of the inductor being tested
4	Diode		1 and 2 are the probes used to test the leg diode 1 as cathode and leg 2 as anode. Ir = Reverse current 48pF-31pF is the diode capacitance at 5V voltage
5	Zener Diode		1 and 3 are the probes used to test the zener diode. Leg 3 terminal of zener cathode and foot 1 terminal of zener anode. Vt is the forward voltage of the zener diode and 3063mV is the breakdown voltage of the zener diode

6	Transistor		PNP or NPN is the type of transistor tested. 123 = Base pin position, Collector, and Emitter on Ie = Emitter foot current Ic = Collector foot collector The transistors are tested. B = beta value or HFE in the transistor under test. Vbe is the emitter-base voltage ICEO is the cut off current of the transistor collector under test
7	Mosfet		N-E-MOS = is the type of Mosfet tested. 123 = GDS is Gate pin position (G), Drain (D), Source (S) in the tested mosfet. The diode and figure symbols are the position of the diode in the mosfet. Vt is the diode voltage in the forward condition of the mosfet.
8	Triac		123 = 12G is the position of the legs of Terminal 1, Terminal 2, Gate on the Triac. Vt is the voltage at moment of triac under On state condition

After testing several active and passive electronic components using electronic component tester and compared using multitester measuring instrument, LCR Tester and datasheet percentage of electronic Component Tester success rate as in table 4.

Table 3. Average Percentage Success Rate.

No	Component Type	Rate of Success (%)
A.	**Passive**	
1	Resistor	90
2	Capacitor	100
3	Inductor	80
B.	**Active**	
4	Dioda	100

5	Transistor	100
6	Mosfet	100
7	Thyristor	100
The percentage of success rate		**97,14**

Based on the data in table 4, the average percentage success rate of electronic component tester in conducting test of passive and active electronics component is 94,17%. Based on the data it can be concluded that the electronic component tester has the ability to test passive and active electronic components so that it can meet basic competence in Basic Electrical Electronics subject that is identifying passive and active electronics component.

The testing phase on the feasibility of using Electronic Component Tester as a learning media is done using validation test which includes validation by subject teachers applying Basic Electrical Electronics and validation of media experts by electronics lecturers.

3.1 Teacher Validation Test Results

This validation test is an assessment questionnaire that is assessed by the subject of Basic Electrical Electronics subject as a material expert. Assessment is reviewed on three aspects: physical, technical and instructional design aspects.

Table 4. The result of the validation test by the subject teacher

No	Aspect of Assessment	Average Score	Σ Score Results	Σ Maximum Score Results	Percentage (%)
Teacher 1					
1	Physical Design	3,625	29	32	90,63
2	Technical	3,889	35	36	97,22
3	Instructional	4	16	16	100
Percentage of Overall Aspects Of Teacher 1					95,95
Teacher 2					
1	Physical Design	3,375	27	32	84,38
2	Technical	3,444	31	36	86,11
3	Instructional	3,25	13	16	81,25
Percentage of Overall Aspects Of Teacher 2					83,93
Average percentage of all Aspects of Teacher					83,91

Based on table 5 validation data analysis, percentage eligibility of electronic component tester obtained from the assessment of all aspects by teacher 1 of 95.95% with the category is very suitable to be used as a medium of learning. For the results of data

analysis of teacher validation 2 based on the assessment of the overall aspect, the electronic component tester eligibility percentage level of 83.91% with the category is very suitable to be used as a medium of learning.

The average percentage gain of electronic component tester eligibility level in all aspects as a medium of Basic Electronic Element subjects tested to two subjects of SMK subjects is 89.91%. Based on the percentage of feasibility level data from all aspects, it can be concluded that electronic component tester is feasible to be used as a medium of learning in SMK on Basic Electrical Electronics subjects.

3.1.1 Media Expert Validation Test Result

This validation test is a questionnaire assessment assessed by two lecturers as media experts. Assessment is reviewed on three aspects: physical, technical and instructional design aspects.

Table 5. The Result of Validation Test by Media Expert

No	Aspect of Assessment	Average Score	Σ Score Results	Σ Maximum Score Results	Percentage (%)
Media Expert 1					
1	Physical Design	3,375	27	32	84,38
2	Technical	3,444	31	36	86,11
3	Instructional	3,5	14	16	87,5
Percentage of Overall Aspects Of Media Expert 1					86
Media Expert 2					
1	Physical Design	3,875	31	32	96,88
2	Technical	3,556	32	36	88,89
3	Instructional	4	16	16	100
Percentage of Overall Aspects Of Media Expert 2					95,26
Average percentage of all Aspects of Media Expert					90,63

Based on Table 6 the percentage eligibility of electronic component testers obtained from the assessment of all aspects by media expert 1 of 86% with the category is very suitable to be used as a medium of learning. For the analysis of media expert 2 validation data based on the assessment of all aspects, the electronic component tester eligibility percentage level of 95.26% with the category is very suitable to be used as a learning medium. The average percentage gain of electronic component tester eligibility level in all aspects as a medium of Elementary Electronic

Element subjects tested by two media experts is 90.63%. Based on data percentage level of eligibility of the whole aspect can be concluded that electronic component tester worthy to be used as a medium of learning.

4. CONCLUSION

Based on the discussion, it can be concluded that:
a. Electronic Component Tester made is already operating properly in identifying passive and active electronic components.
b. Electronic component tester has the ability to test passive and active electronic components so that it can meet basic competence in Basic Electronic Element subject that is identifying passive and active electronics component.
c. Based on the percentage of feasibility level data from all aspects tested by teachers and media experts, it can be concluded that electronic component tester is suitable for learning media.

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EFFECTIVENESS OF INTERACTIVE INSTRUCTIONALMEDIA ON ELECTRICAL CIRCUITS COURSE: THE EFFECTS ON STUDENTS COGNITIVE ABILITIES

Doni Tri Putra Yanto[1], Sukardi[2], Deno Puyada[3]

[12]Department of Electrical Engineering, Faculty of Engineering, Universitas Negeri Padang

ABSTRACT: This study discussed on the effectiveness of interactive instructional media on the learning process of electrical circuit grade X students in Vocational High School and Technology (SMKN) 5 Padang. Design of the research used is One Group Pretest-Posttest design that is research done on 30 students in one class then compare students cognitive abilities between before with after use of interactive instructional media by using Paired Sample T-Test analysis. An objective test is used as an instrument to measure students' cognitive abilities. The results showed that there were significant differences between students' cognitive abilities before and after the use of interactive instructional media, where the cognitive ability after the use of interactive instructional media had a mean value better than the cognitive ability before the use of interactive instructional media. It can be concluded, that interactive instructional media is effective to improve the student's cognitive abilities in electric circuits subjects.

Keywords: Effectiveness, Interactive Instructional Media, Students Cognitive Abilities, Electrical Circuits Course

1. INTRODUCTION

Education is a sustained process and always requires development and renewal so that it can always run well and achieve the goals that nerve. The quality of education should always be improved by fulfilling, implementing, evaluating, and developing the elements that support the ongoing process of education. One of the elements is learning media. Learning media is an important aspect in the implementation of education that is integrated with appropriate learning methods. Learning media is something that is used to convey information, learning materials between teachers and students in the learning process, learning media can be hardware or software that serves to help teachers in delivering learning materials and help students understand learning materials (Ansyar, 2011 ; Rusman, 2011).

The learning process will run well if the learning media is chosen appropriately and adaptive with the development of the science of technology and art (IPTEKS). In the learning process, the presence of learning media has a very important role. Difficulties in delivering abstract, theoretical, and general material can be overcome with the help of relevant and good learning media. Hence, the selection of relevant and good learning media is essential to maximize the function of learning media in a learning process. (Djamarah, 1997; Sudjana, 2008). The choice of instructional media should be appropriate and relevant to the needs and nature of the learning materials and should be relevant to the learning method desired by the teacher. The need for a large learning media and the influence of technological progress requires the emergence of some new learning media that is integrated with computers and mobile to facilitate its use. In addition, learning media should also be able to overcome the problems of delivering material between teachers and students in a learning process.

Electrical Circuit is one of the basic subjects in Vocational High Schools (SMK) which discuss many learning materials that are conceptual and abstract that requires students to fantasize about something that is not visible. If the teacher is not able to concretely abstract the material well then the students will have difficulty to understand it. In the end, the learning outcomes of students will be low and do not reach the target of the implementation of the learning process. This is evidenced by the results of preliminary observations on the implementation of the learning process of Electric Circuits in Vocational High School (SMKN) 5 Padang. Teachers have difficulty in delivering student materials. For that, media selection because the unavailability of learning media that is able to help the explanation of learning materials that are abstract, consequently the electrical circuit learning process is not running optimally. Indicated by the low cognitive ability of students about electrical circuit concepts. Cognitive ability on the concept of the low electrical circuit will cause difficulties for students to carry out practicum and continue on other subjects related to electrical circuit concept. Because electrical circuit subjects are the basic

subjects that every student must understand and comprehend and will always apply to every other subject at the next level.

The subjects of class X electric circuit in SMK have the final competency standard that is Analysis of Electrical Circuit. This competency standard is developed into four basic competencies namely (1) Describing electrical circuit concept; (2) Analyzing direct current electric circuits; (3) Analyzing alternating current electric circuits; (4) Analyzing the series of magnetism. All the basic competencies in electrical circuit subjects have learning materials that are conceptual and abstract nature that requires students to fantasize in interpreting the concept of the theories studied. If it is not supported by good and relevant learning media then the learning process will not run optimally.

Learning communication by using oral will not be able to help students to understand abstract learning materials, it needs an equipment or media that can help to concretize abstract material (Howlitschek & Joeckel, 2017). Thus, it takes a learning medium that is able to overcome the problem. One alternative choice is the interactive computer-based learning media as a form of learning media capable of concreting material that is abstract and adaptive with technological developments. In accordance with the demands of the 21st-century learning process that requires the process of computer-based learning and technology in an integrated manner. Interactive learning media is one of the answers to the problem of abstract learning materials, packing interactive learning media with computer or mobile base in a form of animation display will attract students' desire to learn and understand the concept of learning with abstract bereft. In addition, it adaptive with the development 21st-century technology to integrate into a learning process (Benjamin et al, 2015; Howlitschek & Joeckel, 2017).

Learning media before use must go through some testing process so that the resulting instructional media really able to overcome the problems in the implementation of the learning process. One such process is testing the effectiveness of instructional media. There are several methods in testing the effectiveness of instructional media such as analysis of classical mastery result implemented by Chan et al., 2016; the improvement of the learning process for each learning cycle as a reference to the conclusion of the effectiveness of instructional media used as implemented by Murti, 2014. Analysis of learning outcomes before and after the learning process as a reference reveals the effectiveness of a learning media conducted by Gufron & Jasman, 2012.

In this study the effectiveness of instructional media is revealed by using one group pretest-posttest design, then the result of pretest learning is analyzed by comparison with posttest learning result. This is chosen because it is considered relevant to the needs of interactive learning media and electrical circuit learning materials. Learning outcomes reviewed focused on cognitive abilities because in the subjects of basic electrical circuits more dominant cognitive ability is used as a reference achievement of learning process objectives. The purpose of this study is to reveal the effectiveness of interactive learning media on the cognitive ability of students on learning materials Electric Circuit Concepts. So that later can be applied in the process of learning electrical circuit to improve the cognitive ability of students.

2. METHODS

The research method used is quantitative research method of a queasy-experiment type because in this research some nondominant aspects influence the research result can be ignored, the aspect that becomes the reference in the research is the aspect that influences the research result dominantly and becomes the focus of research.

2.1 Research Design

The research design applied in this research is the One-Group Pretest-Posttest design. The study was conducted on one group of samples consisting of 30 students. At the beginning of the study carried out an early cognitive trained test of the student before being given a treat, then carried out the treatment of the implementation of the learning process by using interactive learning media. At the end of the study carried out the cognitive end-ability test of students after the treatment was done. Then the final outcome of cognitive ability of students was analyzed by comparing with the cognitive early ability of students with a different analysis. The research design of interactive learning media effectiveness is presented in table 1.

Table 1. Research Design

Pretest	Treatment	Posttest
O_1	X	O_2

Keterangan :
O_1 = Test of early cognitive abilities of students
X = Implementation of interactive learning media on electrical circuit subjects
O_2 = The final cognitive ability test of the students

2.2 Research Instruments

The research instrument used is the instrument of cognitive ability in the form of objective test with 5 answer choices. The research instrument was developed based on the electrical circuit learning materials used as the research focus. The research instrument is divided into two, namely pretest instrument and posttest instrument both through several testing processes and then the analysis process before can be used. Such as analysis of validity, reliability, different power index, and difficulty level.

2.2.1 Pretest Instrument

The pretest instrument is an instrument used to measure students' early proficiency in applying interactive learning media. The pretest instrument was developed based on basic competence material 1 which is a basic competency learned without using interactive learning media. Pretest instrument grilles are presented in Table 2.

Table 2. Pretest Instrument Grille

Code	Basic Competency	Indicators
KD.1	**Describe the concept of electrical circuits**	a. Atomic structure b. Terms of the emergence of the emf(ggl) c. The process of the emergence of the emf(ggl) d. The process of flowing currents

Based on the grille then obtained 30 objective questions to be tested. Then based on the results of the analysis of the instrument after the instrument tested then obtained the results as presented in table 3 below.

Table 3. Pretest Instrument Analysis Results

Aspect	Result
Validity	25 Validitems, 5 items invalid
Reliability	High reliability
Power Different	13 good items, 13 medium items, & 4 pool items
Difficulty level	1 difficult item, 19 medium items, & 10 systems

The results of the analysis indicate that only 25 questions are valid and can be used as a pretest instrument while 5 invalid items are removed from the instrument. Thus, the pretest instrument consists of 25 items of the objective.

2.2.2 Posttest instrument

The posttest instrument is an instrument used to measure the final ability of students after the application of interactive learning media. The posttest instrument is developed based on basic competence material 2 which is the basic competency learned during the application of interactive learning media. The posttest instrument grid is presented in Table 4.

Table 4. Posttest Instrument Grille

Code	Basic Competency	Indicators
KD.2	**Analyze direct current electric circuits**	a. The basic laws of electricity b. Terms of the emergence of the emf(ggl) c. The process of the emergence of the emf(ggl) d. The process of flowing currents

Based on the grille above then obtained 30 objective questions to be tested. Then based on the results of the analysis of the instrument after the instrument tested then the results obtained as presented in table 5.

Table 5. Results of posttest instrument analysis

Aspect	Result
Validity	26 Validates, 4 invalid items
Reliability	High reliability
Power Different	15 good items, 11 medium items, & 4 poor items
Difficulty level	1 difficult item, 18 medium items, & 11easy items

The results of the analysis indicate that only 26 questions are valid and can be used as a pretest instrument while 4 invalid items are removed from the instrument. But there is one more problem item that has a high level of difficulty and a poor power different, thus established 25 items for the posttest instrument.

2.3 Techniques of Data Analysis

Data analysis techniques used to capture the effectiveness of interactive learning media is using the formula Paired-sample T-test. The result of measurement of the cognitive ability of students after use of interactive learning media compared with primary ability of students before use of interactive learning media. The Paired-Sample T-Test formula as suggested in Sugiono (2008: 32) is presented as follows.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2} - 2r\left(\frac{S_1}{\sqrt{n_1}}\right)\left(\frac{S_2}{\sqrt{n_2}}\right)}} \qquad (1)$$

Keterangan :
    t   = value of t count
    $\bar{X}_1$ = the average of pretest value
    $\bar{X}_2$ = the average of posttest value
    S_1 = standard deviation of pretest
    S_2 = standard deviation of posttest
    n_1 = number of pretest subjects
    n_2 = numberof posttest subjects
    r = the correlation between two samples

In this study t-pair, paired sample analysis is done using SPSS 20. Criteria decision is if the significance value ≤ 0.05 then there is a significant difference in the cognitive abilities of students between before and after the implementation of the learning process using interactive learning media, so the media effective interactive learning is used on subjects of Electricity Circuit. However, if the significance value> 0,05 then there is no significant difference in the cognitive ability of students between before and after the implementation of the learning process using interactive learning media so that interactive learning media is not effective to be used on the subjects of Electricity Circuit (Sugiyono, 2008: 33). The level of effectiveness is also known by referring to the average class. Where the highest grade average values have a higher efficiency on others.

3. DATA AND DISCUSSION

The result of this research consists of two main data that is pretest data and posttest data. Both data are obtained based on the results of the use of instruments for each test.

3.1 Pretest Data

Pretest data is data obtained based on the measurement of the cognitive ability of students before the application of interactive learning media. the results of the pretest data analysis are presented in table 4.

Table 4. Results of Pretest Data Analysis

N	Minimum	Maximum	mean	Std. deviation
30	48	88	68	9,798

3.2 Posttest Data

Posttest data is data obtained based on the measurement of the cognitive ability of students after the implementation of interactive learning media. Posttest data analysis results are presented in   table   6.

Table 6. Results of Pretest Data Analysis

N	Minimum	Maximum	mean	Std. deviation
30	60	92	80	7,575

Based on these results can be seen that the cognitive abilities of students after the use of interactive learning media is higher when compared to the cognitive ability of students before the use of interactive learning media. It indicates that the interactive learning media gives a positive effect on the improvement of the cognitive ability of students. To get the effectiveness of interactive learning media it is necessary to do further data analysis that is using data analysis paired   sample   t-test.

3.3Effectiveness Of Interactive Instructional Media

The effectiveness of interactive learning media is revealed by performing a comparative statistical analysis between pretest and posttest results. Before can be analyzed with paired sample t-test formula, firstly tested requirement of analysis that is normality test of data normality testing done by using formula Kolmogorov-Smirnov Z. Normality test result presented in table 7 and table 8.

Table7. Pretest Data Normality Test

		PRETEST VALUE
N		30
Normal Parameters[a,b]	Mean	68,00
	Std. Deviation	9,798
Most Extreme Differences	Absolute	0,100
	Positive	0,074
	Negative	-0,100
Kolmogorov-Smirnov Z		0,548
Asymp. Sig. (2-tailed)		0,925

a. Test distribution is Normal.

b. Calculated from data.

Table 8. Posttest DataTest Normality Test

		NILAI POSTEST
N		30
Normal Parameters[a,b]	Mean	80,00
	Std. Deviation	7,575
Most Extreme Differences	Absolute	0,135
	Positive	0,079
	Negative	-0,135
Kolmogorov-Smirnov Z		0,737
Asymp. Sig. (2-tailed)		0,649

a. Test distribution is Normal.

b. Calculated from data.

Based on tables 7 and 8 it can be seen that the significance value of the test is 0.925> 0.05 for pretest, and 0.649> 0.05 posttest, hence it can be concluded that pretest data and posttest data are normally distributed. Normally distributed pretest and posttest data can be analyzed by using paired t-test data analysis to reveal the effectiveness of interactive learning media. The result of a t-test of pairwise data is presented in table 9.

Table 9. Paired Sample T-Test Test Results

	Paired Differences				Sig. 2-tailed
	Mean	Std. Deviation	Std. Error Mean	T	
NilaiPostest - Nilai Pretest	12,0	8,78	1,605	7,47	,000

Based on the results of data analysis presented in table 9 can be seen that the value of t arithmetic> t table that is 7,479> 1,699 and significance value smaller than 0.05 it is found that there is a significant difference between the results of cognitive ability at posttest and cognitive ability results at the time of pretest, the posttest cognitive ability is better than the pretest cognitive ability. This can be known through the average cognitive ability class of posttest students greater than the average of cognitive ability results at the time of pretest (80> 68). Thus it can be stated that interactive learning media is used to improve the cognitive abilities of students in the subjects of the electrical circuit in Vocational High School Technical Expertise of Electric Power Installation.

4. CONCLUSION

Interactive learning media is one of the answers to the difficulties of teachers in optimizing the learning process, especially in conveying learning abstract materials. Effective interactive learning media is used to improve the cognitive ability of students to understand the abstract material on electrical circuit subjects when compared with conventional media, such as whiteboards and other presentation media. Thus the interactive learning media can be used as an alternative choice of learning media to deliver abstract learning materials that are difficult to concretize with the media whiteboard and verbal presentation.

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EVALUATION OF LEARNING PROCESS USING CIPP MODEL

Dwi Sudarno Putra* , Misra Dandi Utama, Dedi Setiawan, Remon Lapisa and Ambiyar
Department of Automotive Engineering, Universitas Negeri Padang, Padang
dwisudarnoputra@gmail.com, dedimpdt@gmail.com, remonlapisa@yahoo.com,
ambiyar@yahoo.com

ABSTRACT: This study aims to evaluate the quality of learning process of automotive technical base skills subject by using the *Context, Input, Process, and Product* (CIPP) model. Context is derivated from the purpose of learning on basic automotive engineering skills, Input is observed by the planning of learning process, the process is represented by the teacher's performance, the product is analyzed by the student competency achievement and learning outcomes of learners. The sample of this research is 58 students and 3 teachers. Informant of this research is 5 person consisting of 3 teachers, vice curriculum, and headmaster. This research is done by combination method (mixed methods). The results, the context components (82.20% and 83.60%), the input component (83.35%), the components process (76.74%), Furthermore, the components product (77.6%).

Keywords: Evaluation, Learning process, context, input, process, and product

1. INTRODUCTION

School is a formal institution to conduct learning process. Learning in school is a system consisting of several elements, namely: input (input) consisting of learners, teachers, facilities infrastructure, curriculum/materials, management, and environment. Process elements, which consists of management of input elements that include learning strategies, learning media, how to teach and interests, attitudes and ways of learning learners. The result element consists of output.

To find out the ongoing learning in school, one way that can be done is to evaluate the learning process. The purpose of learning evaluation is to determine the level of progress, development, learning achievement of learners, the effectiveness of learning in learners and to provide optimal information in policy making and to improve the quality of learning. If the quality of learning has increased then the next will improve the quality of education. Improving a program in the learning of the interaction between teachers with learners, so that the interaction goes well there needs to be planning, implementation, and assessment. Learning consists of several components that are mutually related to each other. If a component is not working properly or is not running properly it will interfere with other component functions, such as the system. The CIPP model (Context, Input, Process, Product) is an evaluation model that views the program evaluated as a system (Suharsimi and Cepi, 2010: 45), so to evaluate learning process in SMK Negeri 2 Solok researcher using CIPP model.

2. METHODOLOGY AND CASE STUDY

2.1 CIPP Model

Stufflebeam (2007: 1) says that CIPP is a comprehensive framework for conducting formative and summative evaluations of programs, projects, personnel, products, organizations, and evaluation systems. While Suharsimi and Cepi (2010) stated that this CIPP evaluation model is the most widely used evaluation model and applied by the evaluators.

The CIPP model evaluation is an evaluation model that views the evaluated program as a system, meaning evaluating a program by analyzing the program based on its components. The program referred to in this research is learning the process

2.2 Context Evaluation (Context)

According to Suharsimi and Cepi (2010: 47), "Context evaluation is an attempt to describe and detail the environment, unmet needs, populations, and samples served, and the project objectives". Context evaluation in this research is the objective of learning TKR Skills Program at SMK Negeri 2 Solok.

2.3 Input Evaluation (Feedback)

Evaluation of inputs is to help manage decisions, determine existing sources, alternatives to be taken, determine plans and strategies to achieve goals, and how work procedures to achieve them. The input evaluation components include human resources, supporting facilities and equipment,

funds/budgets, and the various procedures and rules required (Widoyoko, 2013: 182). Evaluation of inputs in this study is the implementation of existing learning plans in TKR Skills Program at SMK Negeri 2 Solok.

2.4 Evaluation Process (Process)

The process evaluation in the CIPP model refers to the "what" of the activities undertaken in the program, "who" the person referred to as the program responsible, "when" the activity will be completed. In this CIPP model, process evaluation is directed at how far the activities undertaken in the program have been implemented in accordance with pre-prepared plans (Suharsimi and Cepi, 2010: 47). Evaluation of the process in this study is a process of learning in terms of teacher performance on the implementation of learning and learning motivation of learners on learning TKR Skills Program at SMK Negeri 2 Solok

2.5 Evaluation Product (Results)

Suharsimi and Cepi (2010: 47) suggest that Evaluation of the results is directed at things that show changes that occur in the input. Evaluation of the results in this study is the achievement of learning outcomes achieved by learners that can be seen from the value of even semester of the academic year 2016/2017 learning Skills Program TKR in SMK Negeri 2 Solok.

2.6 Research Methods

Research type used is evaluation research with Model Context (Context), Input (Process), Process (Process), Product (Result). This evaluation is to determine the difference between what should be achieved according to process standards and assessment standards with real field conditions. This research is done by combination method (Mixed Methods).

3. RESULTS AND DISCUSSION

3.1 Context Components

Components of context in this study are the purpose of learning on basic automotive engineering skills. The technique of taking data for program planning component is by using questionnaire and interview. Questionnaires are addressed to teachers and learners, while interviews are conducted with teachers of subjects.

From the sub-components of learning objectives with teacher respondents obtained the following results:

Table 1. Acquisition of sub-average values component of learning objectives with teacher respondents

No	Indicator	Average Score	Score Max Ideal	TPR	Category
1	Have knowledge and skills	4,22	5	84,44	Good
2	Growing creativity	4,00	5	80,00	Good
	Overall average rating	4,11	5	82,20	Good

Based on table 1, it can be seen that the acquisition of the mean value of the learning subject component subgroup obtained an average score of 4.11 with the TPR of 82.20% and included in either category. Thus the sub-component of learning objectives with the respondents of subject teachers can be concluded that the learning objectives have been achieved well because learners already have the knowledge and skills and foster creativity after following the learning.

Table 2. Acquisition of sub-average values component of learning objectives with student respondents.

No	Indicator	Average Score	Score Max Ideal	TPR	Category
1	Have knowledge and skills	4,29	5	85,75	Good
2	Growing creativity	4,07	5	81,38	Good
	Nilai rata-rata keseluruhan	4,18	5	83,60	Good

Based on table 2, it can be seen that the mean value of overall learning objectives with student respondents obtained an average score of 4.18 with a TPR of 83.60% and included either category. Thus it can be concluded that the sub-component of learning objectives by students, in general, is good. If seen in sub-indicators that learners still enough to understand the material of each KD provided by the teacher this needs to be done improvements and attention again for the achievement of learning objectives can be achieved by both learners.

Table 3. Display Data Sub Destination Learning

Sub Component	Qualitative Data
Learning Objectives	Learning objectives can be achieved well by learners with knowledge and skills as well able to applying it

Based on the data display sub-component of learning objectives, it can be concluded that the learning objectives have been achieved well by learners with knowledge and skills in KDTO learning, and learners are able to apply knowledge that has been studied on the KDTO learning, although not all participants educate who can achieve it

3.2 Input Components

The input component of this research is learning planning. The technique of data retrieval is done by using questionnaire with teacher respondent. Data collection was also conducted with

interviews with vice principal respondents in the field of curriculum that aims to complement the quantitative data.

From sub-component of learning planning with teacher respondent got the result as follows:

Table 4. Acquisition of sub-average values Learning planning component

No	Indicator	Average Score	Score Max Ideal	TPR	Category
1	Syllabus	4,00	5	80,00	Good
2	Preperation RPP	3,76	5	75,19	Good Enough
3	Learning materials	4,58	5	91,68	Very Good
4	Preparation of Evaluation of Learning Outcomes	4,33	5	86,67	Good
	Overall average rating	4,17	5	83,35	Good

Based on table 4, it can be seen that the overall sub-component of learning planning obtained an overall average value of 4.17 with TPR of 83.35% and included in either category. This shows in general planning of learning according to the teacher is in a good category.

Based on data reduction from interview result, then display data for sub-component of learning planning which obtained qualitatively can be seen in table 5.

Table 5. Display Data Sub Components Learning Planning

Sub-component	Qualitative data
Lesson Planning	Each teacher is required to prepare the learning device, and the lesson prepared by the teacher has not been made in detail

Based on table 5, the display of qualitative data obtained through interviews can be concluded that in the learning of teachers must prepare learning tools, and for RPP that has been made by the teacher outline has all components RPP, but not made in detail. It is necessary to make improvements in the preparation of RPP by teachers with attention to the components that must be improved so that learning planning can be made well for the future.

3.3 Process Components

Components of the process in this study are divided into 2 sub components, namely: a) the performance of teachers on the implementation of learning; and b) learners' motivation. Data collection techniques in this study used questionnaires with the respondent's teachers and learners, while for the sub-component of teacher performance in the implementation of learning interviews conducted to the principal aims to collect and complete the quantitative data collected through a questionnaire. For the sub-component of learning motivation of students of data collection techniques only by using questionnaires with teacher respondents and learners.

Table 6. Obtaining a mean score of sub subcomponents of teacher performance on implementation of learning with teacher respondents

No	Indicator	Average Score	Score max ideal	TPR	Category
1	Start Learning Effectively	4,55	5	90,91	Sangat Baik
2	Master The Learning Materials	4,25	5	85,00	Baik
3	Apply Learning Strategy	3,50	5	70,00	Cukup
4	Utilizing The Media In Learning	3,89	5	77,78	Cukup
5	Trigger And Maintain The Involvement Of Learners In Learning	3,64	5	72,73	Cukup
6	End Learning Effectively	3,47	5	69,33	Cukup
7	Using Various Assessment Methods	3,56	5	71,11	Cukup
	Overall Average Rating	3,84	5	76,74	Cukup

Based on table 6, it is seen that for all indicators in the sub-component of teacher performance in the implementation of learning with teacher respondents obtained overall average value 3,84 with TPR equal to 76,74% and included in enough category. Thus it can be concluded that according to the teacher for the sub-component of teacher performance on the implementation of learning is quite accomplished. Performance of teachers on the implementation of learning according to the results of quantitative research by using questionnaires to teachers need to be improved and make improvements as seen in table 28 namely: applying learning strategies, utilizing the media in learning, trigger and maintain the involvement of learners in learning to end the learning effectively and use various assessment methods to be better for the future.

Based on the data reduction from the interview result, the display data for the sub-component of teacher performance on the learning implementation obtained qualitatively can be seen in table 7.

Table7.Display Data Sub Component Teacher Performance On Implementation Learning

Sub component	Qualitative data
Teacher Performance On Implementation of Learning	Teachers have implemented learning in accordance with the lesson plan even though it has not been implemented maximally

From the sub-components of teacher performance on the implementation of learning with the respondent's learners obtained the following results:

Table 8. Acquisition of sub-average score components of teacher performance on implementation of learning with respondents learners

No	Indicator	Average score	Score max ideal	TPR	Category
1	Start Learning Effectively	4,25	5	85,06	Baik
2	Master The Learning Materials	4,01	5	80,26	Baik
3	Apply Learning Strategy	3,93	5	78,62	Cukup
4	Utilizing The Media In Learning	3,97	5	79,31	Cukup
5	Trigger And Maintain The Involvement Of Learners In Learning	4,00	5	79,91	Baik
6	End Learning Effectively	3,90	5	77,93	Cukup
7	Using Various Assessment Methods	4,06	5	81,26	Baik
	Overall Average Rating	4,02	5	80,34	Baik

This data collection technique uses a questionnaire with teacher respondents and learners. From the sub-component of learning motivation of

learners with teacher respondents obtained the following results:

Table 9. Acquisition of sub-average values component of participant's motivation to learn educated by teacher respondents

No	Indicator	Average Score	Score Max Ideal	TPR	Category
1	Orientation of success	3,17	5	63,33	Kurang
2	Anticipate failure	3,67	5	73,33	Cukup
3	Responsible	3,00	5	60,00	Kurang
4	Innovation	3,33	5	66,67	Cukup
5	Confidence	3,44	5	68,89	Cukup
	Overall average rating	3,32	5	66,44	Cukup

Based on table 9, it can be seen that for the indicator of success and responsibility of learners in learning, the average score of 3,17 and 3,00 with TPR is 63,33% and 60,00% and included in the less category. Thus it can be interpreted that in learning learners have not been well seen in terms of the orientation of success and responsibility of learners. This needs to be improved and improved both in terms of the orientation of success and responsibility of learners.

From the sub-component of learning motivation of learners with respondents learners obtained the following results:

Table 10. Obtaining the mean value of sub components of learning motivation learners with respondents learners

No	Indicator	Average Score	Score Max Ideal	TPR	Category
1	Orientation of success	4,19	5	83,86	Baik
2	Anticipate failure	3,96	5	79,14	Cukup
3	Responsible	3,68	5	73,53	Cukup
4	Innovation	4,00	5	79,93	Baik
5	Confidence	3,90	5	78,05	Cukup
	Overall average rating	3,95	5	78,93	Cukup

Based on table 10, it is seen that for the average value of all sub-components of learning motivation of learners with student respondents obtained a score of 3.95 with TPR of 78.92% and included in the category enough. Thus it can be concluded that the motivation of learners is considered sufficient by learners because students are still quite in anticipation of failure, responsibility and still quite confident in implementing learning.

3.4 Results

The result component of this study is the learning outcomes of learners which are seen from the even semester value of the academic year 2016/2017 on the subjects of basic automotive engineering skills X Class of Light Vehicle Engineering (TKR). The technique of data collecting on a component of this result is done by documentation study which obtained from a subject teacher that is even semester value of academic year 2016/2017 class X TKR.

The results of the study documentation of learning outcomes seen from the value of learners' knowledge consisting of, class X TKR 1, X TKR 2 and X TKR 3 on subjects that can be seen in table 11 below:

Table 11. Learning outcomes are seen from values knowledge of classroom learners X TKR

No	Class	Value of Learners Knowledge						Total Entire Participants
		Value < 75		Value = 75		Value > 75		
		Numer of Learnes	Percentage %	Number of Learners	Percentage %	Number of learners	Percentage %	
1	X TKR 1	0	0	3	4,5	18	26,9	21
2	X TKR 2	1	1,5	8	11,9	21	31,3	30
3	X TKR 3	2	3,0	1	1,5	13	19,4	16
	Total	3	4,5	12	17,9	52	77,6	67

Based on table 11, it can be concluded that the results in learning seen from the value of knowledge of learners in the even semester of the academic year 2016/2017 obtained 52 students with a percentage of 77.6% is complete with the results of learning with a value of good knowledge on the value of mastery learning, while there are 12 students with a percentage of 17.9% is complete with a score equal to the learning mastery. This needs to be improved again by the teacher and become the attention of the school for the achievement of learning outcomes of learners to be better again.

The results of study documentation of learning outcomes seen from the value of the skills of students consisting of, class X TKR 1, X TKR 2, and X TKR 3 on subjects with a value of mastery learning 75, which can be seen in table 12 below:

No	Class	Value of learners knowledge						Total Entire Participants
		Value < 75		Value = 75		Value > 75		
		Numer of Learnes	Percentage %	Number of Learners	Percentage %	Number of Learners	Percentage %	
1	X TKR 1	0	0	3	4,5	18	26,9	21
2	X TKR 2	1	1,5	11	16,4	18	26,9	30
3	X TKR 3	2	3,0	1	1,5	13	19,4	16
	Total	3	4,5	15	22,4	49	73,1	67

Thus it can be concluded that from 67 students who follow learning there are 49 students who complete with a good value with a percentage of 73.1%. While there are 15 people who complete with the same skill value with the value of completeness or complete learning with an unsatisfactory value, it needs to be improved again in order to achieve better learning outcomes for the future

4. CONCLUSIONS AND RECOMMENDATIONS

Based on data analysis and research result of evaluation of learning process of basic skill of automotive technique using CIPP model in SMK Negeri 2 Solok can be concluded that:

4.1 Context Components

Learning objectives have been achieved well, ie learners gain knowledge and skills and foster creativity in KDTO learning, although not all learners who can achieve it.

4.2 Input Components

Teaching plans made by teachers are well made, but still, need to be improved again and make improvements in the preparation of RPP with a complete and systematic that refers to standard processes and assessment standards that have been determined.

4.3 Process Components

The performance of teachers in the implementation of learning has been done, but still needs improvement and improving the performance of teachers in the implementation of learning such as implementing learning strategies, utilizing the media in learning and ending the learning effectively in accordance with the standard process. Furthermore, conducting an evaluation of the learning process that has been implemented and evaluation of the learning outcomes with reference to assessment standards.

4.4 Motivation learners learners

Motivation learners in the classification enough, thus the need for efforts undertaken by teachers and learners to better in the learning process. Motivation learners are important in the learning process because it can stimulate learners to be active in learning.

4.5 Results Component

Based on the completeness of learning that has been determined learning outcomes with the value of knowledge of students in good classification, from 67 students 52 students with 77.6% complete percentage with the above average value of learning completeness (KB = 75). While the 12 students with a percentage of 17.9% complete with the value of learning completeness limit, complete with results that have not been satisfactory because the new learning limit reaches completeness (KB = 75).

Meanwhile, based on the learning completeness that has been determined the learning outcomes with the students' skill value in good classification, from 67 students, 49 students with 73.1% completion percentage with the learning skill above (KB = 75). While 15 students with a percentage of 22.4% complete with the value of learning completeness limit, complete with the value of skills that have not been satisfactory because only

reached the limit of learning completeness (KB = 75).

4.5 Recommendations

Subject teachers Basic Technical Skills Automotive
1. Striving for the learning process is more optimal to achieve learning objectives better
2. Seek the preparation of a more complete and detailed learning implementation plan with reference to standard process and assessment standards.
3. Increasingly more about the application of learning model in accordance with the standard of learning processes such as using learning/research-based model (discovery/inquiry learning), project-based learning model, and problem-based learning model (problem-based learning).
4. Increasing the use of media in learning, applying activities centered on learners and ending learning more effectively, such as involving learners in concluding learning and follow-up in the form of assignment of individual or group, and inform the learning activity plan for the meeting next.
5. Strive for the addition of learning media through the department to the school.
6. Evaluate the planning and implementation of learning for subsequent improvements either independently or with other teachers in subjects.

School
1. Evaluate the learning process that has been done in order to increase the maximum learning result seen from the learning planning, and the learning process that has been implemented by the teacher.
2. Evaluate the facilities and infrastructure needed especially in subjects.

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IMPLEMENTATION OF CONTEXTUAL TEACHING AND LEARNING ON ANALYZING ELECTRICAL CIRCUITS SUBJECT

Dwi prima Elvanny Myori, Citra Dewi, Erita Astrid, Ilham Juliwardi

Department of Electrical Engineering, Faculty of Engineering, Universitas Negeri Padang

*Corresponding author, e-mail:elvannymyori@gmail.com

ABSTRACT: This research is established based on one of the factors that creates the low percentage of student's learning completeness in the subject of Analyzing Electric Circuit. The intended factor is the learning model. This research is conducted in SMK N 1 Pariaman by applying one of the learning models that is the Contextual Teaching and Learning model to observe its effect in student's learning outcomes. This model contains some components that can emphasize students to be more active and participate. The purpose of this research is to determine the improvement of student's learning outcomes in the subject of Analyzing Electric Circuits by implementing Contextual Teaching and Learning model. The type of this research is Quasi Experiment with pretest-posttest one group design and the instruments used to see the results of the applied model are pre-test and post-test.Those instruments must be tested for validity, reliability, differentiation, and difficulty before being used. The results obtained from this research are included into the medium category to improve the student's learning outcomes after implementing the Contextual Teaching and Learning model.

Keywords: *contextual teaching and learning, learning outcomes*

1. INTRODUCTION

Education is a deliberate and well-planned effort to help the student's potential and ability developments to be useful for their life as an individual and a citizen in a society in the future and it must touch their potential of conscience and competence. The concept of education will be more important when they have to enter a life in the society and work environment. This concept is similar to the concept applied in Vocational High School. The students are expected to be able to implement what they have learned in the school to face the problems in their daily life. The Vocational High School is a secondary school that produces graduated students who have certain skills to work in business and industry area.

The students are being the object that determine the school's success performance in educational process. The school's successfulness in teaching their students is determined by the results of students' learning outcomes obtained during the study process. There are many components that could be one of the factor to acquire these results. The first one is the difficulty level of the subject learned by student. Each subject has the different level of difficulty and it requires the proper techniques and methods. The second one is the teacher's role to manage all study process in the school. The third one is the applied learning model used to ensure those process is working well and optimally.

Based on the observation results at grade X TITL of SMKN 1 Pariaman, the study process is still centered and depend on the teachers. The teachers stand in front of students to explain and deliver all the subject matter content with the speech method without involving students to be more active during the study process. This method resulted students accustomed to come, sit, listen, make a note, and memorize the subject material without trying to get more information about it. The study process also tends to focus only in particular subject. The students's learning outcomes are assessed only based on academic exam activities such as midterm and final exam. The assessment is supposed to include all the student's involvement in studying activities such as the attainments, recording appearance, daily test, etc. As a result of this learning method is the students tend to do things that can interfere the study process during the class such as bothering their friends, playing with their phone, sleeping, etc. Moreover, the students are not able to implement the subject content that they have learned in daily life, stuttering to their own problem because they are not accustomed to think critically and working in a team during the class. This kind of learning model is still found in the studying process for the subject Electrical Circuit Analysis.

Electrical Circuit Analysis is a subject that learn about how to describe the basic concept of electrical circuit, analyze AC and DC circuit and also magnetism circuit. It is one of subjects that educate, train, and prepare the students to

understand the concept of electrical circuit in field of electricity.

Based on the observation results conducted in SMKN 1 Pariaman, some students' scores are still below minimum passing criteria (Kriteria Ketuntatasan Minimum / KKM) established by school, which is 75 in range of 0 – 100. There are 67.1 % of students obtain the scores below KKM and 32.9 % above KKM for the subject of Electrical Circuit Analysis. That scores indicate that the percentage of students' learning outcomes is considered as low criteria since more that 50 % of students' scores are below 50 %. It is occurred due to the incompatibility of learning process during the class.

Learning outcomes can be seen as an indicator of students' fruitfulness at school. These results can be used as a reference or consideration to determine the students' ability. The participation of many parties is required to improve student learning outcomes associated with their efforts to improve the quality of education. Besides, an optimal approach is also needed to achieve the desired learning outcomes for the subject of Electrical Circuit Analysis therefore students really want to study hard and has deep understanding.

One of the teacher's efforts to improve students' understanding and learning outcomes in this subject is by applying a learning model that is integrated with the students' daily context. This model will produce a basic deep knowledge where they could understand the problem and the way to solve it. The students are able to use their knowledge independently to solve new and unprecedented problems and have more responsibilities to learn as their experiences and knowledges improvement. Meanwhile, the teachers have more important roles as communicator, motivator and facilitator to create successful students. All the efforts are established to improve the students' learning outcomes in a better way therefore they can getthe scores according to KKM.

The objective of Electrical Circuit Analysis has not been achieved as expected due to the low percentage of student's learning outcomes in this subject. The roles from various education aspect especially teachers are highly required to achieve this purpose. Teachers are expected to implement varied learning model. One of innovative learning model could be implemented is Contextual teaching and Learning model.

2. CONTEXTUAL TEACHING AND LEARNING

Contextual Teaching and Learning (CTL) is a comprehensive system that consist of some parts which are connected to each other. This system generates the overwhelming effects that can exceed the results given by separate parts. Like the features of violin, cello, clarinet, and other musical instruments in an orchestra, they produce different sound each other but these sounds will perform a music with good combination and harmony, as well as the separate parts of CTL that involves different process. When it is used together, it enables students to create the meaningful relationship. Every different part of CTL gives contribution to help the students to figure out the assignment given by teacher and it forms a system that allows the students to see the meaning of it and recall the academic material [8].

CTL model is a strategy that fully involves students in learning process, they are encouraged to learn the subject material according to the topic to be studied. In the context of CTL, students are not only sitting quietly, listening, and writing notes but also they have to be more active and take apart in teaching and learning process and also experience it directly. Therefor the students' development is completely occurred through this process not only in cognitive aspect but also in affective and psychomotor aspects. Furthermore, students are also expected to find and prepare the subject matter content themselves.

2.1 Characteristics of Contextual Learning

Johnson [8] said that a CTL system consist of eight components that become the characteristics in contextual learning as follows:

a. Making meaningful connection.
b. Doing significant work.
c. Self – regulated learning.
d. Collaborating.
e. Critical and creative thinking.
f. Helping the individual to grow up and develop.
g. Reaching high standard.
h. Using authenthic assesment

2.2 Contextual Learning Components

Rusman [7] stated that CTL is characterized by seven components as follow,

2.2.1 Constructivism

Contructivism is cornerstone of thought (philosophy) in CTL which stated that the knowledge built by human gradually and the result are expanded through limited context.

2.2.2 *Inquiry*

Inquiry is a main activity of CTL through the discovery effort. It affirms that the necessary knowledge, skills and other abilities are not the result of remembering a number of facts but they are the result of own discovery.

2.2.3 *Questioning*

Implementing of questioning elements in CTL must be facilitated by teachers. The students' habit to ask the question and the teacher's ability to answer the question will improve the learning quality and productivity.

2.2.4 *LearningCommunity*

The purpose of the learning community is to get the students to work together and utilize the learning resources from their study group.

2.2.5 *Modeling*

The stage of model construction can be used as an alternative to develop the learning process therefor the students can meet their expectation thoroughly and help them to overcome the teacher's limitation.

2.2.6 *Reflection*

Reflection is the ways of thinking about what the students have learned and thinking about what they have done in the past. In this case, the students put fordward what they have learned as a new knowledge structure either in the form of enrichment or revision of prior knowledges. In the reflection moment, the students are given the opportunity to consider, compare, understand, and perform the discussion with themselves (learning to be).

2.2.7 *AuthenticAssesment*

The assessment is an integral part of learning that has the crucial function to gain the information from learning process through the implementation of CTL. This is the process of collecting various data and information that can provide an overview of the students' learning experiences. The assessment is done in authentic form in order to reduce the students do copy paste to the other friends' work. Assessment is authentic when teachers direct examine student performance on worthy intellectual task.

2.3 Advantages and Disadvantages of Contextual Teaching and Learning Model

This model has several advantages [7], such as:

1. It can develop student thinking to perform meaningful learning activity.
2. Students can study, discover, and construct their new knowledges and skills by themselves.
3. It can carry out as far as possible the inquiry activity for all topics being taught.
4. It can develop students' curiosity through raising questions.
5. It creates learning community such as discussion group, question and answer, etc.
6. It presents the model as an example of learning. It can be illustrations, model, and actual media.
7. To familiarize the students to do the reflection in every learning activity that has been done.
8. Doing the objective assessment such as evaluating the actual students' abilities.
9. Inventing the new things from learning outcomes.

Besides, there are several disadvantages of Context Teaching and Learning [7], such as:

1. Students with though disorder (having some problem in the way of thinking) will be difficult to follow this kind of learning model.
2. The teacher must understand the subject matter content very well because it can be a burden when the students discover the new things related to the subject during the learning process and it also can lead a mistake to determine the learning outcomes.

3. MAIN RESULT

The data used in this research is the result of the learning outcomes for the subject of Electrical Circuit Analysis in grade X TITL 2 in SMKN Pariaman. Prelimenery data is obtained based on the result of pre-test of 34 students. The students' scores for this test are around 56 – 80. Then for the final data, all students are given by post – test after they receive the learning process by using the Contextual teaching and Learning model. The students' scores are increased into 68-92.

Table 1 and 2 below show the summary of scores and distribution of frequency data obtained from this research.

Table 1. The summary of the highest score , the lowest score , mean scoreand standard deviation of pre – test and post - test

	The highest score	The lowest score	$\bar{X}$	N	S
Pre-test	80	56	68.91		5.67
Post-test	92	68	83.26	34	6.01

Table 2. Frequency distribution of pre-test and post-test

Range of scores	Frequency of Pre-test	Frequency of Post-test
56	2	1
60	4	3
64	6	5
68	12	6
72	6	12
76	3	4
80	1	3
The total	34	34
Mean	68.91	83.26
Standard deviation	5.67	6,01

From the tables above, it can be seen that most frequencies for the pre – test result achieved by students are in the interval 68-71. The result indicates that many students have not reached the minimum passing criteria of studying. Meanwhile, students achieve most frequencies for the post-test results in interval of 84-87. It shows that there is an improvement of learning outcomes after applying the CTL model.

3.1 Normality Test

Normally test is conducted to see if the data from class that being the subject of the observation is distributed normally. This test uses chi-squared method with the manual calculation. The result is obtained from the value comparison of $\chi^2_{calculation} < \chi^2_{table}$ on the research subject with the significant level is $\alpha = 0.05$ and the degree of freedom is 6.

Table 3. The result of Normality test for pre-test and post-test

	N	$\chi^2_{calculation}$	χ^2_{table}	D.
Pre-test	34	3.56	12,59	Normal
Post-	34	2.34	12,59	Normal

3.2 Improvement of Learning Outcomes

The learning outcomes of Electrical Circuit Analysis is achieved after implementing the *Contextual Teaching and Learning*model that can make students be more active and participate in the learning process. In overall, this model is successfully implemented to 34 students by conducting pre-test and post-test. Based on the data analysis by using Gain scores, the scores are increased by 0.462. Therefor, it can be explained that the learning outcomes of this model has the improvement in medium category.

From the above explanation, it can be concluded that the learning process by using the Contextual teaching and learning model can improve students' learning outcomes because there is significant improvement of learning outcomes between pre-test and post-test.

4 CONCLUSION

Based on data anaylisis and discussion above, it can be concluded that Contextual teaching and learning model can improve the students' learning outcomes in every meeting for the subject of Electrical Circuit Analysis in SMK Negeri 1 Pariaman. This model is conducted by applying two kind of test to compare the result, pre–test and post-test. The result of pre-test is obtained before CTL is applied and the mean score for this test is 68.91 while post-test is obtained after CTL is applied and the mean score of this test is 83.26. By using the Gain Score test, we get the improvement of learning outcome by 0.462 and it can be included into medium category.

5 ACKNOWLEDGEMENTS

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7 AUTHOR'S BIOGRAPHY

DwiprimaElvannyMyori was born in Palembang, South Sumatera, in 1988. She receivedthe Bachelor and Master degree in Mathematics from AndalasUniversity, West Sumatera, Indonesia, in 2010 and 2012, respectively. Since 2012, she has been with the Engineering Faculty ofUniversitasNegeri Padang, West Sumatera, Indonesia.

Citra Dewi, was born in 1989. . She receivedthe Bachelor degree in electrical engineering from UniversitasNegeri Padang and Master degree inelectrical engineering from Gajah Mada University, in 2011 and 2014, respectively. Since 2014, she has been with the Engineering Faculty ofUniversitasNegeri Padang, West Sumatera, Indonesia.

Erita Astrid,a results-oriented electrical engineer operations and optimizations, power quality and energy management system. She graduated from National Sun Yat-Sen University (NSYSU), Taiwan for Master Degree in field of Electrical Engineering on June, 2016. Currently, she works as a junior lecturer in UNP, West Sumatera, Indonesia.

Ilham Juliwardi was attended undergraduate education in Electrical Engineering Universitas Negeri Padang from 2012 until 2016. And now he is attending a master's degree in postgraduate of Universitas Negeri Padang.

8 AUTHOR'S CONTRIBUTIONS

Conception and design : Dwiprima Elvanny Myori, Ilham Juliwardi, Citra Dewi

Administrative support : Dwiprima Elvanny Myori, Citra Dewi, Erita Astrid

Collection and assembly data : Dwiprima Elvanny Myori, Ilham Juliwardi

Data analysis and interpretation :Dwiprima Elvanny Myori, Ilham Juliwardi

Drafting the article : All authors

Final approval of the version to be submitted : All authors

9 ETHICS

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved.

DOMESTIC EMPLOYMENT PROCESSING SYSTEM ON WORKING PROTECTION AND TRANSMIGRATION USING GEOGRAPHIC INFORMATION SYSTEM (GIS)

Eddis Syahputra Pane[1], Kori Cahyono[2]

[1] Faculty of Engineering, Universitas Negeri Padang, Indonesia

ABSTRACT: Geographic information systems (GIS) are used in spatial and thematic data processing that can display information such as the detailed distance between regions, locations, facilities and much other information. Users utilize the information for various purposes such as research, development, area design and natural resources management. SIG provides a more interactive map information service. Users access geographic information using computers, laptops, smartphones, web-browsers via the internet network. The purpose of this research is to build GIS in the Office of Manpower and Transmigration of Pekanbaru City to provide ease of supervision in the processing of foreign workers data and information (TKA), monitoring of address and work location so as to facilitate the process of monitoring and evaluation, program documentation and report. The development of web-based GIS using waterfalls model and Macromedia dream weaver 8.0 software, Xampp, Google Map APIs and MySQL database. The results showed that GIS effectively provides ease of data management and information services of foreign workers optimally on the Department of Manpower and Transmigration Pekanbaru. Users are satisfied (97.50%) with GIS information services available online and accessible regardless of space and time limits.

Keywords: *Geographic information system (GIS), Foreign Workers (TKA), Web*

1. INTRODUCTION

Riau is one of the developing provinces in Indonesia which is well known for its production of oil palm plantations (CPO), oil and gas (MIGAS). Riau's popularity as an industrial area has an impact on the entry of foreign investors or foreign investors who want to do business or build a business related to the petroleum industry. The influx of investors and foreign investors has triggered the coming or importation of foreign workers who are considered to have a competitive advantage in terms of education and technology mastery to enter Indonesian territory, including Riau with the aim of working.

To realize the legal order in employing foreign workers, a regulation that regulates foreign workers from Indonesian labor regulations to Indonesian immigration regulations is required. In article [11] on Manpower, it is explained that to hire foreign workers required written permission from the Minister or appointed official. Therefore, foreign employers must submit a foreign employment plan (RPTKA) to obtain foreign worker (IMTA) license.

Foreign workers after obtaining a work permit from the Ministry of Manpower, are required to apply for a working visa that is a limited stay visa to further obtain a limited stay permit. The residence permit is a valid proof of existence for foreigners to reside in the territory of Indonesia. Without a residence permit, the presence of foreigners in the territory of Indonesia is not desired. It is also to implement an immigration policy that is selective politics towards foreigners who enter the territory of Indonesia. Visas and residence permits indicate activities to be performed by foreigners in the region. So foreigners are not required to perform activities other than or not in accordance with the intent of granting visas and residence permits.

Implementation of manpower duties in the framework of national development with the insight of the archipelago is done by applying selective principles, namely foreigners who can provide benefits for the welfare of society, which does not endanger the security and order, and not hostile to the people, nation and state, to enter the territory of Indonesia. Therefore, there is a need for regulation and limitation in the form of permits granted to foreigners including foreign workers who want to live to work in Indonesia, and law enforcement in the form of labor inspection and immigration`

Based on the background of problems that have been described, the authors formulate the problem as follows:

a. How to make the analysis and mapping of areas for data collection and recapitulation of Foreign Workers in Pekanbaru well-documented.

b. How to create a system that can provide information on the Office of Manpower and Transmigration Pekanbaru using Geographic Information System for more detail data collection and position of Foreign Workers in Pekanbaru

The purpose of this study is to help:

a. Creating GIS at the Office of Manpower and Transmigration Pekanbaru, aims to deliver information more widely, quickly and accurately under the supervision of Foreign Workers in Pekanbaru.

b. With this web, gis-based information system, the Pekanbaru Manpower, and Transmigration Office will be easier and faster in the supervision and presence of Foreign Workers in Pekanbaru as well as stakeholder monitoring (immigration, police, community, business, and industry)

2. THE PREVIOUS LITERATURE

a. Understanding the Internet

Internet comes from the interconnection network and the connection of various computers and various types of computers that form a network system that covers the whole world (global network) and telecommunication such as telephone lines, satellite, infrared, wireless and more.

b. HyperText Transfer Protocol (HTTP)

HTTP is a protocol that defines the rules to be followed by the web browser in the request or take a document and by a web server to provide documents requested by the browser. HTTP is the standard protocol to date.

c. World Wide Web

World Wide Web is a network that is formed on the internet. The term comes from the WWW consortium held in 1994, to develop a standard for Web technology.

d. Geographic Information Systems (GIS)

Geographic information about the surface of the earth and all objects on it, which is the framework for the regulation and organization for all further action. In Denny Carter[2].

GIS is defined as a system (computer-based) used to store and manipulate geographic information. GIS is designed to collect, store, and analyze objects and phenomena in which the geographic location is an important characteristic in Bearman [1], Imrich Jakab[4] Prahasta [8], Z. Aslıgül Göçmen [12]

e. Uniform Resource Locator (URL)

Uniform Resource Locator is the address that specifies the location information of a file on a web server. Where the address consists of:

- The protocol to use a browser to retrieve information
- The name of the server computer where information is stored
- Line or path and filename of an update.
- The general format of the URL is as follows:

Protokol_trasfer: // nama_host / path / filename
Example: http://www.fith.com/technic/index.php
Where: http is the name of the protocol.
www.fith.com is the name of the host.
Technic/index .php is the path and file name.

f. Web Browser

The browser is a program designed to request information from a server and display it.
The browser is often used is as follows:
- Internet Explorer from Microsoft
- Mozilla Firefox
- Linux working on the Unix operating system
- Artificial NCSA Mosaic
- Netscape Navigator from Netscape Communications
- Opera from Opera Software ASA

g. Definition Database

A database is a complex object to store information structured, organized and stored in a way that allows the wearer can retrieve information quickly and efficiently. The information is broken down and stored in a table and each table stores entities-entities that are different from one another Nugroho B [6].

h. Database Management System (DBMS)

DBMS is software that serves to manage the database, ranging from making the database itself, through processes that apply in that database, either in the form of entry, edit, delete, a query against the data, create reports and so effectively and efficiently. One type of DBMS that is most popular today is the Relational DBMS (RDBMS), which represents the data in the form of tables that are interconnected. A table is organized in the form of rows (records) and columns (fields).

Lots developing RDBMS software, such as MySQL, Oracle, Sybase, dBase, MSSQL, Microsoft Access (MS. Access) and others. Basically, a lot of people are using MySQL as the database, especially in creating websites for MySQL is considered to be a couple of PHP

j. PHP Hypertext Preprocessor (PHP)

According to official documents PHP, PHP stands for PHP Hypertext Preprocessor. It is a form of language scripts that are placed in the server and processed on the server. The result web browser.

PHP first was found by Rasmus Lerdorf, Prasetyo [7], a Unix programmer and Perl that time. He tried to spend his spare time to create a macro-Perl CGI script, which initially aim is only to know anyone who saw the writing on his personal homepage. And with the presence of a script that made a lot of response from existing netters, then developed rapidly into a programming language widely used web server millions internet. And finally, PHP develops so quickly that php become a mainstay for building sites-sites large and small, and are categorized as the most popular free software.

PHP is a language that uses a script to create dynamic web pages, meaning dynamic web pages that will be displayed when the page is requested by the client. This mechanism took information received by the client up to date, all PHP scripts are executed on the server where the script is run. Therefore, the specification of the server has more influence on the execution of PHP script than specifications client. Still, note that the resulting web page should certainly be open to the client.

k. Apache

Apache web server is a program that is open source. With a computer can be a web server to store the files into the htdocs folder belong to Apache. To access it simply pressing localhost URL address in your Web browser.

l. MySQL

MySQL is a database software developed by a Swedish company called MySQL AB, who was named TcX Consulate Data AB. At first MySQL AB wearing mSQL or "mini SQL" as the interface is used, apparently using mSQL it encountered many difficulties because it is very slow and inflexible. Therefore, MADCOM[5] Michael Widenius ("monthly"), her nickname, trying to develop The interface so discovery MySQL.

Until now, MySQL can be run as an operating system although initially, MySQL can only run on a Unix system and its variants. MySQL database server into open source is very popular and is an RDBMS that has the ability to very quickly to be able to run SQL (Structured Query Language) with multi user. Therefore, by looking at the high potential so MySQL database to serve as a reliable, all feature continued support is developed so that users can more optimally MySQL in use. Then it will be a pleasure for computer users who use Microsoft Windows as the operating system because MySQL can also be used in Microsoft Windows.

m. Google Maps

Google Maps mapping service is an online tool that gives the user a variety of features such as map display street maps, steering the direction of point-to-point, and the lines to find business locations in various cities. With the addition of street maps and terrain view, satellite or aerial views may give the appearance that is easy to understand user and is accessible to anyone via an online connection Prahasta [9].

n. Macromedia Dreamweaver 8

Macromedia Dreamweaver 8 is a software used to create web pages that are supported by the wizard-wizard contained within the software. Macromedia Dreamweaver has the advantages of other software, in which there has been a wide variety of programming languages such as PHP, ASP, HTML, Coldfusion and others Sugiyanto [10].

Not only programming course, Dreamweaver 8 also can help us in web design and animation with menus and tools available and has the function of each. In making this web I use Macromedia Dreamweaver 8.

3. METHOD

Research methodology and research framework used in the completion of this research. This framework is the steps that will be done in order to solve the problem to be discussed. The stages in the modeling used are Waterfall model, and can be seen in the picture below:
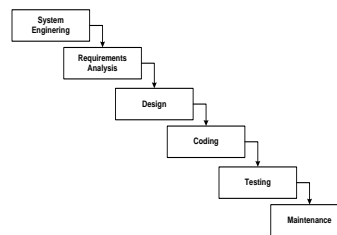
Fig.1 Waterfall Model

3.1 Problem Analysis

Step analysis of the problem is to be able to understand the problems that have determined the scope and limits. By analyzing the problem that has been done, it is expected that the problem can be well understood. The analysis technique used with the following steps:

a. Stage identify are: identifying the problems occurred
b. Stage understand namely: to understand more about the problems that exist in a way to collecting the necessary data.
c. Analyze Phase, namely: look for the weaknesses of existing systems and collect information about needs further required by the user.

3.2 Data Collection

The field research is intended to obtain information directly from the company and also the world of internet. The data collection techniques used are:

a. Observation, namely the collection of data and information that is made by observing directly to the object, and also analyzes the current system, as well as observe a geographic information system (GIS) that already exists in Google Maps.
b. Interviews, namely data collection by way of question and answer with the relevant parties, namely Head of Manpower and Transmigration Office Pekanbaru

3.3.Input-Output Design of GIS Web Based

At this stage of designing the input-output using PHP Application Dreamweaver Macromedia version 8 and using MySQL Database using tools in the program.

3.4 Location Research

The research was conducted at the Office of Manpower and Transmigration Pekanbaru Jl. Samarinda I No 29 Pekanbaru [2]

3.4.1 Type of Data

a. Primary Data
Primary data is data obtained from the original sources. The original source here interpreted as

the first source from which the data was obtained.

b. Secondary Data

Secondary data is data obtained or collected from documents available literature and journal`

3.4.2 Data Collection Techniques

a. Observation Techniques

Researchers conducted direct observation to determine the localized research and witness firsthand the existing systems in the study.

b. **Mechanical Library Research**

Researchers also conducted a literature study to looking for scientific theories which can support through literature-literature in the library or from other sources.

c. **Laboratory Research**

The research was done by using a computer that is supported by hardware and software

3.5 Road Map Research

In order for this research is more focused then we hereby present research roadmap as a benchmark for the success of this system.
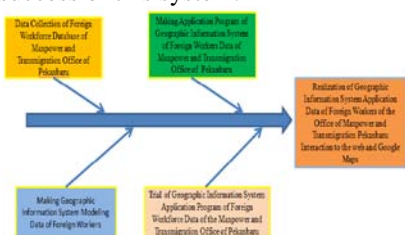
Fig.2 Road Map Research

4. ANALYSIS AND DESIGN SYSTEM

Analysis of this system is the decomposition of a complete geographic information system into its component parts with a view to identify and evaluate the problems, opportunities, barriers that occur and needs of companies that are expected to be proposed improvement.

Systems analysis phase aims as the basis for designing or upgrading the old system. From the results of the analysis can be designed or improved into a system that is more effective and efficient

4.1 Software Architecture

Table 1. Software Architecture

User	Right	Assignment

| Admini strator | Manage SIG Office of Manpower and Transmigrati on Office Pekanbaru Supervision Section | - View and delete user data.
 - View and delete data
 - Provide web confirmation about map data addition map information, edit and update data
 - Manage map data, categories, map legends |
| User | Supervision Section | - Supervision Section can view information presented system.
 - Community can more detail all geographic information data online presented through a digital map that connects to Google Map APIs |

4.2 Specification File

The specification file is used to design the system because this file will determine the physical structure of the database and data types. the structure of the database file which is proposed as follows:

a. Table User

Table Name	: User
Database Name	: disnaker.Sql
Primay Key	: password

Table 2 Table User

No	Name	Type	Size	Dec
1	username	Varchar	50	Nama User
2	password	Varchar	50	Password
3	nama_instansi	Varchar	100	Instansi
4	alamat	Varchar	225	Alamat
5	jabatan	Varchar	15	Jabatan
6	email	Varchar	100	Email
7	no_telp	Varchar	20	No Telp
8	level	Varchar	20	Level User
9	blokir	Enum		Blokir
10	Id_sesssion	Varchar	100	Id Sesssion

b. Table Kategori

Table	: Kategori
Database Name	: disnaker.Sql
Primay Key	: id_kategori

Table 3 Table Kategori

No	Name	Type	Size	Dec
1	Id_kategori	Int	5	Id Kategori
2	nama_kategori	Varchar	50	Kategori
3	kategori_seo	Varchar	100	Seo
4	jenis	Varchar	100	Jenis
5	aktif	Enum		aktif

c. Table Menu

Table Name	: Menu
Database Name	: disnaker.Sql
Primay Key	: id

Table 4 Table Menu

No	Name	Type	Size	Dec
1	Id	Tinyint	3	Id Menu
2	Parent_id	Tinyint	3	Parent id
3	judul	Varchar	100	Judul
4	url	Varchar	100	Alamat url
5	menu_order	Tinyint	3	Menu order

d. Table Locations
    Tabel Name   : Locations
    Database Name   : disaker.Sql
    Primay Key   : id_locations

Table 5 Table Location

No	Name	Type	Size	Dec
1	id_location	Int	10	Id lokasi
2	id_kategori	Int	5	Kategori
3	Username	Varchar	30	Alamat email
4	Judul	Varchar	100	Judul
5	Judul_seo	Varchar	100	Judul seo
6	description	Text		Tanggal
7	latitude	Double		Latitude
8	longitude	Double		Longitude
9	address	Varchar	145	Alamat
10	nobangunan	Varcahr	12	NoBangunan
11	telepon	Varcahar	10	No Telepon
12	kodepos	Varchar	15	Kode Pos
13	hari	Varchar	20	Hari
14	tanggal	Date		Tanggal
15	jam	Time		Jam
16	gambar	Varchar	100	Gambar
17	gambar2	Varchar	100	Gambar 2
18	dibaca	Int	5	Dibaca

e. Table Modul
    Table Name   : Modul
    Database Name   : disnaker.Sql
    Primay Key   : id_modul

Table 6 Table Modul

No	Name	Type	Size	Dec
1	Id_modul	Int	5	Id modul
2	nama_modul	Varchar	50	Modul
3	link	Varchar	100	Link
4	Static_content	Text		Statik
5	gambar	Varchar	100	Gambar
6	publish	Enum		Publikasi
7	status	Enum		Status
8	aktif	Enum		Aktifasi
9	urutan	Int	5	Urutan
10	Link_seo	Varchar	50	Link seo

f. Table Hubungi
    Nama Tabel   : Hubungi
    Nama Database   : disnaker.Sql
    Primay Key   : id_hubungi

Table 7 Table Hubungi

No	Name Name	Type	Size	Dec
1	Id_hubungi	Int	5	Id hubungi
2	Nama	Varchar	50	Nama

3	Email	Varchar	100	Email
4	Subjek	Varchar	100	Subjek
5	Pesan	Text		Pesan
6	tanggal	Date		Tanggal

4.3 Input Design

a. Design Home
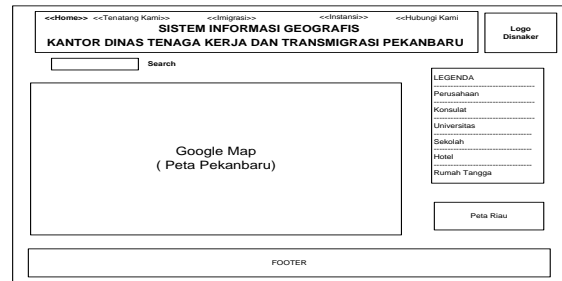
Fig.3 Design Home

b. Desain Menu Disnaker
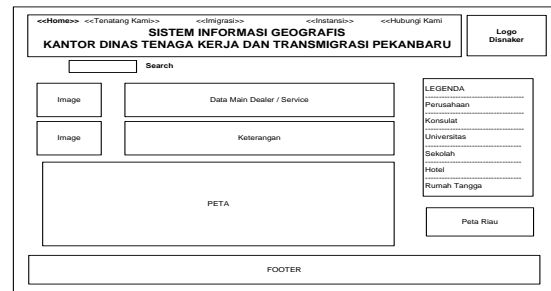
Fig.4 Design Menu Disnaker

c. Desing Menu Instansi
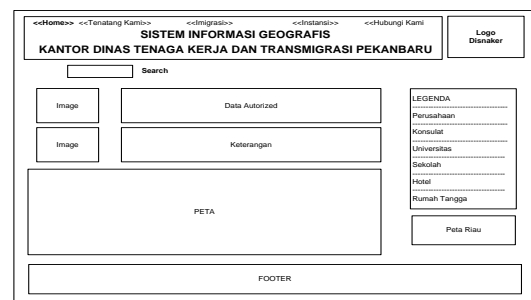
Fig.5 Design Menu Instansi

d. Design Login User
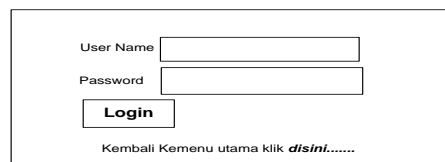
Fig.6 Design Login User

e. Disain Manajemen admin
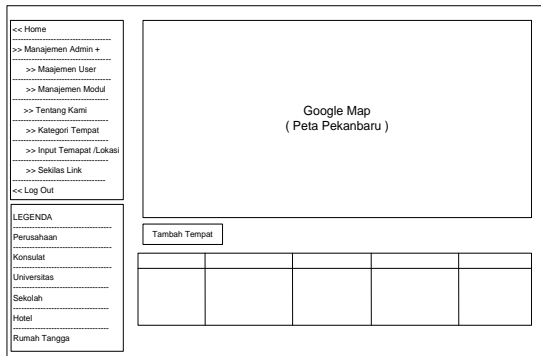
Fig.7 Design Management Admin
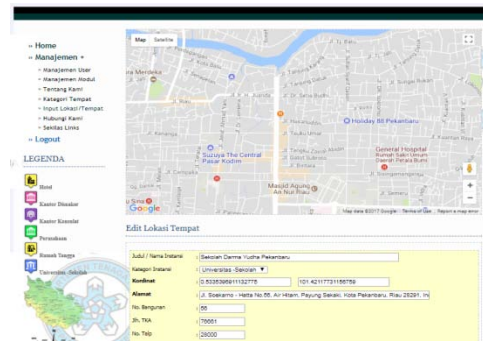
4.4. Program Implementation

The first step of the use of this program is to call the initial appearance of Geographic Information System of the Office of Manpower and Transmigration Pekanbaru by typing http: // localhost / disnakergis. it will appear main page:

a. Home web gis Office of Manpower and Transmigration Pekanbaru

Fig.8 Home web gis Office of Manpower and Transmigration Pekanbaru

b. Login admin page

Fig.9 Login admin page

c. Menu admin page

Fig.10 Menu admin page

d. Input Data of Foreign Workers

Fig.11 Input Data of Foreign Workers

e. List Corporate Data Users Of Foreign Workers

Figure 12.List Corporate Data Users Of Foreign Workers

5. CONCLUSION

5.1 Conclusion

The conclusions of the results of this study are as follows: (1) Geographic Information System (GIS) Application as one means of media control of foreign worker's fortitude, information without being limited by space and time especially to the supervision section of Foreign Workers; (2)The application is user friendly and easy to use are satisfied (97.50%) with GIS information services; (3)With the existence of Geographic Information System (GIS), can accelerate access and good service in the delivery of information, acceptance of information and utilization of information from alien foreign employment in Pekanbaru and surrounding areas with no recognition of space and time limitation.

5.2 Recommendations

Some suggestions are intended for the material development of this system, as for suggestions include:(1)Conducting training to officers in using geographic information system in order to run smoothly and functioning optimally.(2)With this facility is expected to help the labor inspectors and stackholder to know all information about the Foreign Workers on the Office of Manpower and Transmigration Pekanbaru with ease, with it

properly this website treatment can be done continuously.[3]Should be added input user in the form of search criteria info, Data Input Consultation, Data Input Complaint.

6. ACKNOWLEDGMENTS

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CONDUCTING LABOR MARKET ASSESSMENT IN ENGINEERING CURRICULUM DEVELOPMENT

Edi Septe[1], Suryadimal[2], Wenny Marthiana[3], Nizwardi Jalinus[4], Ramli[5]

[45] Fakultas Teknik, Universitas Negeri Padang, Padang, Indonesia
[123]Fakultas Teknik Industri, Universitas Bung Hatta, padang, Indonesia

ABSTRACT: Engineering education is one of the most significant components of the human resource development. In order to achieve competitiveness with advanced countries, human resource development policies have to be changed. The curriculum has to be made dynamic to take into account in changes of technologies and lab our demand. The curriculum Development based on labor market assessment is the key factor to make the dynamic curriculum. Labor market assessment can be done through four approaches, that are: employer surveys, extrapolation, the econometric and job vacancy. Based on labor market assessment we can identify the technology development at workplaces and competency profile of engineering manpower and determination of the strengths and weaknesses of the engineering system. Through the design and developing process that is translated into the curriculum which stronger links between the worlds of education and work**.**

Keywords: Labor Market Assessment, Curriculum Development, Occupational Analysis, Engineering Education

1. INTRODUCTION

Engineering education is one of the most significant components for the human resource development spectrum which has great potential for adding value to the products and services, contributing to the national economy and improving the human quality of life. Each country develops its education system through considering specific socioeconomic and cultural identities to fulfill the times changing to ensure that the outcomes reach all sections of society [1].

The number and type of Engineer manpower requirements depend on the state of development in a particular country. In developing countries, the required labor is innovators, engineers and technicians engineers proportion is comparatively larger than underdeveloped countries. While in a developed country, number of innovators, managers and technician engineers is still greater as compared to developing country. The globalization of markets is accelerating the diffusion of technology and the pace of innovation. New occupations are emerging and replacing others. Within each occupation, required skills and competencies are evolving, as the knowledge content of production processes and services is rising [2].

In order to achieve competitiveness with advanced countries, human resource development policies have to be changed. The curriculum is to be made dynamic to take into account changes in technologies and labor demand. That means curriculum is the key factor in engineering education.

The philosopher Hoffer (1973) once reflected that "In a time of drastic change it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that no longer exists"[3].

Curriculum was defined by many authors in varying contexts. A review of literature produced by various writers reveals marked differences in the way each perceives and defines the term curriculum as follows.

Bobbit (1918) defined curriculum in two ways. The first is as the range of experiences directed to develop skills in the individuals. The other one is as the series of training experiences that schools utilize to complete and perfect that development. Tyler (1949) assured that curriculum is all the learning experiences planned and directed by the school to reach the school's educational goals. Similarly, Arrieta (1995) defined curriculum as the series of things that children and teenagers have to perform and experience to develop abilities that would form them to decide upon issues in their life as adults [**4**].

Taba (1962) stated that a curriculum usually contains a statement of aims and objectives, it indicates some selection and organization of content, it either implies or manifests certain pattern of learning and teaching, because the objectives demand them or because the content organization requires them. Finally, it includes a programme of evaluation of the outcomes. [1]-[4].

Saylor (1966) stated that curriculum encompasses all learning opportunities provided by the school. Johnson (1967) described the term curriculum as structured series of intended learning outcomes. Burns and Brooks (1970) stated that a curriculum is a plan for the arrangement of information and experiences which educator consider necessary for children to cope with successfully in life. It is further stated that

curriculum is defined as everything that is planned to happen to a learner with a view to enhancing, investigating or modifying predetermined behavior.

Jenkins et. al., (1976) expressed that a curriculum is the formation and implementation of an educational proposal, to be taught and learned within a school or other institution, accepts responsibility at three levels, its rationale, its actual implementation and its effects.

Rubin (1977) stated curriculum to encompass the total impact of the school environment on the learner. Lawton et. al., (1978) defined curriculum as all the learning which is planned and guided by the school, whether it is carried out in groups or individually, inside or outside the school. He divides the curriculum into four aspects: curriculum objectives; knowledge; learning experiences; and curriculum evaluation.

Doll (1978) expressed that curriculum emphasizes guided, preselected experiences to which children and youth should be exposed; plans for learning; ends and outcomes of being educated and system for achieving educational production.

Harris et. al., (1978) stated that the term curriculum is used in a broad sense to include the totality of what is to be taught in school, the relationship between subjects, teaching materials, teaching methods, technological and other aids and organization of teaching-learning.

Tanner Daniel (1980) stated that curriculum is planned action for instruction. Burshoff (1981) stated that curriculum is an education project defining goals, aims and objectives of an educational action; ways, means, activities employed to achieve these goals; method and instruments required to evaluate the success of the action.

A publication of CPSC (1982) stated that curriculum of a course has been defined as an educational programme designed and implemented to achieve specified educational objectives and Choate (1987) stated that the curriculum is that set of courses and instructional experiences afforded to students.

Taking above into consideration, the curriculum is viewed as a plan of intents about the learning outcomes, the processes, and resources, designed and implemented to attain the specified goals of an educational programme for specified learners. In other words, curriculum is a written document of an educational programme which states educational objectives, details out the integrated sequence of curriculum areas(subjects) and detailed contents, recommends learning experiences to be given to students and methodology of student evaluation for achieving the objectives in a stipulated period for a specific group of learners.

So that curriculum of a programme is an important document based on which entire teaching−learning process is planned to prepare suitable technical human resource. Curriculum is important for the learner to understand the scope of study; for the teacher to know what and how to teach and select appropriate learning experiences to be given to student for developing desired competencies in them, industry to understand the type of manpower and competencies possessed by the pass outs from a programme and to facilitate Universities for planning physical, human, informational and financial resources for effective implementation of the curriculum

2. CURRICULUM DEVELOPMENT

Curriculum development typically focuses first on curriculum policy, including frameworks, learning areas, associated syllabi and learner outcomes to be assessed [5].

Jnanesh and Hebbar (2008) stated the general model for curriculum design requires four matrices. The first matrix is needed matrix. Here the customer's needs for the course is developed. In order to satisfy those needs, a set of required skills should be developed and the relationships between the two sets are evaluated. Once it is validated the skills can be carried into the second matrix namely skills matrix, to match a set of primary topics. On the development of topics matrix, the primary topics are broken down into secondary topics and this now creates subjects for which the instructional hours are assigned. This becomes the third matrix. The fourth matrix will be on delivery of the subjects and knowledge [6].

The curriculum design and development model recommended for adopting in the engineering college, shown in Figure.1
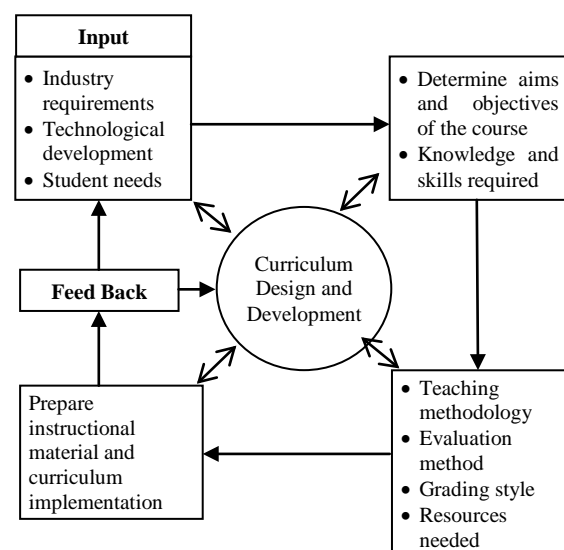
Fig.1. curriculum design and development model recommended for adopting in the engineering college.

The curriculum will be designed by considering the inputs such as industry requirements, technological developments, and students' needs. After identifying this, the next step is to determine the aims and objectives of the courses and to decide about the intended knowledge and skills to be developed in the students. This would help to decide about the design of teaching methodology, students evaluation methods, students grading pattern and identify the resources needed for teaching-learning process. This decision will lead to the preparation of instructional material and curriculum implementation process. A feedback will be collected from the industries and students and further the process will be continued once again from the beginning. This is a continuous improvement of curriculum design and development process.

The curriculum development comprises of the four stages, there are need analysis stage, curriculum design stage, curriculum implementation stage and curriculum evaluation stage.

The first stage in curriculum development process is the need analysis stage. This stage deals with the diagnosis of needs which involves conducting market surveys for determining employment opportunities for the specific target group, technology development at workplaces and competency profile of technical manpower, keeping in view the present and future employment trends. This also includes determination of the strengths and weaknesses of the system of engineering education [1]- [7].

The curriculum design stage involves devising or planning the intents of the curriculum. At this stage, decisions regarding curriculum objectives for specified target group are spelled out. From these objectives, curriculum areas (subjects) are identified. Detailed contents are worked out to match the competency profile of specific target group. Alter working put time requirement for imparting desired knowledge, skills and attitudes, study and evaluation scheme is worked out, selection of appropriate methods and media for various curriculum areas is also detailed out. At this stage resources required (i.e. physical, human and informational) for effective implementation of the curriculum are also spelled out

Once the curriculum document is ready it will call for the development of appropriate resources for the successful implementation of the curriculum. This stage deals with the harnessing of resources and their utilization for providing appropriate learning experiences to students for developing desired competencies in them. Networking with industry and other organizations for sharing resources is one of the important considerations for effective implementation of the curriculum.

The last stage of curriculum development is

evaluation stage. The evaluation is considered in two stages. The first stage is monitoring during the implementation stage. During this stage, corrective measures are taken to improve teaching−learning process. Once the system has undergone corrective process for some time and got improved, a summative evaluation is undertaken for making changes at different stages for increasing the effectiveness and bringing improvement in the curriculum and the processes at different stages

In this article, the review focuses on the first phase of curriculum development, which is one of the fundamental parts of curriculum development, which is the labor market assessment.

3. LABOR MARKET ASSESSMENT

Beside to achieve competitiveness with advanced countries, the human resource development of engineering is also related to the mismatch between employers and job seekers. The difficulties the employers face can be grouped into two kinds of mismatch: one based on a lack of job seeker interest and the other on a lack of skills. Interest mismatch characterized by a gap between what job seekers are looking for and what employers are offering. Skills mismatch characterized by either too few people with the required skills to meet employer demand, or when highly skilled people are not being matched with the right jobs [8]. Therefore, labor market assessment is important to solve the problem

Labor market assessment processes to assessing current and future manpower supply and demand. Labor market assessment may be done on a large or small scale. In small scale, the labor market assessment is conducted to find out some information, such as:
1. What industries are there in the region
2. Any company related to the existing industry in the region
3. How much labor needs are appropriate for the graduates of the study program
4. Where there are substantial opportunities for specific courses not available in universities do they have the resources to develop the program.

In the context of instructional programs, the labor market assessment is usually a local endeavor and is essential to:
1. Assess the need for a program in a specific community.
2. Assess the extent and type of education needed.

Demands projected beyond four to five years may often lead to inaccurate decision making and will result in developing inappropriate curriculum. However, this situation should not stop the assessment. As argued by Tyler (1949) developing curriculum and plan of instruction will be answered some fundamental questions in educational process, that are: what educational purposes should be attain?,

what educational experiences can be provided that are likely to attain these purposes?, how can these educational experiences be effectively organised?, and how to determine whether the purposes are being attained? **[9].**

Different tools and techniques are used for collecting **i**nformation regarding employment opportunities, competency profile and type of present and future technology trends etc.

Some of the important approaches include employer surveys, extrapolation approaches, the econometric approach and job vacancy which may be of great help in making decisions regarding manpower forecasting.

4.1. Employer Survey Approach

The most widely used approaches in assessing labor demand data are through employer surveys. This approach basically involves contacting the employer in order to assess the current and projected manpower needs. The strength of this approach is in the collection of meaningful data. However, the employer survey approach has certain limitations because employers may be reluctant to share employment data with strangers.

Data should be collected regarding current and projected manpower needs and the instrument used should accomplish both purposes. Several approaches may be used in the collection of data from employers. The two primary methods are:

a. Distribute a survey instrument to potential employers, either the entire population or a representative sample. The information payback of a survey is valuable because of the number of employers included. A survey might be mailed to several hundred potential employers. Identifying who should receive the survey and collect their addresses is time-consuming

b. Convene a focus group of potential employers to collect information through a strategic group interview. Focus groups may provide a smaller picture of the community market but can be easier to implement. Arrange a one- to two-day meeting with approximately 15 to 20 industry leaders whose reputations indicate they are knowledgeable about the field as well as the community.

Regardless of the strategy for collecting data, the following types of information should be requested:

1. Type and size of the organization as well as its products and/or services
2. Type of applicable jobs and number of that personnel employed by the organization (both full- and part-time)
3. Wage for entry-level personnel
4. Minimum level of education required for employment
5. Required work experience for employment
6. The degree of difficulty finding qualified personnel
7. Projected number of full-time and part-time job openings in the next one to five years
8. Types of skills and training the organization needs for entry-level personnel
9. Future trends in the industry

4.2. Extrapolation Approach

This approach of projecting future manpower needs is based on the assumption that past and current trends will give an indication as to what will happen in the future. The strength of this approach is that it is relatively easy to perform and can be done in a short time.

4.3. Econometric Approach

The econometric approach of manpower forecasting appears to be the most sophisticated approached for manpower forecasting in use. The projections are developed in a series of five steps, each of which is based on separate model. These are as follows:

(a) Labour force projection: based on future age, sex, racial composition and migration of population
(b) Aggregate economic projections: projects the Gross National Product (GNP) and major categories of demand and income
(c) Industry output projection: Industry output projections are estimated using input-output data associated with the expected GNP
(d) Industry employment projections: given the final output expected from the identified industrial sectors, estimates are then made of the occupational structures needed in the industries required to produce that output
(e) Occupational employment projections: an industry − occupational matrix is developed showing the distribution of employment, which will be helpful to project the manpower needs

As with other labor demand forecasts, the econometric technique has several limitations. Among the major drawbacks are that economic activity fluctuates widely and can greatly influence the manpower needs, thus projections can be inaccurate. Other limitation centers around the unpredictable rate of technological advances and the attempt to predict the educational requirements for occupations that now are few in number but in future may represent a sizeable share of workforce.

4.4. Job Vacancy Approach

This approach to manpower forecasting is based on current job vacancies. Job vacancy approach depends heavily upon information obtained and

compiled by employment exchanges. The strength of this approach is that immediate needs of an area can be quickly ascertained.

Job vacancy as a means of forecasting manpower needs does have some limitations. First, are the vacancies of long-range nature or seasonal jobs? When a particular vacancy remains vacant for quite some time, it is essential to inquire the type of qualification and experience desired for the fulfillment of such vacancies

The above manpower demand approaches may help to choose one or more approaches for collecting relevant information. The selection of approach depends upon the purpose, resources and the time available to the planner. All four approaches have distinct advantages and limitations

5. UTILIZE LABOR MARKET ASSESSMENT FOR CURRICULUM DEVELOPMENT

The application of labor market assessment for curriculum development is done in three stages, that are occupational analysis, design curriculum, and development curriculum. However, before reaching the stages, several steps of the labor market assessment must be ensured has been done, that is:
a. Specify the area will be surveyed. This area can be around the university or away from the university location
b. Identify the industry/project/company in the survey area which relevant to the field of study
c. Identify the core business of the industry/ project/ company, such as mining, cement factory, manufacturing, petrochemical, pulp and paper, oil and gas, palm oil mill, etc
d. Identify the production capacity of the industry or scope of the company
e. Identify the field of works found in the industry/ project/ company, such as managers, supervisors, planners, head of the production, etc
f. Identify the required requirements for each field of works
g. Identify the amount of labor available today
h. Extrapolate the number of industrial/ project/ company workforce for next 5 or 10 years based on its production capacity or scope of the company
i. Extrapolate the number of workers in each field of work in the industry/ project/ company and requirements needed.

5.1. Targeted Occupational Analysis

According to Hutchinson and Waters, target needs are what the needs in the target situation. The analysis of target needs can see in three ways such as necessities, lacks and wants [7].

Occupational analyses are intended to be quick, efficient ways to determine job tasks, knowledge, and skills for a targeted occupation.

The goal of the occupational analysis is to develop competency- and performance-based learner-centered curriculum and instructional materials. Specifically, the results are then analyzed and systematically translated into a program curriculum. The occupational analysis is used to:
a. Identify instructional needs and gaps.
b. Plan an instructional program or validate and revise an existing program.
c. Design and develop or revise curriculum.
d. Design and develop or revise instructional materials.
e. Provide teachers with valuable feedback on emerging and future trends in a career field.
f. Provide career guidance for students.
g. Ensure that students will have real-world skills to bring to the workforce.
h. Provide management with qualitative data on curriculum validity.
i. Promote business and industry "ownership" in a university's goals.
j. Assure employers that students meet business and industry job criteria and performance standards.
k. Network with business and industry personnel who may agree to collaborate with a program by joining an Advisory Committee, donating needed equipment, providing speakers, funding, etc.
l. Use as a public relations tool to show the effectiveness of university-business-industry partnerships

The value of a targeted occupational analysis can be used for developing effective curriculum. It is the critical starting point for the curriculum development process. Detail job competencies, both technical (knowledge, and skills) and general (communication, computer, teamwork, interpersonal skills) becomes the starting point for curriculum design and development.

5.2. Design

At the stage of design curriculum development, occupational analysis information used as a basis to determine the specific content needed for learning. Create the performance goals, competencies, criteria, and assessment:
1. Analyze each task to determine what specific knowledge and skills are necessary for performing the task.
2. Write a performance objective as a measurable, specific criterion of acceptable performance

3. Identify and sequence the steps a worker follows to complete the task. Include cues, decisions, and warnings
4. Determine the necessary equipment and materials needed to complete the task
5. Write measurable performance criterion for assessing learning outcomes. Ensure that the assessment aligns with the original performance objective

After analyzing process and flesh out the occupational analysis, the information continues to be developed as student performance objectives and is organized into courses. When working on a course, one of the results of design will be the syllabus.

5.3. Development

The development stage is to determine how the above content can best be presented. Select and/or create delivery strategies and learning activities that directly support the performance goals and competencies from the design stage.

Delivery strategies and learning activities set based on learning needs, that are what the learner needs to do in order to learn [5]. Through learner analysis, the different types of learning "intelligence" may be found, and can now target as many of these as possible in teaching strategy and related to the course, some of the results of development should be:

1. Content organizations
2. Lesson plan content
3. Delivery methods, such as lecture, reading or writing an assignment, demonstration, discussion, hands-on activity, practice and group work
4. Assessment/feedback mechanisms
5. Pilot testing prior to introduction into the classroom

6. SUMMARY

The developing curriculum process is a structured type of occupational or task analysis that is used to identify knowledge and skills gaps. The developing a curriculum process has three main elements, that are a needs assessment, a data-gathering workshop, and curriculum development.

A needs assessment is simply a focused effort to determine whether the instruction is needed and, if so, in what area; this effort often begins with labor market survey. A data-gathering workshop is held to bring together a focus group of expert workers in a specific field or occupation for a brainstorming session to produce that lists the tasks performed by an entry-level worker in the occupation and the knowledge and skills required. The developing a curriculum is to the identification of instructional needs, program planning, lecture materials

development, and career guidance.

Based on labor market assessment we can design and develop the dynamic curriculum which stronger links between the worlds of education and work.

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DIFFERENCES IN LEARNING OUTCOMES IN THE PRACTICE OF MICROCONTROLLER SYSTEM USING MCS51 MICROCONTROLLER TRAINER KIT

Edidas[1] dan Dedy Irfan[2]

[1]Department of Electronic Engineering, Fakultas Teknik

Universitas Negeri Padang

[*]Corresponding author, e-mail: edidasunp@yahoo.com

Abstract

This paper describes the differences in learning outcomes in the practice of Microcontroller System using MCS51 Microcontroller Trainer Kit. Trainer Kit The MCS51 microcontroller is tested to Electronics Engineering students who are studying in practice of Microcontroller System. The research method used is quasi experiment. The experimental class uses the MCS51 Microcontroller Trainer Kit as a medium of controlled learning medium using a self-assembled circuit on the Project Board. The results show that the learning outcomes of the exprient class is better than the control class.

Keyword: MCS51 Microcontroller Trainer Kit, Quasi Eksperimental

1. INTRODUCTION

In this article is discussed about determining differences in learning outcomes that occur if media MCS51 Trainer Kit Microcontroller used in learning Microcontroller System. The research was conducted in the class of practice of Microcontroller System at the Department of Electronic Engineering, Universitas Negeri Padang in the even semester of academic year 2013/2014.

2. LITERATURE REVIEW

Trainer Kit Microcontroller MCS51 is a learning media that can simulate various display programs that can be done by microcontroller system. In relation to Nesbit's simulated learning in Joyce, Weil & Calhoun (2009: 443) states that: "Simulations can stimulate learning about: 1) competition; 2) cooperation; 3) empathy; 4) social system; 5) concepts; 6) skill; 7) efficacy; 8) serving a sentence; 9) the role of opportunity / opportunity; 10) the ability to think critically ". Simulation learning can increase healthy competition among learners who practice. Learners who left behind practice materials will try to catch up, so the practice process can be more passionate

and excited. During simulation learners are trained to conduct positive cooperation to work on an activity by working on sub-activities that the results can be synergized. Besides, if any of the friends who are late or even meet a dead end in doing the simulation can be helped by way of encouragement or other ways. Unfinished friends working on their simulated practice tasks should be waited until completion because the results of the practice should be collected in groups. It will train the empathy of learners who are studying. In terms of synergies as well as simulation learning can also train students in social interaction.

1. Learning by simulation method can also stimulate learners to construct scientific concepts. By doing simulation exercises learners can gather their experiences to construct the concept of a science. The more students learn to simulate, the more learning experiences they can get, the better the concepts they can get.

2. Similarly, simulated learning can train the skills that will be owned by learners who are learning. Repetitive simulation exercises cause habituation to learners to deal with the difficulties that occur in microcontroller programming. The difficulty can be program error caused by syntax

error or other writing errors. If learners are familiar with the difficulties encountered and always try to find a solution it will result in their skills better.

3. RESEARH METHOD

The research method is quasi experiment where the research subject consists of experiment class and control class. The experimental class used MCS51 Microcontroller Trainer Kit in its practice lesson, while the control class did not use it. After the learning took place eight times the meeting conducted measurement of learning outcomes, then analyzed.

Student competency competency variable (Y) based on the assessment of the level of ability obtained by students after following the learning using MCS51 Microcontroller Trainer Kit (X). The learning competence variable is organized into indicators such as: (1) cognitive ability; (2) psychomotor abilities; and (3) affective ability. The research hypothesis is that learning using MCS51 Microcontroller Trainer Kit is better than that do not use it.

Data of research result as seen in Table 2. Learning outcomes from the experimental group and control group. To test this hypothesis is used univariate analysis, by the help of SPSS.

Tabel 2. Learning Outcomes

EXPERIMENT GROUP			CONTROL GROUP		
Resp.	Using Trainer (0/1)	Competences	Resp	Not use Trainer (0/1)	Competences
1	1	4.027	1	0	3.272
2	1	2.862	2	0	3.406
3	1	3.731	3	0	3.528
4	1	3.346	4	0	3.384
5	1	2.025	5	0	3.906
6	1	4.027	6	0	3.328
7	1	4.415	7	0	3.15
8	1	3.923	8	0	3.506
9	1	3.927	9	0	3.984
10	1	3.919	10	0	3.784
11	1	2.862	11	0	2.972
12	1	3.350	12	0	3.272
13	1	3.246	13	0	2.828
14	1	3.442	14	0	2.972
15	1	3.35	15	0	2.828
16	1	3.731			

Analysis is done through the following consecutive menus: Analyze $\longrightarrow$ General Linear Model $\longrightarrow$ Univariate $\longrightarrow$ Univariate Dialog Box $\longrightarrow$ Enter the Y Value Variable into the Dependent Variable box $\longrightarrow$ Enter Group Variables and Variables_Y to the Fix Factor (s) box $\longrightarrow$ Options $\longrightarrow$ Check Descriptive Statistics $\longrightarrow$ Contibute $\longrightarrow$ OK. So that displays the results of the analysis in the form of descriptive data table 3. Descriptive Statistics The mean figures for each of the variables tested in the control group and the experiments in the descriptive data table were compared. A higher mean number of a variable indicates a better group for the variable being tested. The experimental group had an average learning outcome of 3.708 higher than the average learning outcome of control group only 3.446. Thus it can be concluded that learning using MCS51 Microcontroller Trainer Kit is better than those not using it.

Table 3. Descriptive Statistics

Descriptive Statistics				
GROUP	VARIABEL _X	Mean	Std. Deviation	N
CONROL GROUP	Total	3.445923	5027442	30

EXPERIMENT GROUP	Total	3.708778	.4473527	32
Total	Total	3.581590	.4892865	62

4. CONCLUSION

The learning of microcontroller using MCS51 Microcontroller Trainer Kit is better than those not using it.

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Edidas, is a lecture in the Department of Electonic Engineering, Universitas Negeri Padang. I live in Jl. Delima IV nomor 66 Perumnas, Belimbing, Kuranji Kota Padang. My contact E-mail is edidasunp@yahoo.com.

7. AUTHOR'S CONTRIBUTIONS

Dedy Irfan: Conception and drafting the article. Rusnardi Rahmat Putra: Critical reviewing and final approval of the version to be submitted.

MICROCONTROLLER SKILL TRAINING FOR SMKN 2 PAYAKUMBUH AND SMKN 1 SUNGAI RUMBAI

Edidas[1], Legiman Slamet[2] dan Ilmiyati Rahmy Jasril[3]

[1]Department of Electronic Engineering , Fakultas Teknik,

Universitas Negeri Padang

Abstract: This paper describes microcontroller skill training for SMKN 2 Payakumbuh and SMKN 1 Sungai Rumbai. This training aims to train students to be skilled at creating microcontroller circuits and programs. The training method is the direct practice of creating and programing the microcontroller system. The result is the improvement of microcontroller skill of the students who participated in this training.

Keyword: Microcontroller Skill, Direct Practice.

1. INTRODUCTION

In vocational syllabus design and assembly as well as programming the microcontroller is a competence that must be mastered by the student areas of Electrical and Electronics engineering expertise also includes Automotive. One package of existing expertise in SMKN 2 Payakumbuh dan SMKN 1 Sungai Rumbai is Power Installation Engineering and Mechanical Light Vehicle. In the syllabus of each package contained expertise Basic Competency (Kompetensi Dasar) on Microcontroller Competence. Microcontroller Basic competence is a competence that is very complicated but not difficult to learn by students of SMK. However, to make students master microcontroller properly, it should be the teachers involved in the teaching competence enhanced microcontroller (upgrade). Increased mastery of microcontroller for teachers of SMK 2 Payakumbuh dan SMKN 1 Sungai Rumbai is planned through the institution of Community Services on Universitas Negeri Padang at academic year 2016/2017.

2. SITUATION ANALYSIS

General portraits of the description of, profiles and conditions of target audiences to be involved in community service are seen through situational analysis. Situation analysis is an important part of the content of community service proposals that are activities of the application of Science,

Technology and the Arts (IPTEKS). Looking at current technological developments almost all areas of expertise require controls made from microcontrollers. For example in the field of electrical expertise to control: Washing Machine, Air Conditioning (AC) and others. Electronics expertise such as controlling Television, Mobile, DVD player and others. In the field of Automotive for ignition control and oil flow in car engines. Similarly, other areas of expertise such as Informatics Engineering, Mechanical Engineering, and Building Engineering are not behind in utilizing the ability of the microcontroller in controlling the aircraft and its equipment. Thus the competence that must be mastered by a graduate of SMK not only competence in the field of expertise but also must master the control using a microcontroller.

In the syllabus, SMK microcontroller Design and assembly, programming is a competence that must be mastered by students in the field of Electrical and Electronics engineering expertise also including Automotive. One of the expertise packages that exist in SMKN 2 Payakumbuh and SMKN 1 Sungai Rumbai is Electricity Installation Technique and Light Vehicle Technique. In the syllabus of each skill package, there is Basic Competence (Kompetensi Dasar) about Microcontroller Competency. Basic Competency Microcontroller is a very complicated competence but not too difficult to learn by vocational students.

However, to be able to master the microcontroller well and correctly, then the students should be involved in teaching the competence of microcontroller upgrade. Increased mastery of microcontroller material for students SMKN 2 Payakumbuh and SMKN 1 Sungai Rumbai planned through the Institute of Community Service State University of Padang academic year 2016/2017

3. AIM

Based on the background and formulation of the above issues, the purpose of this educational / training activity is to improve the ability of mastery of microcontroller skills for students of SMK in the field of expertise that intersect with control using a microcontroller.

4. BENEFITS

Benefits of training the students SMK N 2 Payakumbuh and SMKN 1 Sungai Rumbai is able to increase student competence in the field of Microcontroller, thus increasing students' insight into the modern control system.

5. LITERATUR REVIEW

Training is one way to learn a skill. Education and Training is a learning activity within a short period of time that is expected to increase the ability of participants in certain skills. Skill training can be interpreted as a systematic and measurable way given to a person to acquire a particular skill.

Mastery of skills is measured in three elements, namely: knowledge (knowledge), attitude (attitude) and skills (psychomotor). Skills that are generally called competence is needed in the preparation of a job. Education and Skills Training is part of education that is to acquire or enhance knowledge to meet the requirements of an occupation that goes beyond the formal education system in relatively singular time and by prioritizing practice rather than theory.

In accordance with technological developments in the field of current control, both in hardware and software, almost most of the control system do with the help of Microcontroller. By using a microcontroller in the control system can be made a control system that is very simple but more powerful.

According to Moh. Ibnu Malik and Anistardi (1997: 1) write that microcontroller is a single chip microcomputer (SCM). This is because the microcontroller IC is able to work like a microcomputer although only a chip component only. For more complete understanding then in this book is defined that the microcontroller is a chip-shaped electronics components or Integrated Circuit (IC) in which there is a series of microprocessors and other support circuits that enable this component can work like a computer on a limited scale. Because of the ability that microcontrollers have that can work like a computer then the microcontroller is given the nickname as a computer in one IC or in Single Chip Computer English (SCC). Then Durham (2004: 4) mentione that: "A Microcontroller is a microprocessor with additional interface components as part of the chip. In essence, a microcontroller is designed to connect directly to the input and output. In addition, it has some memory as part of the chip. In some cases, these are also called single chip computers". In general, the microcontroller parts are as shown in Figure 1. Those sections are data center or central procesing unit (CPU), ROM, RAM, Timer and Input Output (I / O) port data channels.

The block diagram of microcontroller architecture of MCS51 is like Figure 1. In it can be seen the parts of MCS51 microcontoler. The three types of MCS51 microcontroller ICs (AT89S51, AT89S52 and AT89S55) have the same inner construction, the difference lies in the PEROM Flash capacity and the number of ports. Microcontroller MCS51 requires only 3 additional capacitors, 1 resistor and 1 Xtal and a 5 Volt 1 Ampere power supply to assemble the circuit so it can work. A series of microcontrollers that can run certain control programs is called a minimum system microcontroller circuit. A 10 Farad Micro Capacitor and a 10 Kilo Ohm resistor coupled to produce a momentary reset pulse on the foot Reset
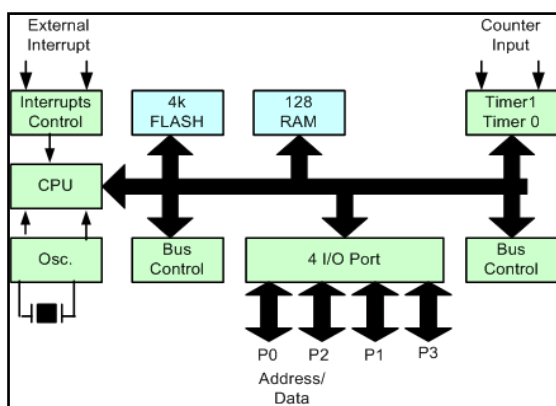
Figure 1. Diagram Block Microcontroller
AT89S51

The reset pulse is a minimum positive square wave of 2 clock spins or 2 micro seconds (if using 12 MHz chips). The reset pulse will make the program counter program (Program Counter Register) to be re-run address 0000H. Resets the program to make the program run from scratch. The RC reset circuit serves as an automatic reset by utilizing a 10 uF capacitor charging time coupled with a 10K resistor. The length of charging time of a capacitor is 5 times the time constant of the RC circuit. The reset pulse will make the program counter program (Program Counter Register) to be re-run address 0000H. Resets the program to make the program run from the beginning.

Port P0, Port P1, Port P2, Port 3, Timer 0, Timer 1 and other means are physically registered registers specially placed in the Special Function Register (SFR) location. The location of the SFR register is the same as the 128 RAM address starting from the 80H address to the FFH. Although it has the same address, the program will not mis use it, as it is differentiated how to access it. As shown in Figure 2. above to access RAM 128 over used indirect access (indirect acces) while to access SFR is done by direct access (direct access). What and how direct and indirect access will be explained in the instruction section of the microcontroller.

The SFR map can be seen in Figure 2. In the locations shown on the SFR map the address of each register and its original content (default) can be found. As the port register P0 resides at the location of RAM 80H and the initial contents of the register is 1111 1111. The location of address P1 is 90H, P2 at address A0H and P3 at address B0H. All Port registers have a default value of 1111 1111. Drai 128 locations of the SFR map

register address are currently not fully loaded. Locations filled in are visible on the map. Make sure you can memorize the register names and address locations of each register in the SFR map.
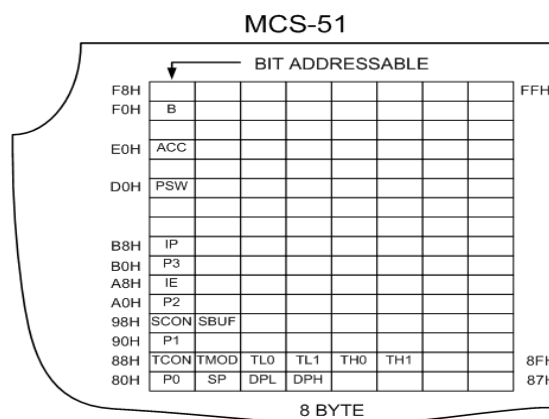
Figure 2. Map of Special Function Register

3. Microcontroller Hardware Assembly

To assemble a microcontroller systems based on the circuit scheme that has been designed it needs 5 certainties as follows:

1. Make sure the 5 VDC power supply is plugged into pin 40 and GND is connected to pin 20.

2. Make sure the crystal is connected properly on pins 18 and 19.

3. Make sure the Reset circuit (either manual or automatic circuits) is properly connected to pin 9.

4. Make sure pin 31 (pin EA) is connected to 5 VDC.

5. Make sure the load used is connected to the correct port on the I / O port (P0, P1, P2 and P3).

How to determine the certainty can be done by performing cold measurement and heat measurement. Cold measurements are measured using the Ohm meter before the power supply is connected. The criterion of the result of measurement is that if the resistance between the point measured 0 Ohm means that the point is connected, but if the resistance is very large (~) then it is said that the two points are not suspended.

As with the heat measurement, the measurement is done when the power supply has been connected to the circuit. The voltage between two points is measured using Voltmeter. Figure 3. is one of the minimum system circuit schemes for LED control on Port P0. Minimum system circuit for Seven segment control, Dot matrix, DC Motor. Motor Stepper, Dummy Sensor input and others can be easily designed through microcontroller control.
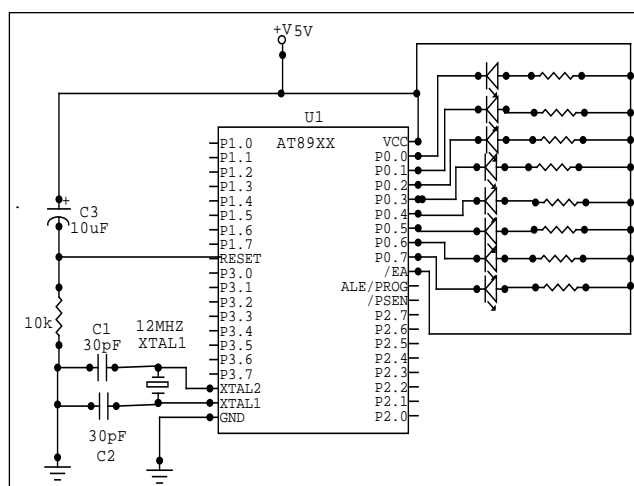
Figure 3. One of the Minimum System circuit

schemes for LED Control on Port P0

4. Implementation Method Implementation of Science and Technology

The method of implementation carried out during the execution of this activity, both theoretical and practical are as follows:

a. Discussion Method

The method of discussion is considered appropriate in the delivery of theoretical material. To determine the determination of where the discussion material begins to explore the initial ability. Assessing the participants' initial ability is done through question and answer in the discussion forum.

b. Direct practice

After the trainees get theoretical knowledge, then held the practice directly in the form of planning, assembling and programming microcontroller.

6. RESULTS AND ANALYSIS

Community service activities with IPTEKS implementation program at SMKN 2 Payakumbuh and SMKN 1 Sungai Rumbai by training 60 students have produced a product in the form of MCS51 series of microcontroller circuit kits, in addition to increasing their skills in the field of the microcontroller. Results in the form of a series of MCS51 minimum microcontroller system can be seen in the images as shown in Figure 4. below:

a.   The product at SMKN 2 Payakumbuh

b. The product at SMKN 1 Sungai Rumbai

Figure 4 . MCS51 Microcontroller System

Circuit Kit

5. CONCLUSION

Community service activity with a program of science and technology implementation in SMKN 2 Payakumbuh and SMKN 1 Sungai Rumbai can be concluded as follows:

1. Microcontroller skill training has succeeded in improving the skills of students as evidenced by the existence of MCS51 minimum system circuit kits that work well.

2. Built partnership and cooperation between the FT UNP and SMK N 2 Payakumbuh and SMKN 1 Sungai Mumbai well.

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7. AUTHOR'S BIOGRAPHY

Edidas is a lecture in the Departement of Electronic Engineering, Universitas Negeri Padang, Sumatera Barat, Indonesia. May contact E-mail is edidasunp@yahoo.com

8. AUTHOR'S CONTRIBUTIONS

Legiman Slamet: Conception, design, acquisition.

Ilmiyati Rahmy Jasril: analysis and interpretation of data and drafting the article.

THE EFFECT OF ISLAMIC WORK ETHICS AND SPIRITUAL LEADERSHIP ON EMPLOYEE'S COMMITMENT IN PADANG SHARIA HOTELS

EkaMariyanti[1], Rasidah Nasrah[2]
[1] UNIDHA, Padang, Indonesia

ABSTRACT: Now West Sumatera declare that ready as a provider of halal tourism then one of support halal tourism is the availability of accommodation facilities that operate with sharia, if a tourist destination declared as a halal tourism then that is expected to be more halal food and hotel based on sharia, the hospitality industry in Padang City also participate in supporting the halal tourism is started the number of sharia hotels brand in the Padang City,to observed practice of sharia hotels management in Padang City this study chose 6 (six) sharia hotels in Padang City, to find out the influence Islamic work ethics and spirituality leadership on employee commitment, the sample in this study are 118 respondents with sampling method used census method and data collected by used questionnaire, in accordance with that objectives, In this research formulated three hypotheses that : the first hypothesis is allegedly Islamic work ethic have a significant effect on employee commitment, the second hypothesis is assumed leadership effect on employee commitment and third hypothesis alleged that Islamic work ethic and spiritual leadership have significant effect on employee commitment, this research used multiple linear regression analysis with SPSS program to find out influenced each variable. The result of the research stated that Islamic work ethic has a positive and significant impact on employee commitment; spiritual leadership has a positive and significant impact on employee commitment beside that the result of research also emphasizes on hotel managers desire to start Syariah principle and contribution to the competitiveness of niche market of sharia hotels in Padang City.
Keyword: Islamic ethic work, spiritual leadership, employee commitment, sharia hotel

1. INTRODUCTION

Spirit of the government and West Sumatera people make RanahMinang as World Halal destination Tourism refers to all tourism activities based on Islamic law (Syar'iah), so that all economic activities such as trade, industry, including domestic and foreign tourists, regulated based on Islamic law, which comes from the Qur'an and Hadith (Schedneck, 2014). Therefore, halal tourism relies more on Islamic culture, which is a type tourism adapts to Islamic teaching and behavior such as in dressing, behavior in destination areas, as well as halal food. So halal tourism as 'Islamic tourism industry' (Brown & Osman, 2017).

On a larger scale, halal tourism includes all tourism infrastructure and superstructure based on Islamic concepts, where all tourism activities from the journey and stayed based- shariah, hospitality, restaurants, banking and finance which is sharia-based. So it can be said that halal tourism is a tourism activity that produces tourism products and services based on the teachings of (Shariah) Muslims. Islamization of West Sumatra tourism by using Islamic values approach, so it will increase awareness of tourism business actors, tourists to apply Islamic values in tourism activities.

tourism based -Sharia activities are supported by facilities and services that should provide hospitality by integrating the values of sharia in all forms of facilities and services managed, criteria within the scope of sharia hotels currently applied seem exclusive because of the intended segment is Muslim tourists, sharia hotels also contributed

positively to the tourism industry in West Sumatera but currently in West Sumatera especially in Padang city hotel brand with sharia hotels are clasification 2 star hotels, based on syariah hotel category facility has been arranged in Minister of Tourism and Creative Economy about the service manual of sharia hotels, in the context of sharia is not enough just to see based on facilities but also must be seen in management and management in carrying out activities at the hotel sharia, and this is very high hook with the commitment of employees in conducting activities at sharia hotels, to realize the commitment in running the management of sharia hotels as well will be very dependent on spiritual leadership and Islamic work ethics that exist within the organization.

2. LITERATURE OF REVIEW

Halal Tourism as a type of religious tourism that is in confirmatory with Islamic teaching regarding behaviorism, dress, conduct, and diet, WTM (2007) According to SaptaNirwandar (2015) the existence of halal tourism is extended services. Halal tourism is a complement to tourism in general. Its properties can be complementary, like a Shariah hotel. In principle, halal tourism is expanding the market, not reducing the tourist market.

Halal tourism is leisure tourism (tourist trip in general) for Muslim tourists where there is support the availability of tourism products and services in accordance with Islamic value/norms and comfort to carry out worship while traveling.

Sharia hotel a hotel can be defined as an operation that provides accommodation and other related services to the people that are away from home. Sharia-compliant hotel (SCH) and Islamic hotel both are operated according to sharia principles (Idris&Wahab, 2015; Samori& Rahman, 2013). However, Othman, Taha, and Othman (2015) explain that SCH is governed by sharia standard that goes beyond the concept of Islamic hotels and dry hotels. In addition, Salleh et al. (2014) and Ahmat et al. (2015) also agreed that sharia-compliant hotel is different from Islamic hotel, this statement is contradicting with Razalli et al. (2012) that state SCH also was known as Islamic Hotel. In general, based on previous studies there are three types of hotel in Muslim-friendly accommodation namely SCH, Islamic hotel and dry hotel. In this study, we believe that Islamic hotel is hotel establishment that provides basic facilities and services for Muslim travelers that go beyond the dry hotel concepts to ease Muslims perform their religious obligations and also provide others services and facilities same with conventional as long as does not violate the principles of sharia. Dry hotels can be defined as hotel establishment that operates the same as a conventional hotel but did not sell the alcoholic drinks in their properties (Rosernberg&Choufany, 2009)

Attributes of Sharia-compliance for hotels (Henderson, 2010)

1. No alcohol to be served or consumed on the premises
2. Halal foods (slaughtered in the name of Allah and excluding all pork products and certain other items)
3. Quran, prayer mats and arrows indicating the direction of Mecca in every room
4. Beds and toilets positioned so as not to face the direction of Mecca
5. Bidets in bathrooms
6. Prayer rooms
7. Appropriate entertainment (no nightclubs or adult television channels)
8. Predominantly Muslim staff
9. Conservative staff dress
10. Separate recreational facilities for men and women
11. All female floors
12. Guest dress code
13. Islamic funding

This spiritual leadership concept is believed to be solution current leadership crisis, due to the decline of human values as a result of ethical malaise and ethical crisis, spiritual leadership is also a leadership that makes spiritual values as core belief, core values

and philosophy in leadership behavior (Tabroni: 2015)

This model of spiritual leadership can refer to applied leadership pattern by Prophet Muhammad who was able to develop the most ideal and successful leadership with his main characteristics, namely Siddiq (integrity), trust (trust), and Tabligh (openly, human relations) and Fathanah (working smart).

Louis W. Fry (2005) defines spiritual leadership as follows: "The values, attitudes, and behaviors required to intrinsically motivate one's self and others in order to have a sense of spiritual survival through calling and membership-ie, they experience meaning in their lives, have a sense of making a difference, and feel understood and appreciated"

Spiritual Leadership Theory (SLT) (Fry et al., 2005). is a leadership model that uses intrinsic motivation models by combining:
1. Vision
2. Hope / faith
3. Altruistic love
4. Workplace spirituality
5. Spiritual welfare / spiritual survival

Islamic Work Ethics (IWE) may be defined as the set of moral principles that distinguish what is right from what is wrong (Beekun, 1997) in the Islamic context. According to Rizk (2008), IWE is an orientation towards work and approaches work as a virtue in human's lives. IWE is originally based on the Qur'an, the teachings of the Prophet who denoted that hard work caused sins to be absolved and the legacy of the four Caliphs of Islam (Ali, 2005; Rizk, 2008)

Islamic work ethics dimension there are four according to kamaluddin, et all: 2010 :

1. The effort in Islam is held in the highest regard. Islam consequences positively resulted from his endeavor
2. Honesty could mean telling the truth even with external forces such as surveillance pressures but though it is difficult to do so
3. Teamwork Islam promotes teamwork thus employees can on such their reward according to the best of his action" help each other to fulfill their needs in this world
4. Accountability is frequently described as Justice significantly related to integrity which refers the means by which individuals and organizations report to right action, goodness, charity, and proficiency. to a recognized authority (or authorities) and are held Integrity

motivates man to voluntarily sacrifice extra responsible for their actions

Employee Commitment is the extent an employee identifies himself/herself with the organization and wishes to participate actively in the organization.Newstrom and Davies (2002: 211), committed employees would work diligently, conscientiously, provide value, promote the organization's services or products and seek continuous improvement Norton and Testa (1999: 03)

Due to this multidimensional nature of organizational commitment, there is growing support for a three-component model proposed by Meyer and Allen (1996:1).

1. Affective Commitment: involves the employee's emotional attachment to, identification with, and involvement in the organization;
2. Continuance Commitment: involves commitment based on the costs that the employee associated with leaving the organization; and
3. Normative Commitment: involves the employee's feelings of obligation to stay with the organization.

3. RESEARCH METHOD

3.1 Sample Size and Data Collection

Hotel is one of the great facilities in the tourism industry, its existence becomes inseparable in the development of tourism, the growth of hotel facilities in Padang city continues to increase the development of tourism in West Sumatra.

Table 1.

Hotel data in 2015based on the number of accommodation, room, availability of hotel beds in Padang city.

NO	LOCATION	ACCOMMODATION	ROOM	BED
1	Kecamatan bungustelukkabung	6	67	134
2	Kecamatan lubukbegalung	1	8	16
3	Padang selatan	6	280	457
4	Kecamatan padangtimur	10	192	355
5	Kecamatan	27	1.593	2.487
	padangbarat			
	total	50	2.140	3.449

Number of Hotels / Accommodations existing in Padang city amounted 50 with number of room 2140 and bed existance amounted 3,499, from 50 hotels located in Padang City about 11 Hotels listed as Sharia Hotels, The object of research conducted on Sharia hotel employees in Padang City following list of Muslim hotels / accommodation in Padang Citybased on the criteria Halal tourism guide in Indonesia (Indonesia halal tourism guide book): Rang Kayo Basa Hotel, HW Hotel, Musafir Inn Hotel, NabawiSyari'ah Hotel, Bunda Hotel, Amaris Hotel, Buana Lestari Shariah Hotel, Rocky Hotel, Grand Inna Hotel, Abidin Hotel and Rasaki Hotel.

From 11 hotels listed as sharia hotels, Caused limited time and personnel , the researcher selected six hotels to be populated in this study namely RangkayoBasa Hotel with 35 employees, Abidin Hotel with 30 employees, Nabawi Syariah Hotel with 7 employees , Rasaki Hotel with total employee 35 people and Bunda Hotel with total employee 30 people with total of population 137 people, sample used in this research use nonprobability sampling with determination technique of saturated sample or by using census method where population used as sample, this study used the quantitative research that is a process of finding knowledge using data in the form of numbers as a tool to analyze information about what want to find out. (kasiram, 2008) data collection techniques used interviews and questionnaires was given to all employees of sharia hotels in the Padang City, from 137 questionnaires distributed, the total of questionnaire returned 94 questionnaires this happens because until the last limit of the return questionnaire there are about 43 questionnaires are not returned, it means 94 people can be sampled in this research.

3.2 Construction of questionnaire and measurement of variables

Questionnaires were made on basis of reference (Fry et al., 2005). for Spiritual Leadership Theory (SLT) variable with vision, hope / faith, altruistic love, workplace spirituality, spiritual welfare survival for employee commitment variables by measuring 14 questions items that is: My leadership formulated a clear vision, My leader socialize the vision well, My leadership inspires employees to work better based on vision, My leadership has a strong belief to realize his vision, My leadership has confidence I believe that good mission implementation means achieving organizational success. My leader is very concerned about his employees. My leader is paying attention to the

RASAKI	36	38.3
SRIWIJAYA	21	22.3
total	94	100.0

troubled employee. My leader is very upholding honesty. I believe that every job did have meaning for others.

My leadership provides services to subordinates, My boss recognizes the contribution of his subordinates, My leadership is able to build teamwork, My leadership is able to build employee commitment. For variables of Islamic Work Ethics measured by ethics there are four dimensions according to Kamaluddin, et all: 2010 ie Effort, Honesty, Teamwork and Accountability measured with 14 items statement that I believe laziness is bad nature, I believe that high dedication to work is good , I believe that cooperation, justice, and comfort in the workplace is an important condition I believe by consulting the workplace will reduce the occurrence of mistakes, I believe by working to achieve progress in life, I believe that life does not mean without work I believe that social relationships in work must be of great concern, I believe that work is a means of fostering personal development and social relationships, I believe that work allows people to self-determination. I believe that work creativity is a source of happiness and success. ability and creativity at its best, I believe that someone who succeeds is a person who fulfills his or her job targets, I am able to work hard consistently according to my responsibilities, I believe that the value of work is more determined than the intention of the work, for the dependent variable ie the employee commitment is measured by three dimensions of affective commitment with 5 items of revelation, continuous commitment with 5 items of statement and normative commitment with 5 items statement (naiker, 2008)

In the background of respondents there are 5 information about the demographics of respondents namely sex, age, highest education, and position, in connection with Islamic Work ethics and Spritual leadership towards employees commitment in running Sharia Management in sharia hotels in the city, Likert scale used to measure the level of approval or disagreement of respondents to the statement that measures a obek, the likert scale that is used in this study using a five-point scale starting from 5: Very Agree, 4: Agree, 3: Less Agree, 2: Disagree, 1: Very Disagree.

4. RESULT

Table 2. *List Total Of Respondent Tables*

HOTEL NAME	TOTAL OF RESPONDENT	PERCENTAGE
ABIDIN	12	12.8
NABAWI	7	7.4
RANGKAYO	18	19.1

From 50 Hotels listed as accommodation there are 11 Hotels / Accommodation friendly Muslim in Padang City based on the criteria of guidebooks Halal tourism guide Indonesia: Rang Kayo Basa Hotel, HW Hotel, Musafir Inn Hotel, Nabawi Syari'ah Hotel, Bunda Hotel, Amaris Hotel, Buana Lestari Shariah Hotel, Rocky Hotel, Grand Inna Hotel, Abidin Hotel and Rasaki Hotel. Researchers only collected 94 respondents to serve as samples in this study are Abidin Hotel with a number of respondents 12, Nabawi Hotel 7 respondents, rangkayoBasa Hotel 18 respondents, Rasaki Hotel 36 respondents, and Sriwijaya Hotel 21 respondents.

Table 3. *Respondent Background*

Respondent background	Total Respondent	Percentage
Sex		
Male	54	57.4
Female	40	42.6
TOTAL	94	100
Age		
<20 year	7	7.4
>40 Year	12	12.8
21-30	48	51.1
21-30T	1	1.1
31-40	25	26.6
Total	94	100.0
SMA/ MA/SMK	70	74.5
Academic	16	17.0
Bachelor (S1)	8	8.5
Total	94	100.0
POSITION		
ACCOUNTIN	3	3.2
CHASIER	1	1.1

CHEF	6	6.4
DRIVER	2	2.1
ENGINEERI	7	7.4
F.B	10	10.6
F.O	17	18.1
H.K	24	25.5
HOUSEMAN	9	9.6
HRD	1	1.1
LAUNDRY	2	2.1
LINEN	1	1.1
MANAGER	1	1.1
MARKETING	1	1.1
PURCHASIN	1	1.1
SECURITY	6	6.4
WAITER	2	2.1
	94	100.0
Long Working		
<1 year	16	17
1-3 year	33	35.1
3-4 year	1	1.1
3-5 year	34	36.2
>5 year	9	9.6
Total	94	100.0

Based on the respondents data in sharia hotel employees seen from the sex, male employees more than female employees this happens because the male labor is more needed than the female workers, it is also in harmony with various problems faced by women when working in a hotel like working hours following the shift, many women workers who object to night shift, with erratic work schedules will surely object to the status of married women because they have to divide their time with their husbands and children, and the prohibition of women work at night for security reasons, and the amount of time off for women such as maternity leave, maternity leave or retirement leave, educational background is dominated by an equivalent high school graduate with 74.5 percentage because in this case supports most needed position for the hotel employees are part housekeeping, with percentage 25.5% and then followed by the front office with the number 18.1% seen from the long working average the longest working 3-5 years with the percentage of working length 36.2%.

Table 4. *Reliability Test Result*

variable	Cronbach alpha	Significant	explanation
Islamic Work ethics	0,820	0,60	Reliable
Spiritual	0,864	0,60	Reliable
leadership			
Employee Commitment	0,875	0,60	Reliable

Based on table 4 of realism test results each variable has a value of Cronbach alpha above 0.60 which stated that the variables Islamic work ethics, spiritual leadership and employee commitment are reliable.

Table 5. *Determination Coefficient Test*

Explanation	R	R Square	Adjusted R Square	(percentage)
Model	0, 660	0,435	0,423	57,7 %

Table 6. *Hypothesis Test Results*

Explanation	Regression Coefficient	sig	alpha	Result
Constanta	26,320			
Islamic Work ethics	.377	.008	0,05	Significant
Spiritual leadership	.683	.000	0,05	
Employee Commitment				

Based on the output of SPSS 21 show the results of hypothesis testing:

1. The influence Islamic work ethics on employee commitment in sharia hotels in Padang city.
   from the calculated results obtained by regression coefficient value of 0.377 with a significance value of 0.008, therefore it can be stated that Islamic work ethics has no significant effect on employee commitment with value 0.008> 0.005 it means that Islamic work ethics existing in sharia hotel in Padang City not in accordance with the environmental conditions of the hotel sharia management as it is currently managing the new sharia hotels based on the facilities in the management of the working environment and still being conventional.
2. Influenced by Spiritual Leadership to

Employee commitment at Sharia Hotel in Padang City

from the calculated results obtained by regression coefficient value of 0.683 with a significance value of 0.000 <0.005 which means that spiritual leadership affect the employee commitment, the better the leadership of a leader leadership, the higher the employee's commitment to the organization

5. DISCUSSIONS AND CONCLUSION

West Sumatra is a province in Indonesia with a majority Muslim population, this is very appropriate for the government program to make western Sumatra as a destination halal tourism in addition to the beautiful views also very thick with Islamic Culture, from the data Kemenparekraf (2012) most Muslim tourists who data to the SumateraWest is a tourist from Malaysia

The number of tourist visits becomes a benchmark of tourism competitiveness. In addition the tourist visits, one of which is influenced by low-cost airlines. In Tourism the key is Connectivity, airports, road and rail networks. The airport serves as the entrance, while in road and rail network is airport infrastructure to tourist attraction. Direct and cheap access to tourist attractions will add a special attraction for tourists from ASEAN countries. The attraction of tourist attraction is not only determined by the beauty of nature but also influenced by the culture of society, human resources, and accessibility. The combination of these four factors will add the tourist attraction.

The development of the tourism industry, followed by development of its supporting facilities, needs to get serious attention from all levels of society, including in the direction of Syariah-based hotel development. The presence of sharia-based hotels is an added value for the tourism industry in the country, but its development must be in line with the direction and policy of the tourism industry. Accommodation as one of the important elements in the tourism industry is a unity that cannot be separated, for that development must also support the progress of the tourism industry. Sharia hotels, as part of the accommodation management arrangement, shall be constructed with due observance of the purpose of providing accommodation facilities. Products and services provided do not create exclusive facilities and only for limited facilities, but must be able to translate the principle of "Islam Rahmatanlil 'Alamin, to implement the concept of sharia would require a commitment together both Leaders, employees, and Parties involved in the Management management of sharia hotels, Islamic working

environment

By adopting from Henderson (2010) and Stephenson (2010), Kessler (2015) formulates an operational business principle of sharia hotels as in the following table:

Table 6. *principles of Sharia hotels*

Departe ment	Principles of Sharia Hotel
1. Hu man Res ourc es	1. Traditional uniforms for hotel staff 2. Islamic dress for female staff (Hijab) 3. Provision of prayer time for Muslim employees 4. Restrictions on working hours for Muslim staff during Ramadan
2.Food Catering	1. Halal food 2. No pigs 3. No alcohol 4. Eat for women and families
3. Facili tate	1. There is space for women and families 2. No casino or gambling machines 3. Separate leisure facilities (including swimming pool and spa) between men and Women 4. Available *mushala* for men and women equipped with Al Qur'an (also available at front desk) 5. Wudu facilities (washing area that allows the process of ablution before the prayer 6. Located outside the prayer room 7. The toilet facing away from Mecca 8. Non-figurative decoration pattern (Art that does not depict human form and 9. animals) 10. No music expresses tempting and controversial messages
3. Hotel Operatio nal Manage ment	1. Marketing ethically and promotion 2. Perform corporate social responsibility (related to Islamic values) 3. Philanthropic Contributions (the

portion of income to be donated to charity follows the principle of "zakat"). 4. Transactions and investments in accordance with Islamic banking, accounting, and finance 5. (funding used to operate hotel needs should be based 6. on the principles of Islamic finance) 7. Management and ownership are favored by Muslim individuals

Presence sharia hotels become an added value for Sumatra Westto support the halal tourism program, the current category of new syariah hotels in West Sumatra based on the criteria set by tourism office that is the room and environment of the hotel / clean accommodation, there is the direction of the Qiblah indicator, non-kosher menus, Muslim prayer equipment, availability of prayer time information, bathrooms equipped with bidet or hand shower, no non-halal animals entering the hotel area, not providing alcoholic beverages in mini bar in room, providing meal and breaking atramadan, there is a public mushalla with separate male and female areas.

The fundamentals of halal tourism is understanding the meaning of halal in all aspects of tourism activities ranging from hotels, means of transportation, eating and drinking halal, financial system including its management, based on the category of halal hotels set by the new tourism office to touch the facility but if viewed the hotel management system shari'a in the city of padang is still the same as the conventional hotel concept, where the ethics of Islamic work has not been so visible, because the recruitment requirements for sharia hotel employees are Islamic and based on the needs of this is still in line with the conventional hotel concept in implementation, to support the quality of service needs human resources need to be considered, the results showed that spiritual leadership has a positive and significant impact on employee commitment means that leadership style based on spiritual and has a good Islamic value will affect employees' commitment to together a to be loyal to his organization in providing quality services based on sharia principles

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THE DESIGNING OF THE PROTOTYPE OF THE AIR QUALITY MEASURING HELMET

Eko Hariyanto[1], Solly Ariza Lubis[2], Zulham Sitorus[3], M. Iqbal[4]

[1,3,4] Lecturer of Faculty of Computer Science, University of Pembangunan Panca Budi, Indonesia
[2] Lecturer of Faculty of Engineering, University of Pembangunan Panca Budi, Indonesia

[2] Doctoral Students Faculty of Electrical Engineering, Universiti Malaysia Perlis - Malaysia
[3] Doctoral Students Faculty of Technology and Vocational Education, Padang State University - Indonesia
[4] Doctoral Students Faculty of Computer Science and Information Technology, University of North Sumatera - Indonesia

ABSTRACT: The purpose of this research is to produce a prototype of air quality measuring helmet equipped with output (output) sound and know the level of accuracy on the highway. The results of research are useful for motorcyclists as a warning of air quality that is around in real time. Target to be achieved is that motorcyclists can always maintain and protect themselves from the dangers of air pollution on the highway, especially in traffic jams using helmets that can measure air quality. The outcomes of this study can be included and published in national journals and as teaching materials. For long-term outcomes is the creation of helmets equipped with air quality measuring instruments with more accurate results and a more attractive appearance. In this research approach used is demonstration application and data collection method used is observation, where prototype helmet will be tested directly on the highway and test result data, will be recorded and collected. After conducting a field test of 50 times and analyzed it can be known the accuracy level of the series of systems mounted on the helmet to detect and calculate air quality.

Keywords: Prototype helmet, Air quality measurements, Air pollution, demonstration applications, Observation, Testing,

1. INTRODUCTION

The industrial and transport sectors are the largest air pollution sectors. But in Indonesia, vehicle exhaust emissions from the transportation sector occupy the highest position as a source of urban air pollution namely about 85 percent (Gusnita, 2012). This is evident from the increasing population of motor vehicles from year to year. Based on the Traffic Corps data of the State Police of the Republic of Indonesia, in 2013, vehicles reached 104.211 million units, up 11% from the previous year (2012) which only 94.299 million units (source: http://www.tribunnews.com /otomotif/2014/04/15/jumlah-kendaraan-di-Indonesia-capai-1042 11-juta-unit, accessed on February 25th, 2016). Especially in Medan, Directorate of Traffic Police of North Sumatra (Dirlantas Poldasu) recorded the number of existing vehicles has reached 5,531,777 units.

Increasing the volume of this vehicle is not balanced with the improvement of existing road infrastructure that often causes congestion. Parking lots and street vendors that often use the road body further aggravate the congestion. (source: http://www.beritasumut.com/view/Politik---Pemerintahan /18976 /Pemko Medan Akan Batasi Jumlah Kendaraan.html, accessed on February 25th, 2016). This condition can cause concentrated air pollution.

Motorcycles are the most dominant vehicles on the highway. In Medan, the number of motorcycles reaches 86.29 percent of the total number of vehicles, which are 4,757,328 units. Motorcyclists are more easily exposed to direct air pollution compared to other vehicle users such as cars or public transportation especially when there is a traffic jam. Many of these motorcyclists do not protect themselves with a protector (mask) or full face helmet that can filter air pollution because of their lacking of knowledge about the dangers of vehicle exhaust emissions on health. In addition, real-time information about air quality is still minimal at some points of congestion. Medan currently has three air pollution measurements (namely located at Jl Jamin Ginting, Jl Gatot Subroto, and Jl Palang Merah) but they are no longer working (source: http://medan.tribunnews.com/2015/10/23/alat-ukur-pencemaran-udara-medan-tak-kunjung-diperbaiki, accessed on March 1st, 2016). Other data from the Ministry of Environment and Forestry, Medan has four air quality monitoring stations where all of those stations are also inactive (source: http://iku.menlhk.go.id/, accessed on March 1st, 2016).

Several studies have been conducted previously on air quality measurements, such as [7]Wicaksono and Suismono who make CO, CO_2 and NOX gas detectors using dot matrix as a means of outputting concentration values of these gases and light

emitting diode (LED) as indicator lights which will light up if the detected gas concentration exceeds the threshold. Research by [4]Hafiizh and Danang are to make air pollution detector with visual output using 16x2 LCD screen. Another research conducted by [2]Jilly et al is to make CO, CO2, SO2 gas detectors where data captured by gas sensors will be sent to a wirelessly connected computer for presentation and storage.

Based on the researcher's analysis, the results of the above studies have not been optimally used to assist motorcyclists to obtain information about the surrounding air quality in real time. This is because the output media used is a text visualization media in the form of LCD or dot matrix so that motorcyclists should always see the results shown. This can certainly disrupt the concentration of motorcycle riders in riding. Other output media such as computers that provide information about air quality also cannot be used directly by motorcyclists.

Therefore in this study, the research team will design an air quality measuring instrument with output information equipped with sound. The air quality measuring tool will be mounted on a helmet (head protector) so that the audio device used can be placed around the ear area so users more easily receive/listen to air quality information detected nearby in real time and accurately.

2. OBJECTIVES OF WRITING

The objective to be achieved is to produces a prototype air quality measuring helmet equipped with sound as output information of air pollution levels and to know the accuracy level of information output from the helmet prototype that is implemented on the road.

3. DESIGN

The prototype design in this study is a helmet equipped with sensors to detect pollutants then the output data from the sensor is processed with a microcontroller and produce information by voice through the speakers.
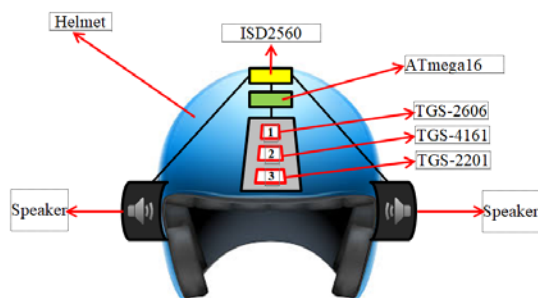
Figure 1. Prototype design

4. FINDINGS AND DISCUSSION

The findings of this study are as follows:
1. The researcher has designed schematic circuits and layout on the printed circuit board (PCB) board as the place of each component to be used and the data path.
2. Schematic circuit and layout which has been designed are printed on PCB board. Then, the researchers do the installation of the required components in accordance with the arrangement on the layout that has been designed.
3. Conducting a test of a PCB circuit that has been installed with the components, it is to know the output voltage required by the sensor. This is done to determine the output data generated by each sensor when it detects the presence of pollutants, then the output data can be used in data processing by the microcontroller.
4. Designing the program for microcontroller so that all components can work and test output to Liquid Crystal Display (LCD) and audio. The microcontroller components used by researchers are the Atmega16 which are easily configured for the prototype design of an air quality measuring helmet.
5. Installing the sensor circuit and audio components on the helmet. The series of sensors assembled/installed on the helmet are adjusted with the comfort of using the helmet.

The design of the prototype of the air quality measuring helmet in this study can be seen in figure 1 below.
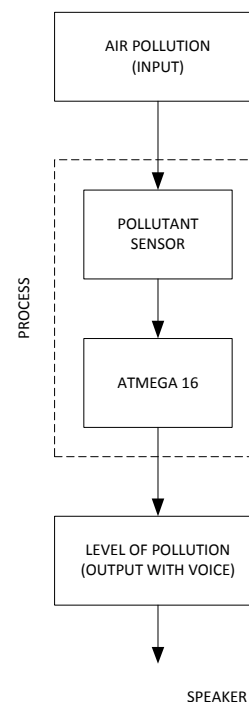
Figure 2. The flow of data process

1. Data Input

   Data input will be obtained from sensors that detect the presence of pollutant gas around the sensor. Some of the pollutant gases that can be detected by these sensors are carbon monoxide, carbon dioxide, ammonia, and some other pollutant gases according to the sensor specifications that researchers use. Sensors that researchers submit in the proposal are 3 pieces of the sensor namely TGS 2600, TGS 4161, and TGS 2201. Until July 2017, researchers tried to get TGS 2201 sensor, but researchers have not got that sensor from the vendors so that the sensors used in the current study only 2 pieces namely TGS 2600 and TGS 4161 where data output from each of these sensors are in the form of numbers in a unit of ppm

2. Data processing.

   Furthermore, the output data from the pollutant gas sensor is processed on the microcontroller to obtain the desired output. The output category is adjusted to the Air Pollution Standard Index (ISPU) in the Decree of the State Minister of the Environment Number: KEP 45 / MENLH / 1997 on the Air Pollution Standard Index and Decree of the Head of Environmental Impact Management Agency no. 107 of 1997 dated 21 November 1997. The basic parameters and time period of measurement can be seen in table 1.

Table 1. Basic parameters for ISPU and time period of measurement

No	Parameters	The time period of measurement
1	Partikulat (PM_{10})	24 hours (average measurement period)
2	Sulfur Dioksida (SO_2)	24 hours (average measurement period)
3	Karbon Monoksida (CO)	8 hours (average measurement period)
4	Ozon (O_3)	1 hour (average measurement period)
5	Nitrogen Dioksida (NO_2)	1 hour (average measurement period)

Table 2. Basic parameters for ISPU and time period of measurement

No	Category	Range	Explanation
1	Good	0-50	The level of air quality that has no effect on human or animal health and no effect on plants, building or aesthetic value
2	Medium	51-100	The level of air quality has no effect on human or animal health but affects sensitive plants, and aesthetic value
3	Unhealthy	101-199	The level of air quality that is harmful to humans or groups of sensitive animals or it can cause damage to the plant or aesthetic value
4	Very Unhealthy	200-299	The level of air quality that can be detrimental to health in a number of exposed population segments.
5	Dangerous	300-more	The level of hazardous air quality that can generally be detrimental to serious health.

Table 3. Limits of standard index of air pollutant in SI units

ISPU	24 hours PM10 $\mu g/m^3$	24 hours SO2 $\mu g/m^3$	8 hours CO $\mu g/m^3$	1 hour O3 $\mu g/m^3$	1 hour NO2 $\mu g/m^3$
50	50	80	5	120	(2)
100	150	365	10	235	(2)
200	350	800	17	400	1130
300	420	1600	34	800	2260
400	500	2100	46	1000	3000
500	600	2620	57.5	1200	3750

Calculation of standard index of air pollutant can be done by using the following formula:
Real concentration of ambient (Xx) $\rightarrow$ ppm, mg/m^3, etc.
Real number of ISPU (1)

Xx $\rightarrow$ I

$$I = \frac{Ia-Ib}{Xa-Xb}(Xx - Xb) + Ib \quad ....(1)$$

Ket:
I = ISPU counted
Ia = ISPU upper limit
Ib = ISPU lower limit
Xa = Ambient upper limit
Xb = Ambient lower limit
Xx = Actual ambient level of measurement results

3. Data output.

   The final output of category information from the range value of the standard index of air pollution is the display of LCD or sound through an audio device.

Figure 3. Design helmet prototype

5. DISADVANTAGES OF PROTOTYPE

Some of the disadvantages of this helmet prototype are :
1. This prototype does not have a shield so it can not be used during rainy conditions.
2. This prototype can not produce air pollution information caused by dust.
3. This prototype can not produce air pollution information based on each of the existing pollutants.

6. CONCLUSION

The results obtained from the field test process in this research is prototype helmet detector air pollution can produce information air pollution levels well so that facilitate the user helmets (motorcyclists) to know the air pollution information generally.

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REVIEW DEVELOPING OF PROJECT BASED AS INNOVATION INSTRUCTIONAL

Eko Indrawan

Students of the Doctoral Program of Vocational and Technology Education
Universitas Negeri Padang, Padang. Indonesia.
autoitss@gmail.com

ABSTRACT: Objectives: To examine primary research articles published between December 2010 and November 2016 that focused on the issues review of project based learning as innovation instructional. The literature was systematically reviewed, critically appraised and thematically analyzed. Data Sources: Online databases including Social and Behavioral Sciences, International Journal of Project Management, Procedia Computer Science, Mechatronics, Journal of Cleaner Production, Learning, and Instruction, Computers & Education, Robotics and Autonomous System, Computers in Human Behavior and Science Direct were used. Methods: The criteria used for selecting studies reviewed were: primary focus on project based learning and issues faced by innovation Instructional; all articles had to be primary research studies, published in English in peer-reviewed journals between December 2010 and November 2016. Results: Analysis of the 15 reviewed studies revealed the following three themes: issues project based learning as innovation instructional. Conclusion: The review through project-based learning, learners will work within a team, find the skills to plan, organize, negotiate, and make a consensus about issues of tasks that will be done, who is responsible for each task, and how the information will be collected and presented scientifically.

Keyword: Project based learning, instructional media, innovation

1. INTRODUCTION

The demands of study at colleges in addition to the demanding academic ability (hard skill), learners are also required to be able to improve the ability of personal (soft skills), so it is ready to enter the real world of work after his studies. Environmental education field should, in addition to providing enough theories, also need to give examples of solving real projects by utilizing learning strategies that support environmental education field. Current knowledge century, wanted the paradigm project-oriented learning, problem, investigation (inquiry), invention and creation "(Wilson, 1996; Ardhana, 2000).

This means providing opportunities to learners to wading through the whole realm of learning (cognitive, affective, and psychomotor), as well as to develop the whole of his intelligence (emotional, spiritual, social, and so on).

Background

The empirical evidence shows that experiential education addresses specific methods and Project Based Learning is one of them. "The core idea of Project Based Learning is that real-world problems capture students' interest and provoke serious thinking as the students acquire and apply new knowledge in a problem-solving context. The teacher plays the role of facilitator, working with students to frame worthwhile questions, structuring meaningful tasks, coaching both knowledge development and social skills, and carefully assessing what students have learned from the experience" (David, 2008: 80). PBL can take place both inside or outside classrooms.

The PBL method calls for learners to acquire and develop core learning concepts through collaborative projects that require the learning and application of contextual knowledge. The literature has shown that PBL enables students to become interactive learners (Blumentfeld et al., 1991; Lin & Hsieh, 2001; Synteta & Schneider, 2002) and to construct knowledge through exploration (Edward, 1995; Jang, 2006a; Johnson & Aragon, 2003; Prince & Felder, 2007). Recent PBL studies have described the use of new technologies to different ends. PBL has proven particularly effective when combined with computer technology (Barron et al., 1998; Edelson, Gordin, & Pea, 1999; Solomon, 2003; Stites, 1998). Given the growing pervasiveness of the Internet, technology is now a major tool in PBL (Land & Greene, 2000). However, although technological advances change the tools that are used in support of PBL, they do not change its fundamental principles. Therefore, an important challenge for educators and policy makers is to train teachers in not only PBL pedagogy but also the technology needed to implement PBL successfully in the classroom (Barab & Luehmann, 2002; Barak & Dori, 2004).

Uses of technology to facilitate PBL implementation can be categorized as technology-

supported or multimedia technology-assisted. In technology-supported PBL, the technologies are often used as communication tools (Hafner & Ellis, 2004), research tools (Land & Greene, 2000), scaffolding tools (Intel Teach Program, 2009; Synteta & Schneider, 2002), project management tools (Denis, Harald, Hermann, & Nick, 2005; Rooij, 2009), and telecollaboration tools (Anderson, 2002; Harris, 1998). In multimedia technology-assisted PBL research, however, such technologies are often used as production tools that enable students to organize and present their research work through multimedia. Cognitive load theory (Penney, 1989) and the cognitive theory of multimedia learning (Moreno & Mayer, 2000) indicate that, when learners process multimedia data simultaneously, they integrate numerous types of information and form mental models based on their understanding of the learning material. Multimedia technology-assisted PBL thus affords students opportunities to demonstrate organized learning outcome and to increase their knowledge and self-efficacy in the subject matter. However, some possible barriers to multimedia technology-assisted PBL projects include technical difficulties with software, hardware and networks, as well as time constraints, and the need for teacher training (Steelman, 2005). A lack of prompt technical support may cause anxiety for a teacher. Teachers must also customize instruction to prevailing knowledge levels and learn goals (Seo, Templeton, & Pellegrino, 2008). An even greater challenge for a subject teacher is to address the technical needs of students who may have varying proficiency and interest in the use of computers.

One of the learning strategies that can help learners to have the creativity of thinking, problem-solving, and interactions as well as aiding in the investigation that leads to the completion of the real issues is a project-based learning (PBL) or project-based learning (Thomas, 1999; Esche, 2002; The George Lucas Educational Foundation, 2005; Turgut, 2008). Project-based learning can stimulate motivation, process, and improve the learning achievements of learners by using issues relating to certain subjects on the real situation.

One of the things that are interesting why project-based learning is important to apply is indicated by some of the research that preceded it. The results showed that 90% of the students who follow the learning process with the implementation of project-based learning is confident and optimistic can implement project-based learning in the world of work as well as academic achievement can increase (Koch,

Chlosta, & Klandt, 2006). In addition, the research results of the survey, Johanna Lasonen, Vesterinen, Pirkko & (2000) showed 78% of students said that the curriculum based on project-based learning can help equip learners to prepare for entering the world of work because students learn not just in theory but of practice in the field. Project-based learning is a learning model that has been developed in advanced countries such as the United States. If translated into the languages of Indonesia, project based learning is meaningful as a project-based learning.

Project-based learning is a model or innovative approach to learning, which emphasizes the contextual learning through complex activities (Cord, 2001; Thomas, Mergendoller, & Michaelson, 1999). Project-based learning focuses on the concepts and principles of the main (central) of a discipline, involving students in problem-solving activities and other meaningful tasks, giving learners opportunities to work autonomously reconstruct to learn on their own, and the Summit produce learners work value, and realistic (Okudan. Gul e. and Sarah e. Rzasa, 2004). Project based learning is an model effective toward increase of the problem solving student (Jalinus and Nabawi, 2017).

In contrast to traditional learning models that are generally characterized by short-term class practices, insulated/off, and the learning activity centers on the Professor, the model project-based learning greater emphasis on learning activities that are the relatively long-term, holistic-interdisciplinary, learner-centered, and is integrated with the practice and real-world issues. In project-based learning students learn in a real problem situation, which could give birth to a permanent knowledge and organizing projects in learning (Thomas, 2000).

Project-based learning is an effective educational approach that focuses on the creative thinking, problem-solving, and the interaction of the students with their peers to create and use new knowledge. This was done particularly in the context of active learning, scientific dialogue with supervisors who are active as researchers (Berenfeld, 1996; Marchaim 2001; and Asan, 2005). Based on these opinions, project-based learning is a learning strategy that is developed based on constructivist learning schools demanding learners put together his own knowledge (Doppelt, 2003). Constructivism is a learning theory that gets the broad support that rests on the idea that learners construct knowledge themselves within the context of his own experience (Wilson, 1996). Project-based

learning approach can be seen as one approach to the creation of a learning environment that can encourage learners reconstructs personal knowledge and skills. Buck Institute for Education (1999) mention that project-based learning has the characteristics, namely: (a) learners as a decision maker, and create frameworks, (b) there is a problem the solution is not determined in advance, (c) learners as a process to achieve results, (d) the learner is responsible for acquiring and managing the information collected, (e) perform continuous evaluation, (f) learners regularly look back to what they used to do , (g) the final result in the form of product and quality is evaluated, and (h) of class has an atmosphere that provides fault tolerance and change.

Project-based learning has a great potential to create learning experiences that are interesting and meaningful for students to enter employment. According to Gaer (1998), in project-based learning applied to develop competence after learners working in a company, the learners to be more active in learning, and a lot of skill to successfully built from the project in its class, such as team building skills, cooperative decision making, problem solving, and group management team. The skills of its value when it was entering the work environment and it is a difficult skill taught through traditional learning.

Tendency of the XXI century is marked by the increasing complexity of technology equipment, and the emergence of the movement for restructuring corporative that emphasizes the combination of technology and human qualities causes the workforce will require people who can take the initiative, critical thinking, creative, and skilled in solving problems. The relationship of "man-machine" is no longer a mechanistic relationship but a communicative interaction that demands high-level thinking skills.

These tendencies began to responded by world education in Indonesia, which since 2000 to implement the four educational approaches, namely (1) life skills-oriented education (life skills), (2) curriculum and competency-based learning, (3) production-based learning, and (4) broad-based education (broad-based education). The new orientation of education it wished to make the institution as the institution of life skills, with an education which aims at achieving competence (hereinafter called competency-based), with authentic learning and contextual product that can generate valuable and meaningful for learners, and the granting of broad-based education services through a variety

of routes and secondary flexible multi-entry-multi-exit.

Life skills-oriented education, competency-based learning, and the learning process which is expected to produce a product that is valuable demanded the rich learning environment and real (rich and natural environment), which can provide a learning experience the dimensions of competence is integrative. The learning environment is characterized by:

learning Situations, environments, content and tasks are relevant, realistic, authentic, and presents the natural complexity of "real world"; the primary data sources used to ensure the authenticity and the complexity of the real world; develop life skills and not the reproduction of knowledge; development of skills within the context of individual and social negotiation, through collaboration, and experience; previous Competence, confidence, and attitude considered as a prerequisite; Problem-solving skills, higher-order thinking, and deep understanding is emphasized; Learners are given the opportunity to learn in apprenticeship where there is addition of the complexity of the task, the acquisition of knowledge and skills; knowledge Complexity is mirrored by a greater emphasis on learning the connectedness of conceptual, and interdisciplinary learning; cooperative and Collaborative Learning take precedence in order to expose students to alternative views in; and Measurements are authentic and become an integral part of the learning activities

Having regard to the unique characteristics and comprehensive, project-based learning model (Project-Based Learning) is enough potential to meet the demands of such learning. The model project-based learning helps learners in the study: (1) a solid knowledge and skills and meaningful action (the meaningful-use) built through tasks and authentic work (Cord, 2001; Myers & Botti, 2000; Marzano, 1992); (2) expanding knowledge through authenticity supported by curricular learning activities process planning (designing) the investigative or open-ended, with the result or the answer that is not set in advance by a certain perspective; and (3) in the process of constructing knowledge through real world experience and cognitive interpersonal that negotiations take place in an atmosphere of collaborative work.

The activities of project-based learning workshop for tutors according to Rosenfeld (2001) consisting of: (1) make inquiries to be made into a project, (2) choose the main questions or specify the project, (3) reading and looking for material that is relevant to the issues, (4) design problem, (5) designing/the right method in

solving problems, (6) writing projects proposals, (7) implementation and create documents task, (8) data analysis and make conclusions , (9) final report, (10) presented the final project.

A shorter step to setting the learners according to Gabriella (2000) and Thomas (2000) is the first problem formulation preparation: (pick a theme project, make questions, create lists, create a list, vote and decide the project, formulas problem, and hypothesis). This is a standard introductory phase of learning where information and schedules created learners strive to understand each other by introducing yourself and collect the expectation within the overall activities of the project.

The second integration, this is the step process consisting of a number of activities relating to the preparation and important step the workmanship of a project. designing and preparing the equipment for the project, specify the methods, locations, and the symptoms.

The formation of groups and election project: students are expected to solve a problem that is selected by a small group of honest. collection of information: concise presentation and discussion of individual projects, which supports the collection of various views on the project. project work Step: step's work is an important part of the work of the group. As for the things which are seen with regards to how the motivation of learners in the following project-based learning, the way learners do problem-solving, process collaboration between learners and teachers, as well as the independence of the students in completing the projects.

The third step is evaluation (interpretation and make comparisons, concluded the project report. Things that are prepared in the LBC: curriculum, project supplies, the physical environment, the social environment, and the interactions of these aspects. This pattern of activity in the form of conducting an assessment of learners. Feedback help lecturer in interpreting mastery learners taking action against the project have been doing. The aims of this literature review were to identify research related to Project-based learning and to identify issues for innovation instructional.

2. METHODS

A systematic search of primary research literature was performed using a selection of electronic search tools over three broad categories: Project-based learning. Online databases including Social and Behavioral Sciences, International Journal of Project Management, Procedia Computer Science, Mechatronics, Journal of Cleaner Production, Learning and Instruction, Computers & Education, Robotics and Autonomous System, Computers in Human Behavior and Science and Science Direct were searched. Manual searches based on the reference lists and bibliographies of articles, reports, and books considered relevant to this study were also performed. The following keywords incorporating 'Project base Learning' These arches were then repeated adding the following keywords: issues, barriers, perceptions, attitudes, readiness, and concerns.

3. RESULTS

Initial searches identified 50 studies for possible review. The title and abstract then were read to determine relevance; 30 studies were discarded as not being directly relevant to the review, leaving 25 for more detailed examination. These studies were then examined against the inclusion criteria. A further 20 were judged as not meeting the selection criteria, leaving 20 articles. Another 5 studies were discarded as not meeting the appraisal criteria leaving 15 studies to be included in the review.

4. CONCLUSION

Learning in College especially, environmental education, in addition to providing enough theories, is associated with technical prowess, also claimed a good personal ability. Personal skills such as soft skills is an ability that is absolutely filled with individual the learner before and when it will enter the world of work. Learning strategy approach is required that can synergize the academic skills like understanding the theory and soft skills (problem-solving, independence, teamwork, self-reliance, responsibility, honesty, and the ability to communicate ideas and convey ideas through the percentage of the group project). One of the learning strategies offered is project-based learning (project-based learning). Project-based learning stresses education that gives odds on the learning system based on learners/learners, collaboratively and integrates the real issues and practical, effective teaching in building knowledge and creativity.

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IMPROVING THE ESP STUDENTS' VOCABULARY BY USING PICTURES IN CIVIL ENGINEERING STUDY PROGRAM AT FIRST SEMESTER OF EKASAKTI UNIVERSITY PADANG

Elda Martha Suri

Mahasiswa S3, Ilmu Pendidikan, Universitas Negeri Padang

ABSTRAK: This research was conducted on one semester students of civil engineering study program of Universitas Ekasakti, Padang. The purpose of this study is to know the extent of the positive impact of the use of images in improving students' skills in English vocabulary. This research is a Classroom Action Research (PTK) conducted through a research cycle using images in teaching English subjects. In addition to using the test, the data obtained in this study is through observation, interviews, questionnaires. The results of this study indicate that there is an increase in the number of vocabulary students from the use of images in teaching and learning process which can be seen from the average student increased from 53 to 63. It also can increase motivation and interest of students in learning English.

Keywords: Picture, Vocabulary Mastery and Classroom Action Research (PTK)

INTRODUCTION

A.Background of the Research

English is still seen as a language number one at schools. Students´ interest in this language is enormous and I dare say there is no school where English language is not taught. English is a part of school curriculum. On the other hand, the students do not study general English,but they learn English for Specific Purpose (ESP). In this terms English for civil engineering. Learning English in general and English for specific purposes is different, where in learning English for specific purposes, the students learn more complicated vocabulary.

Furthermore, vocabulary is the first thing for students to learn the four skill. As the lecturer in the Ekasakti University of Padang, the researcher found that some her and his students have difficulties in mastering English vocabulary. The problems might come from lecturer, students and the way of lecturer's teaching. In the way of teaching, lecturer has ever tried some methods. Usually lecturer asks students to remember some words. Besides that, the lecturer has ever asked students to write down the words that lecturer said. However, these methods can not help to increase students motivation in studying English. It can be seen from result the test, where not more than 30 % students can answer lecturer's questions. One the way to improve students' vocabulary by using picture. Picture is good used in the class especially for ESP students.

Based on the description above, the researcher would like to do classroom action research with the title "Improving The ESP Students' Vocabulary by Using Picture in Civil Engineering Study Program at First Semester of the University of Ekasakti University Padang".

B. REVIEW OF THE RELATED LITERATURE

1.Definition of Vocabulary

According to Susanti (2002:89), "Vocabulary is the total number of words in a language. It is also a collection of words a person knows and used in speaking and writing ". It means that vocabulary is collection of the words used every one to use in speaking and writing.

2.Vocabulary Mastery

According to Swannel adopted by Larasati (2011:12) mastery is comprehensive knowledge. From the definition, mastery is wide; it covers all of the elements of knowledge. It means that mastery is a comprehension about all of knowledge. Mastery is the knowing and understanding everything about knowledge. Moreover Cameron (2001:78) vocabulary skills included: pronunciation, spelling, grammar and meaning.

B. Research Method

This research was a class action research since it fulfiled the criteria mentioned by some experts above that this research was done to find out the solution to real problem of the researcher about students' vocabulary mastery.Besides, this research wasalso done with a collabolator.

The collabolator was Mrs. Nursyalini Eka Putri, M.Pd an English lecturer in Ekasakti University Padang

In conducting this reseracher, therewere some instrumets used to get the data. The data were collected by using test, observation, field note,and interview to describe the situation during the research and the result of the research.

In conducting this reserach, the reseracher used 2 cycles. Since it was a classroom action research, each cycle consisted of 4 steps, they were; plan, action, observation, and reflection.

C. Finding and Discussion

1. The finding

This research was conducted to answer the research questions: 1) to what extent can vocabulary by using pictures to Improving the ESP Students' Vocabulary by Using Pictures In Civil Engineering Study Program at First Semester of Ekasakti University Padang? and 2) what factors influencing Improving the ESP Students' Vocabulary by Using Pictures In Civil Engineering Study Program at First Semester of Ekasakti University Padang?

By looking at the data analysis The researcher conducted the research to the first semester students of Civil Engineering Study Program, The University of Ekasakti Padang during two cycles. In order students' ability in vocabulary mastery can be improved after taught by using pictures, the researcher analyzed the result of increasing the students' scores from pre-test to post-test. The reseacher did pre-test to subject of this research; it is first semester of the Ekasakti University. The participants were 40 students. From 30 items, the row score was 18.04 and teh average scores was 53.

Table 4: The Pre-Test Score and the Students' Ability Level in Vocabulary

No	Range Score	Ability Level	Frequency	Percentage
1	80 - 100	Good to Excellent	0	0 %
2	60 – 79	Average to Good	7	23 %
3	50 - 59	Poor to Average	17	57 %
4	0 - 49	Poor	6	20 %
	Total		30	100 %

From the table above, we can see that there were no students or 0 % who Good or Excellent score, 7 students or 57 % who git Average to Good score, and 6 students or 20 % who got a Poor score. This pre-test was to know the students' ability in vocabulary mastery before the treatment. But, after giving the Pre-test, the researcher conducted the treatment for three meetings. After giving the treatment, the researcher gave post-test to the students to see the increasing of students' vocabulary score between pre-test and post-test.

The items were given as the pre-test. From 30 items, by focusing on calculating the means score of the post-test, it was found that the mean score of students was 63.

The average score in the pretest was 53; it means that the vocabulary mastery of the students was Poor to Average. After conducted the treatment by teaching them using pictures, the researcher analyzed that there was an increasing of students' result in the post-test. It was shown that average score of students increased to be 63.

Table 6: The Average Scores of the Students in Pre-Test andPost-Test

The Average Scores of Pre-Test	The Average Scores of Post-Test
53	63

Based on the table above, we can see that the average scores of the students increase in post-test. It increased from cycle I,the students got score was 53 and the cycle II, the students got score to become 63. The average scored could reach 60 as minimum score, so the research was categorized success.

2. Discussion

From the two cycles in this action research, the researcher concluded that students' Vocabulary mastery could improve the ESP Students' Vocabulary by Using Pictures.

Based on the findings of this research, it was stated that pictures could better improve the first semester at Civil Engineering study program of Ekasakti University Padang of 2015/2016. The improvement couldbe seen from cycle 1 until cycle 2.

3. Conclusion

In conducting this research, the researcher found some an increase in the students' average scores in pre-test and post-test. The means score in pre-test was 53 and increased in post-test to be 63. From the observation table of the students,it also is shown that the motivation of students in teaching and learning process increased. Application of this study some strengths of using pictures to increase the vocabulary of the first year's students, they are:

a. The students were trained to be smart in using pictures to increase vocabulary.
b. By using pictures, the students were easy to remember the words.
c. By mastering English vocabulary, the students are expected has improvement in English skills; speaking, reading, listening and writing.

However, the researchers also found the weakness that the students were why to speak English at the first time the researcher taught them by using pictures

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INTEGRATED SERVICES SYSTEMS ELECTRONIC DEVELOPMENT FACULTY OF ENGINEERING PADANG STATE UNIVERSITY BASED ON JAVA DESKTOP

Elfi Tasrif, Asrul Huda

Faculty of Engineering, Universitas Negeri Padang, Indonesia

ABSTRACT: Before students complete their education, students must have an interest in correspondence, for example to take care of the advisors' interests, seminar letter, final project or final project. Before getting the letter the student must follow a number of procedures first and bring the terms for the completeness of the letter. Student of Department of Electronics Engineering Faculty of Engineering, State University of Padang, before getting a letter they must take a blank of letter that has been provided in the department, then filled manually to be submitted to the department along with the attachment of requirements requested to be signed by the department chairman. Prior to signing the head of department, the letter and its attachment are verified by the Secretary of the Department after it is signed by the Head of Department. This process can last for 2-7 days if it has constraints. The constraints in question are such as the difficulty of collecting the files because they have to be photocopied or printed first, the number of queues making the letter while the officers who take care of the letter is limited so that takes a long time, waste of paper and map, chairman of majors who are not always in the department because they have to teach and or is performing the task. Thus required a system that can assist the acceleration in the process of making the letter to be more effective and efficient. This is what prompted the author to develop Integrated Service System Department of Electronics Faculty of Engineering, State University of Padang Based Java Desktop Client-Server, which is expected with this system will overcome the weaknesses of service system to students of Engineering Department of Engineering Faculty of Engineering State University of Padang that already exist ..

Keywords: Integrated Services Systems, Java Desktop

1. INTRODUCTION

Education has a very important role in life. The development of a nation can not be separated from the education system, because a good education system will bring progress for the nation. Education is an absolute necessity for all mankind, with human education having knowledge, values and attitude in doing to support the growth and development needed by itself, society, nation and state.

Students are a term for people who are studying at a college consisting of high schools, colleges, institutes and the most common are universities. According KBBI student is someone who study college.

Before students complete their education, students must have an interest in correspondence. For example to take care of the interests of mentors, seminar letters, final project or final project. Before getting the letter the student performs a number of procedures in advance and carries the terms of interest of the letter.

Electronic Engineering is one of the majors in Engineering Faculty State University of Padang. This department has 3 study program namely Computer Information Technology Education, Electronic Engineering Education and Electronics Engineering. The Department has not yet implemented an integrated service system in the management of letters.

Based on the results of an interview with one of the students majoring in Electrical Engineering Faculty of Engineering, State University of Padang, before getting a letter they must take a blank letter that has been provided in the department, then filled manually to be submitted to the department and attachment requirements required to be signed by the chairman of the department. Prior to the signing of the head of department, the letter attached to the attachment was verified by the secretary of department after it was signed by the department chairman.

This process can last for 2-7 days if it has constraints. The constraints in question are such as the difficulty of collecting the files because they have to be photocopied or printed first, the number of queues making the letter while the officers who take care of the letter is limited so that takes a long time, waste of paper and map, department chairman who is not always in the department for having to teach and or is performing the task.

Thus needed a system that can assist the acceleration in the process of making a letter in the department to be more effective and efficient. This is what encourages the authors to develop Integrated Service System of Electronics Department of Engineering State University of Padang Based Java Desktop Client-Server, which is expected with this system will overcome the weaknesses as mentioned above.

2. LITERATURE REVIEW

In Big Indonesian Dictionary (KBBI) system is an elemental device that is regularly interconnected to form a totality. The system is derived from the Latin (systēma) and the Greek (sustēma) is a unity consisting of components or elements connected together to facilitate the flow of information, matter or energy to achieve a goal. This term is often used to describe a set of interacting entities, in which a mathematical model can often be made.

Service according to Big Indonesian Dictionary (KBBI) is as an attempt to help prepare or take care of what is needed by others. Meanwhile, according to Moenir (2010: 26) service is an activity undertaken by a person or group of people on the basis of material factors through certain systems, procedures and methods in order to meet the interests of others in accordance with their rights. Its essential service is a series of activities, therefore service is a process. As a process, service takes place on a regular and continuous basis, covering the whole life of people in society.

Whereas in Law No. 25 of 2009 concerning public services, it defines that public service is an activity or series of activities in the context of fulfilling the needs of services in accordance with the laws and regulations for every citizen and citizen of the goods, services and or administrative services provided by public service providers.

Netbeans

In its website, Netbeans explains "The NetBeans Platform is a broad Java framework on which you can base large desktop applications. NetBeans IDE itself is one of the hundreds of applications based on the NetBeans Platform. The NetBeans Platform contains APIs that simplify the handling of windows, actions, files, and many other things typical in applications. "

This Netbeans is one of the Integrated Development Environtment (IDE) applications used to compile code from the source code we have typed and make it a directly executable application.

Client-Server

Quoted from Wikipedia, the notion of client-server is, "A distributed application structure that partitions tasks or workloads between the providers of a resource or service, called servers, and service requesters, called clients."

In the implementation, this client-server model uses a server computer that is classified according to the services they provide. For example, a web server presents a web page and the file server presents a computer file. The resources can be computer software and server electronic components, from programs and data to processors and storage devices.

3. RESEARCH METHODS

This research belongs to Research and Development research type. R & D in question is the design of Integrated Service System application Department of Electronics Faculty of Engineering, State University of Padang based on Java Desktop.

4. RESULTS DESIGN AND DISCUSSION

a. Design Results Integrated Services System Application

Based on the result of interface design that has been designed then result of interface design Integrated service system can be described as follows:
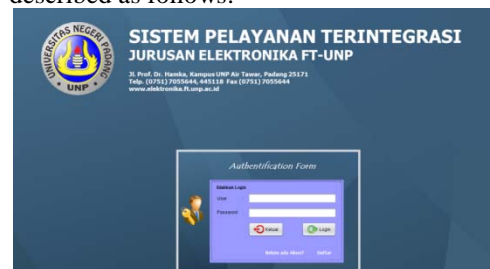
Figure 1. Design Results Display System Login Page

On the login page, the student must enter the NIM account and password, while the operator enter the operator id account and password. At login time if NIM, id operator or password wrong, then error message will appear.

The script to display the login form as follows:

```
import java.awt.event.KeyEvent;
import java.sql.*;
import javax.swing.JOptionPane;

public class Login extends javax.swing.JFrame {

@SuppressWarnings("OverridableMethodCallInConstructor")
    public Login() {
        initComponents();
        setExtendedState(MAXIMIZED_BOTH);
    }

    Mahasiswa nimUser  = new Mahasiswa();
    Petugas idPeg       = new Petugas();

    @SuppressWarnings("UseSpecificCatch")
    private void proses(){
        try{
        String sql      = "select *from mahasiswa where
nim = '"+txtUser.getText()+"' and password =
'"+String.valueOf(txtPassword.getPassword())+"'";
        ResultSet rs    =
Koneksi.KoneksiDB.executeQuery(sql);

        String sql2     = "select *from petugas where
id_petugas='"+txtUser.getText()+"' and
password='"+String.valueOf(txtPassword.getPassword())
+"';";
        ResultSet rs2   =
Koneksi.KoneksiDB.executeQuery(sql2);
```

```java
      if (rs.next()){
         nimUser.set_data(txtUser.getText());
         nimUser.setVisible(true);
         dispose();
      }else if (rs2.next()){
         idPeg.set_data(txtUser.getText());
         idPeg.setVisible(true);
         dispose();
      }else{
         lblSalah.setText("Username Atau Password
Anda Salah");
         txtPassword.setText("");
         txtPassword.requestFocus();
      }

   }catch(Exception e){
      JOptionPane.showMessageDialog(null, "Error
"+e);
   }
 }

 private void
btnLoginActionPerformed(java.awt.event.ActionEvent
evt) {
    proses();
 }

 private void
btnBatalActionPerformed(java.awt.event.ActionEvent
evt) {
    System.exit(0);
 }

 private void
txtPasswordKeyPressed(java.awt.event.KeyEvent evt) {
    if (evt.getKeyCode() == KeyEvent.VK_ENTER) {
       proses();
    }
 }

 private void
btnDftrActionPerformed(java.awt.event.ActionEvent
evt) {
    new L_Pendaftaran().show();
 }
```

The script snippet above will work to display the login form. Where user must enter NIM and password or id operator and password.

b. The Design of the Registration Page

Registration page is a page that must be visited by students to create an account, without account student cannot access the system. The account used in this system is the Parent Number (NIM). By registering the NIM to the system, the student concerned can access this system. To register the NIM the student must click the list button.

By clicking on the list, the student will be directed to the registration page. Implementation of the register page can be seen from the following figure:
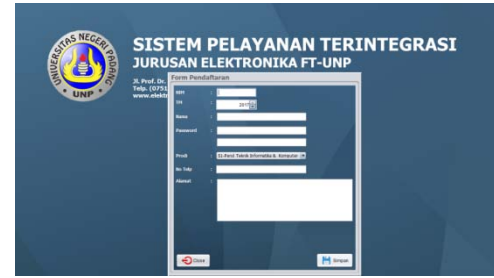
Figure 2. Registration page

The picture above is the student account registration page. The script to display the registration form as follows:

```java
package SIA;

import java.awt.Dimension;
import java.awt.Toolkit;
import java.sql.ResultSet;
import javax.swing.JOptionPane;
import javax.swing.table.DefaultTableModel;

public class L_Pendaftaran extends
        javax.swing.JFrame {

    public L_Pendaftaran() {
        initComponents();
        Dimension screenSize,frameSize;
        int x,y;

         screenSize=Toolkit.getDefaultToolki
         t().getScreenSize();
         frameSize=getSize();
         x=(int) ((screenSize.width-
         frameSize.width)/1.9);
         y=(screenSize.height-
         frameSize.height)/1;
         setLocation(x, y);
    }
    String SQL;
    @SuppressWarnings("UseSpecificCatch")
    private void simpanData(){
        if(btnSimpan.isEnabled()){
           int jwb =
        JOptionPane.showConfirmDialog(this,
        "Anda Yakin Data Sudah
        Benar?","Konfirmasi",JOptionPane.YE
        S_NO_OPTION);
           if(jwb == 0){
              try{
                 SQL            =
        "Select *from mahasiswa where nim =
        '"+txtNim.getText()+"';";
                 ResultSet rs    =
        Koneksi.KoneksiDB.executeQuery(SQL)
        ;
                 if (rs.next()){
JOptionPane.showMessageDialog(this, "NIM
        yang anda entrikan sudah pernah
        terdaftar. \nSilahkan hubungi
        Sekretaris jurusan untuk
        menyelesaikan masalah ini! ",
        "PERINGATAN",
        JOptionPane.WARNING_MESSAGE);
                      txtNim.setText("");
                 }else{

        if(txtNim.getText().equals("")  ||
        txtNama.getText().equals("") ||
        txtPassword1.getPassword().toString
```

```
().equals("") ||
txtPassword2.getPassword().toString
().equals("") ||
areaAlamat.getText().equals("") ||
txtNoTelp.getText().equals("") ){

JOptionPane.showMessageDialog(this,
"Harap Lengkapi Data!
","INFORMASI",
JOptionPane.INFORMATION_MESSAGE);
                }else{

if(txtPassword1.getPassword().toStr
ing().equals(txtPassword2.getPasswo
rd().toString())){
                        SQL =
"INSERT INTO mahasiswa (nim, tm,
password, nama, prodi, alamat,
no_telp) "
                            +
"VALUES(
'"+txtNim.getText()+"','"+yearTm.ge
tYear()+"','"+txtPassword1.getPassw
ord().toString()+"','"+txtNama.getT
ext()+"','"+cmbProdi.getSelectedIte
m()+"','"+areaAlamat.getText()+"','
"+txtNoTelp.getText()+"')";
                        int status
= Koneksi.KoneksiDB.execute(SQL);
                    }else{

lblError1.setText("Password Tidak
Sama");

lblError2.setText("Password Tidak
Sama");
                    }
                }
        }catch(Exception e){

JOptionPane.showMessageDialog(null,
"Error");
            }
        }
    }
    }
```

c. Home Page Operator

Implementation of user operator home page can be seen from the following figure:
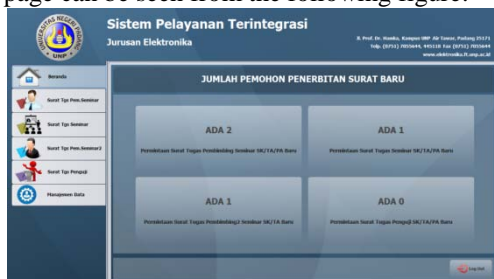
The home page is the main page of the user operator. This page is the initial view if the operator has to login. Home page contains information about the number of students who apply letter making include:

1) Supervisor Letter Seminar SK / TA / PA
2) Task Letter Seminar SK / TA / PA
3) Supervisor Letter2 Seminar SK / TA

4) Task Letter of Seminar SK / TA / PA Seminar

5. CONCLUSION

Based on the analysis and design of Integrated Service System of Electronic Engineering Department Faculty of Engineering State University of Padang can be concluded several things as follows:

1. The integrated service application is completed in design
2. Small scale product testing needs to be done to test the application of Integrated Service System of Electronic Engineering Department of Engineering Faculty of State University of Padang.
3. Implementation of Integrated Service System Department of Electronic Engineering Faculty of Engineering State University of Padang will be continued at the next research stage.

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THE EFFECT OF STRATEGY OF TRAINING MODELS IN LEARNING ELECTRICAL INSTALLATION

Elfizon[1], Syamsuarnis[2] dan Oriza Candra[3]

[123]Department of Electrical Engineering, Faculty of Engineering, Universitas Negeri Padang
Email: elfizon@ft.unp.ac.id, elfizon24@gmail.com

ABSTRACT: This study aimed to determine the effect of model training strategy on learning outcomes in electrical installation courses in engineering majors of electrical engineering faculty of state universities of Padang. The subjects of this study are students of electrical engineering education courses (S1) force 2016. Which consists of 55 people as an experimental class and 52 people as a control class. Assessment instruments using performance appraisal, and the data obtained were analyzed using two-tension test (t-test). From the results of data analysis showed that the class using the model training strategy has a higher average value when compared with students using conventional learning. Based on the calculation of t-test obtained t arithmetic> t table is 4.21255> 2.0042. Thus, the hypothesis in this study is that there is a significant influence of electrical installation learning results in electrical engineering majors engineering faculty of state universities Padang

Keywords: Influence Strategy, Training Model, Learning Outcomes

1. INTRODUCTION

The success rate of Indonesia's national development in all fields will depend on human resources as the nation's asset in optimizing and maximizing the development of all human resources. These efforts can be done and pursued through education, both through formal education and non-formal education channels. One institution on a formal education path that prepares its graduates to have excellence in the world of work and the Industrial world.

Education is a process of establishing qualified human resources. Improving the quality of education can only be achieved through improving the quality of the learning process which leads to improving the quality of educational outcomes. The realization of the government's efforts to prepare educational graduates in entering a challenging era of globalization is to apply an industry-minded curriculum.

Student competency will be formed and developed through a learning process that uses student-centered, learning-oriented approaches and methods. This learning will provide a challenging and fun learning experience. Students are expected to use the in-depth approach and strategic approach to learning, not just learning to remember information or learn to graduate. Lessons that need to be developed by lecturers in the framework of the formation of competencies are interactions that enable students to build knowledge, attitudes, and skills through various transformations of the learning experience.

Associated with learning to improve student competence, curriculum development needs to be oriented to the world of work. Law No. 20/2003 on National Education System emphasizes the autonomy of educational units, competency-based curriculum and paradigm shift from teaching to learning. The existence of paradigm shift from teaching to learning requires a more innovative learning pattern, giving priority to increasing the potential of study subjects, learning facilities, and facilities and infrastructure. The establishment of student competence is an educational process that requires the involvement of various parties, among others, family, school/campus, work/industry, government and professional associations.

State University of Padang (UNP) as one of the institutions of higher education institution in Indonesia always strives to realize the national education function stated in Act on National Education System Number 20 the Year 2003, that is to develop the ability and form the character and civilization of dignified nation in order to educate the life and organize the process education to produce educators who will participate to build the country through education.

Department of Electrical Engineering Faculty of the Engineering State University of Padang seeks to increase the quality of graduates of education today that leads to the mastery of both academic and professional competence. So the lecturing process plays an important role to equip graduates to be able to adapt to employment ". Therefore it is recommended to the lecturer as a learning facilitator able to package the lectures that motivate students to work in the business world/industry. Improvement of student learning outcomes in learning can be done with a variety of ways, one of them with the application of effective learning strategies.

One of the learning strategies is learning model training strategy. Learning strategy Model Training is a strategy that focuses on job skills that are skills that involve all the senses, and are trained repeatedly in the form of organized and coordinated actions.

Learning Model Strategy Training will improve students' activity. Because in this strategy there is a demonstration or performance by lecturers before the students do lectures so that the students understand the procedure of doing the practice properly and correctly, the practice of diversion with the assignment of practical tasks that are more complex than the practical tasks taught so that students can develop an understanding of the material is linked to problems in the field or industry by giving the task of a visit to the industry so that students can match the lessons learned in school with the state of the field or the industry.

The lesson uses the Training Model's strategy of 6 stages: (1) Submission of objectives, (2) Explanation of supporting materials, (3) Demonstration of performance, (4) Practice simulation, (5) Transfer Practices and (6) Industrial Visits. Problems occur above, the author tries to improve learning outcomes is by comparing the students learning outcomes between learning strategies Model with conventional, this is in accordance with the title of research that the authors do is Influence Strategy Model Training on the recovery of electrical installations in engineering majors Electrical Engineering Faculty State University Padang.

2. RESEARCH METHODS

The method of investigation is the experimental method. This research consists of two classes namely control class and experiment class. In the experimental class in doing the learning in accordance with the procedure of model training strategy and on the control, the class is done by conventional learning.

This type of research is an experimental research that is categorized into quasi-experimental type. The research was conducted at the Department of Electrical Engineering Faculty of the Engineering State University of Padang in Electrical Engineering Education Study Program S1 As the subject of research is the 3rd semester students of Electrical Engineering Education Study Program (S1) FT UNP which took the electrical installations totaling 107 people, consisting of two classes ie 2LA and 2LB. Where 2LA is an experimental class using Model Training strategy and 2LB is a control class that uses conventional learning. The determination of this class is done randomly from the existing class, this is done because the average score of student's GPA does not differ significantly. Thus, based on the t-test the two classes have the same initial capability.

The research design used in this study is presented as follows:

Table 1. Research Design

Class	Treatment	Result
Experiment	X_1	O_1
Control	X_2	O_2

Information:
X1=Treatment with Training Models
X2 = Conventional learning
O1 = The results of the experimental
O2 = Results of a control class performance assessment

The type of instrument used in this study is the assessment of performance. According to Depdiknas (2009: 14) "Performance assessment is an assessment done by observing the activities of learners in doing something". Validity in this research is content validity. Implementation Content validity is by arranging aspects to be assessed in the electrical installation courses according to the curriculum in the Department of Electrical Engineering FT UNP.

After data collected conducted analysis data. Prior to testing the research hypothesis, student learning outcomes must meet the requirements of normality test and homogeneity test:

1. Normality test

Normality test is used to determine the distribution of student learning outcomes, whether the data is normally distributed or not. Normality test is done by using chi-square test proposed by Riduwan (2006: 124). Criteria test normality if $\leq$ then the data is normally distributed.

2. Homogeneity test

Homogeneity test was conducted to find out whether the research data has the same variance. The homogeneity test of experimental class and control class is done using F test with the formula of Sudjana (2005: 249). Homogeneity testing criterion is if Fhitung <Ftabel means data have homogeneous variance, otherwise if Fcount> Ftabel means data not homogeneous.

3. Hypothesis test

To determine whether there is a difference to the learning outcomes between the two classes of subjects, for normal and homogeneous distributed data, an average two-t-test (s) using the formula Sudjana (2005: 241) is used. The t value of the calculated result is compared with the t value of the table. The provisions for acceptance of the research hypothesis are:
a. Ho accepted if t count <ttabel and Ha rejected.

b. Ho is rejected if thitung> ttabel and Ha accepted.

3. RESULTS AND DISCUSSION
Data Description

This research was conducted in semester July - December 2017 Academic Calendar State University of Padang. The implementation of the research consists of 6 lecture meetings that include; Design of Electric Installation of simple House, Electricity Installation of Multi-storey Home, Maintenance, and Maintenance of Electrical Installation. Based on the result of the research, it is found that the average value () of the students' experimental learning result is higher than the control class as can be seen in table 2

Table 2. Average and Percentage Completion of Experiment and Control Class

Class	Amount	Result
Experiment (2LA)	55	85,5
Control (2LB)	52	81,3

Strategy Training model is essentially a strategy that can facilitate students in the lecture so that students become skilled. By using the strategy Training model requires students to work in stages and structured, which includes: the preparation stage, demonstration, imitation, and practice.

Based on the description and analysis of data that has been done on student learning outcomes on electrical installation learning through learning model training in the experimental class and conventional learning on the electronics engineering education faculty of Universitas Negeri Padang, there are differences in learning outcomes between the experimental class and the control class. This difference can be seen from the highest value of the experimental class 96 with an average of 85.5, while the control grade is at a high of 89 with an average of 81.41. Thus, it can be stated that the students 'learning outcomes in the experimental class are higher than the students' learning outcomes of the control class.

Strategy Training model is essentially a strategy that can facilitate students in the lecture so that students become skilled. By using the strategy Training model requires students to work in stages and structured, which includes: the preparation stage, demonstration, imitation, and practice. The following is the normal curve of the experimental class and control class as follows:
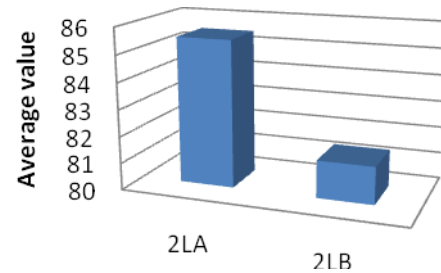
Figure 1. Graph of Experiment and Control Class

From the graph, the difference in the mean values of the two classes taught. Where the experimental class (2LA) obtained an average value of 85.5, while for control class (2LB) taught by conventional methods obtained an average value of 81.4.

Data Analysis

The data analysis here is done manually. Differences in learning outcomes were analyzed using t-test by first looking at whether the subject was normally distributed and had a homogeneous variant. Therefore tested normality and homogeneity test.

a. Normality test

Based on the calculation results in the experimental class at can χ^2_{hit} = 6.37 and control class at can χ^2_{hit} = 0.908. While for χ^2_{ta} both classes at significance level with α = 0,05, got χ^2_{ta} = 9,488. It can be concluded that the data obtained from the two classes are normally distributed.

b. Homogeneity Test

Test homogeneity to see whether the two classes are homogeneous or not. Based on calculation results obtained Fhitung is 1.389 and Ftable value in experiment class and control class with dk numerator = 23 and dk denominator = 22 is 2.04 at a significance level of 0.05. Thus Fcount <Ftable means that both classes have a homogeneous variance.

c. Hypothesis test

Based on the normality test and homogeneity test of the final test variant it was found that the two classes were normally distributed and had homogeneous variance, so t-test was used to see the difference between the two classes. From the calculation results obtained count = 3.62, and the value of ttable = 2.0157. Thus tacount> ttable, then Ho

is rejected and also receive Ha. It can be concluded that there are significant differences in student learning outcomes that apply the strategy of Model Training with the conventional learning model in the electrical engineering practice course on the students of Electrical Engineering Education (S1) Program of Electrical Engineering Faculty of Engineering Universitas Negeri Padang.

Discussion

Based on the results of data analysis there are significant differences in student learning outcomes that apply the strategy of Model Training with the conventional learning model in Electrical Installation courses in the lectures of undergraduate students (S1) majoring in Electrical Engineering Faculty of Engineering, State University of Padang. Where the application of Strategy Strategy Model Training scores higher than students who are taught conventionally.

This is because the Model Training strategy is able to generate student motivation in learning so that students are more motivated to improve their learning achievement. Model Strategy Training is a strategy that teaches how to bring students to learn and teach. The atmosphere of training means, not to bring students to the industrial world with sophisticated equipment.

But how the industry trains newly skilled employees are imitated by the strategy of the Model Training Program consists of five main models: 1) work instructions, 2) work methods, 3) employment relations, 4) work safety, 5) program development. All these programs are used to support the success of learning in the course. Application of learning strategy of Model Training in Electric Installation lecture able to increase student motivation in lecture. This is seen with the seriousness of students in doing all job sheet at every lecture meeting.

4. CONCLUSION
Conclusion

Based on data analysis and discussion, it can be concluded that the learning motivation students using Model Training strategy are better than conventional learning. This can be seen from the learning result obtained by the students who apply the strategy of the Training model is higher than the class that takes the conventional model. Thus there are differences in learning outcomes are significant between the application of training models on electrical installation lectures with conventional learning on students Electrical Engineering Education Studies (S1) Faculty of Engineering Universitas Negeri Padang

Suggestions

It is expected that FT-UNP Leaders, especially lecturers to always try to improve student's learning achievement and foster self-reliance learning so as to complete the study on time with good achievement quality.

For the next researcher, it is suggested that the factors that influence the learning achievement are included as part of the research so that the research result is more objective.

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SOFTWARE DEVELOPMENT OF CONCENTRATION SELECTION WITH INTEREST TEST BASED ON INTELLIGENT SYSTEM

Elin Haerani

Information Technology UIN Sultan Syarif Kasim Riau
Jl. H.R. Soebrantas No.155 KM 15 Simpang Baru Panam, Pekanbaru, Indonesia
elin_haerani@yahoo.com.sg

ABSTRACT: Universities are designed to prepare graduates who are ready to enter the workforce and are able to develop a professional attitude. Educational institutions such as the University need a form of decisions in determining the right concentration for students so that the learning process can be achieved well in accordance with the interests. The decision is very influential in the process of handling the choice of alternative concentration, choosing an appropriate concentration of interest will also have an impact on the research focus for the final assignment of students. To know the right concentration for students is not easy, because of the limited information possessed by students. This research develops student concentration selection system in Electrical Engineering Department UIN Suska Riau. The system was developed with three criteria, ie, interest tests using psychological tests, prerequisite concentration course grades, and GPA. The system is built using an intelligent system model that is Fuzzy Multiple Attribute Decision Making (FMADM) web-based, which helps the Department in the selection process and helps the process of career guidance on students. With this selection system, the Department can provide the most suitable concentration decisions with interest in student concentration.

Keyword: Concentration, Interest, Intelligent, Career Guidance, Decision

1. INTRODUCTION

Interests are a source of motivation that encourages a person to do what one wants if the person is given the freedom to choose (Elisabeth B. Hurlock, 1999). Interest is also a tendency of a person's general behavior to be attracted to a certain group of things (Guilford in Munandir, 1997). Learning or working in areas that match the skills and interests, will bring motivation in studying or living it. Developing an interest is aimed at getting people to learn well and in the future able to work in a field that suits their abilities and interests so they can develop the capability to learn and work optimally with great enthusiasm. Related to the importance of choosing majors in accordance with the interests, which is one way to help the process of career counseling to students at the university. Career guidance is the most important thing to direct students according to their interests and potential. The selection of the right career in the students will give satisfaction and will achieve maximum results.

University is part of vocational education developed in Indonesia, designed to prepare students or graduates who are ready to enter the workforce and are able to develop a professional attitude in the vocational field. University graduates are expected to be productive individuals who are able to work as a manpower and have the readiness to face work competition. In accordance with the provisions set forth in the National Standard of Higher Education (SN DIKTI) in 2014, each study program shall be supplemented with learning achievement targets (Belmawa, 2015). Educational institutions such as the University often require a form of the decision in determining the appropriate concentration for the students so as to achieve good learning in accordance with student interests.

The decision is very influential in the process of handling alternative concentrations to be selected, choosing an appropriate concentration of interest will also have an impact on the research focus for the final assignment of the students. But to know the right concentration is not an easy thing, because of limited information owned by students. The various constraints in determining the concentration according to the criteria will confuse the students. According to Sutejo, et al (2012), in the process of selection of competence skills can affect the success of students at the time of study at the University and after graduation later.

In the selection process of determining the concentration in the Department of Electrical Engineering which acts as a decision-making is the Chief of the Department, the person acting as the decision maker performs comparisons on several alternatives, including evaluating the calculations. The process of choosing a concentration at the Department of Electrical UIN Suska Riau today is done by a conventional method where the selection process is carried out with some administrative requirements by looking at student value

attachment or transcript. Some technical problems that often occur are the first, in the implementation of the selection process will take time in the process because it is still done manually. In addition, the selection process is also vulnerable to errors and obstacles in reporting results that can impact on the stage of the announcement of results. The second problem is the lack of guidance to students in choosing the right concentration for themselves.

The purpose of the specialization itself is explained in the guidance of specialization issued by the Ministry of Education and Culture of the Republic of Indonesia (May, 2013) which can be described that the service of student's interest is part of the advocacy effort and facilitate the development of learners to actively develop their potential to have spiritual spiritual power , self-control, personality, intelligence, noble character, and skills needed by him, society, nation and state (direction of Article 1 number 1 of Law Number 20 Year 2003 on National Education System) so as to achieve optimal development. Optimal development is not limited to achievement in accordance with the intellectual capacity and interests it has, but as a condition of development that allows learners to make choices and decisions in a healthy and responsible and have a high adaptability to the dynamics of life it faces.

This study aims to develop a concentration selection system for students in the Department of Electricity UIN Suska Riau with interest tests, using an intelligent system model that is Fuzzy Multiple Attribute Decision Making (FMADM). Interest tests are used for students as a guide in choosing concentrations, the system is expected to assist the Department in the selection process and can help the Student Guidance Counseling process, and can provide concentration decisions that best suit the interests of the students.

II. LITERATURE REVIEW

A. Fuzzy Multiple Attribute Decision Making (FMADM)

According to Kusumadewi (2007), Fuzzy Multiple Attribute Decision Making (FMADM) is a method used to find the optimal alternative of a number of alternatives with certain criteria. The core of FMADM is to determine the weight value for each attribute, then proceed with the ranking process that will select the alternatives already given. Basically, there are 3 approaches to finding attribute weight value, that is the subjective approach, objective approach and integration approach between subjective & objective. Each approach has its advantages and disadvantages. In the subjective approach, the weighting value is determined by the subjectivity of the decision

makers, so that several factors in the alternative ranking process can be determined freely.

Whereas in the objective approach, the weight value is calculated mathematically so that it ignores the subjectivity of the decision maker. The Fuzzy Multiple Attribute Making algorithm is:

1. Give each alternative value (Ai) on each criterion (Cj) that has been determined, where the value is obtained based on crisp value; i = 1,2, ... m and j = 1,2, ... n.
2. Provide weight value (W) which is also obtained based on crisp value.
3. Normalize the matrix by calculating the normalized performance rating (rij) value of the alternative Ai on the attribute Cj based on the equation adjusted to the type of attribute (attribute benefit = MAXIMUM or cost attribute/cost = MINIMUM). If the attribute is again, the crisp (Xij) value of each attribute column is divided by the crisp MAX (MAX Xij) value of each column, while for the cost attribute, the MIN crisp (MIN Xij) value of each attribute column is divided by the crisp value (Xij) each column.
4. Perform the ranking process by multiplying the normalized matrix (R) with the weight value (W).
5. Determine the preference value for each alternative (Vi) by summing the product of the normalized matrix (R) with the weight value (W). A larger value of Vi indicates that Ai's alternatives are preferred. (Kusumadewi, 2007).

There are several methods that can be used to solve FMADM problems. Among others (Kusumadewi, 2006):

a. Weighted Product (WP)
b. ELECTRE
c. Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)
d. Analytic Hierarchy Process (AHP)
e. Simple Additive Weighting Method (SAW).

The SAW (Simple Additive Weighting) method is often also known as the weighted summing method. The basic concept of the SAW method is to find the weighted sum of performance ratings on each alternative on all attributes. The SAW method requires the process of normalizing the decision matrix (X) on a scale that can be compared with all the alternative ratings available. The steps are:

1. Determining the criteria that will be used as a reference in decision making, namely Ci. The criteria included in this research report are 3 as follows:

Tabel 1-1 Criteria

KRITERIA	KETERANGAN
C1	Interest Test
C2	prerequisite concentration course grades
C3	GPA

2. Determine the match rating of each alternative on each criterion. That is after determining the criteria that are used as guidelines for weighting and determine some alternatives to be processed where each alternative has a value corresponding to the criteria. Here are the match rate tables of each alternative on each criterion:

Tabel 1-2 Rating Matches Any Alternative

Alternatif	Kriteria		
	C1	C2	C3
A1	X11	X12	X13
A2	X21	X22	X23
A3	X31	X32	X33
A4	X41	X42	X43
Bobot (W)	W1	W2	W3

Then create a decision matrix from the match table:

$$X = \begin{pmatrix} X11 & X12 & X13 \\ X21 & X22 & X23 \\ X31 & X32 & X33 \\ X41 & X42 & X43 \\ W1 & W2 & W3 \end{pmatrix}$$

3. Make a decision matrix based on criteria (Ci), then normalize the matrix based on the equation that is adjusted to the type of attribute (attribute gain or cost attribute) so obtained normalized matrix R.

$$r_{ij} = \begin{cases} \dfrac{x_{ij}}{\underset{i}{\text{Max}}\, x_{ij}} & \text{if } j \text{ is a benefit attribute (benefit)} \\[3ex] \dfrac{\underset{i}{\text{Min}}_{ij}}{x_{ij}} & \text{if } j \text{ is a cost atribute (cost)} \end{cases}$$

With rij is the normalized performance rating of the alternative Ai on the attribute Cj; i = 1,2, ..., m and j = 1,2, ..., n. So the R is obtained as follows:

$$R = \begin{pmatrix} R11 & R12 & R13 \\ R21 & R22 & R23 \\ R31 & R32 & R33 \\ R41 & R42 & PR3 \end{pmatrix}$$

Information:
r_ij   : Normalized performance rating value
x_ij   : The attribute value that belongs to each criterion
Max 〚x_ij〛 : The largest value of each criterion
Min 〚x_ij〛 : The smallest value of each criterion
Benefit : If the greatest value is best
cost   : If the smallest value is best

The final result is obtained from the ranking process that is the sum of the normalized matrix multiplication R with the weight vector to obtain the largest value chosen as the best alternative (Ai) as the solution. (Kusumadewi, 2006). The preference value for each alternative (Vi) is given $(V_i = \sum_{j=1}^{n} w_j r_{ij}$

The largest value of Vi indicates that Ai's alternatives are preferred.

B. Measurements and Psychological Tests

Interest tests are a type of test instrument used in assessing individual interests in different types of activities (Chaplin, 2000). Much of interest inventory is designed to estimate individual interests in various occupations. A number of inventories also provide an analysis of interest in the educational curriculum or field of study, which in turn is related to career decisions.

The identification of students' direction of interest can be done with both test and nontest approaches. A test approach is usually done using standard instruments such as psychological tests that we know. While the non-test approach is based on data from non-standard instruments, such as academic achievement, observation, interview, questionnaire, etc.

Psychological measurement is the measurement of visible aspects of behavior, which are considered to reflect the achievements, talents, attitudes and other aspects of personality (T. Raka Joni, 1977). In practice, psychological measurements generally use many tests as a tool. The term psychological test is a tool for investigating the reaction or disposition of a person on the basis of his behavior. Thus the notion of psychological measurements and psychological tests are essentially the same. Its foundation lies in the process and its tools used as the basis for the use of the term in practice.

C. Various Scale In Psychology (Ordinal Scale)

Ordinal scale occurs when the objects that exist in one category of a scale not only different from those objects but also have a relationship with each other. The usual relationships we encounter among classes are: higher, more favorable, more frequent, more difficult, more mature and so on

Ordinal measurement scale provides information about the relative number of different characteristics possessed by a particular object or

individual. This level of measurement has nominal-scale information coupled with a certain relative means of ranking that provides information on whether an object has more or fewer characteristics but not how many flaws and strengths.

Measurements made on an ordinal scale are objects distinguished according to their equations and in order. So can be made a sequence or a complete and regular rankings delivered classes.

Ordinal scale is a scale that is the second level of measure, which is tiered something that becomes 'more' or 'less' than others, this measure is used to sort objects from the lowest to the highest and vice versa which means researchers have made measurements on the variables studied. Example: measure sports championships, work performance, seniority of employees. For example: Answer questions such as rank: strongly disagree, disagree, neutral, agree and strongly agree can be symbolized numbers 1, 2,3,4 and 5. These numbers are only a symbol of ranking, not expressing the number.

The Ordinal scale is higher than the nominal scale, and is often also called the rank scale. This is because on an ordinal scale, the symbols of the number of measurements other than indicating the distinction also indicate the order or degree of the object as measured by certain characteristics [6]. For example the level of satisfaction of a person to the product. Can we give a number with 5 = very satisfied, 4 = satisfied, 3 = less satisfied, 2 = not satisfied and 1 = very dissatisfied. Or for example, in a race, the winner is ranked 1,2,3 etc.

On an ordinal scale, unlike the nominal scale, when we want to change the numbers, it must be done sequentially from large to small or from small to large. So, should not be made 1 = very satisfied, 2 = not satisfied, 3 = satisfied dstnya. Allowable is 1 = very satisfied, 2 = satisfied, 3 = less satisfied etc.

In addition, the need to consider the characteristics of ordinal scale is that although the value already has a clear limit but not yet have a distance (difference). We do not know what distance the satisfaction from the unsatisfied to the less satisfied. In other words too, although very satisfied we give 5 and very unsatisfied we give the number 1, we can not say that satisfaction is very satisfied five times higher than the very dissatisfied.

Just as on a nominal scale, on an ordinal scale we also can not apply standard (arithmetic) mathematical operations such as subtraction, addition, multiplication, and others. Statistical equipment that corresponds to ordinal scales is also statistical tools based on numbers and proportions such as mode, frequency distribution, Chi-Square and some other non-parametric statistical equipment.

III. RESEARCH METHODOLOGY
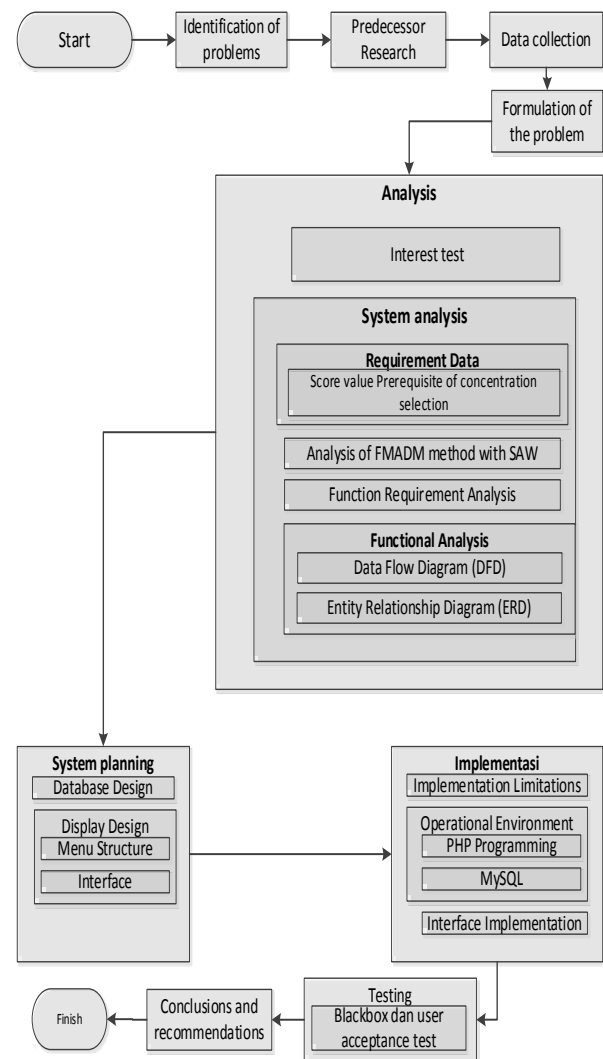
1) Design of Data Subsystem
   This stage is the design of the analysis of the previous data management subsystem. This stage of the sculpting context diagrams, data flow diagrams and entity relationship diagrams. And next will be made data dictionary design.

2) Design Subsystem Model
   This stage is the result of the model analysis that is the method used in making the system. At this stage will be made a model design in the form of flowchart system and flowchart calculation FMADM method of the process of determining the ranking of alternative priority sequence.

3) Design of Dialog Subsystem
   This stage is the result of the analysis of the dialog management subsystem. This stage will generate a design menu structure and interface design (interface) system

IV. ANALYSIS AND DESIGN SYSTEM

Context diagram used to describe the work process of a system in general. DFD level 0 or diagram context is depicted in Figure 4.1 below:
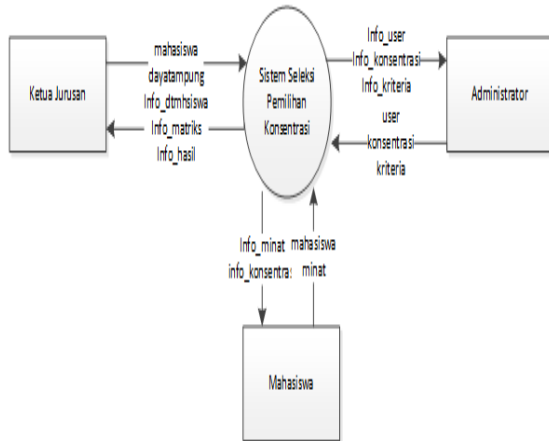
Figure 4.1 Context diagram

Menu Structure Design, The design goal is to create a design guide at the implementation stage of the of the system to be built. Menu structure of decision support system of majors selection can be seen in Figure 4.2 below:
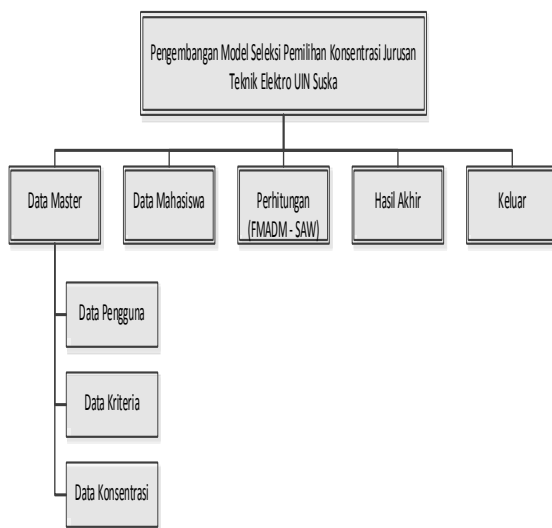
Figure 4.2 Menu Structure Design

IV. IMPLEMENTATION AND TESTING

Implementation stage is a condition where the system has been analyzed and designed ready to be operated under the actual conditions, from this stage of implementation will know the success rate of analysis and design on the system to be built.

The implementation of this system is divided into two components, namely hardware and software, the following is the operational environment used in the implementation of the system:

a. Hardware
Processor: Intel Pentium Dual CPU 1.86 GHz
Memory (RAM)   : 1.00 GB
System Type   : 32 bits
b. Software
Operating System   : Windows 8
Programming Language: PHP
DBMS   : MySQL
Tools   : Sublime Text
Web Browser   :Mozilla Firefox

Users are divided into 3 namely the head of the department, admin majors and students. Administrator (head of department and admin) has full access rights to system, can add, change and delete master data and can see student test result report.

Students can only test interest only. Before accessing the system Students must first fill the data to get login permissions. To Fill student bios with the way to start the test.

1.   Home View
Before accessing the system Admin must login first, input username and password. After Login will appear Home Page As Next:
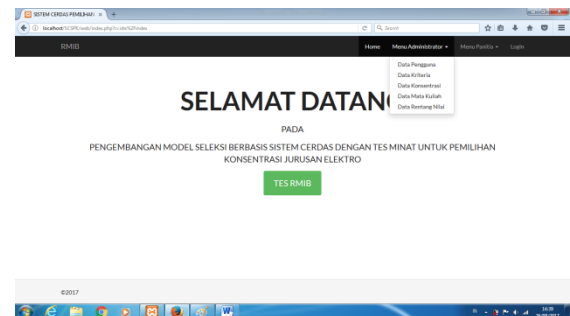
Figure 5.1 Home View
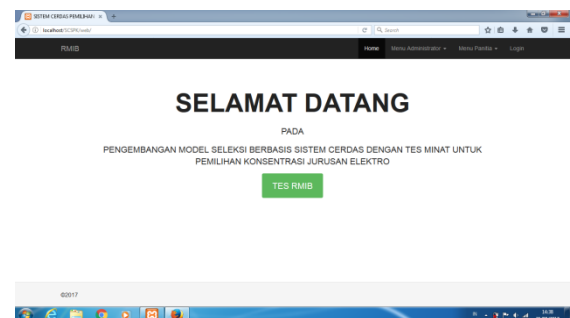
Figure 5.2 administrators Menu

Figure 5.2 is a view for administrators, administrators can process test data of interest and students. On the administrator page Selection Concentration Based Intelligent System With This Interest Test, there is the main menu that is Data administrator with

submenu. Each has different sub-menus and uses. Sub menus that exist are:

a. User Data
b. Criteria Data
c. Concentration Data
d. Course Data
e. Value Range Data
f. Student Data

The User Submenu is a menu for managing system user data, such as add user, view, modify, and delete. The criteria submenu is a menu for managing criteria data, such as add, view, modify, and delete criteria data. Submenu Concentration is a menu to manage concentration data majors such as add, see, change, and delete the concentration. Course submenu is a menu for managing course data such as add, view, change, and delete the course. And the Range of Values submenu is a menu for managing fuzzy value range data for GPA, Subject and Interests values such as add, view, change and delete value ranges.

On the Student Data Submenu, a menu to manage student data, by first selecting the desired year and semester. Administrators can fill in MK Value, IPK Value such as add, view, modify, and delete. The administrator can see the Student Interest Value derived from the interest test process that has been done by the student. Administrators can perform the ranking process to see the student grade ratings. Below will show the various processes that have been described above in the form of images.

Sub-menu of Results Calculation and Ranking :

Figure 5.3 Results Calculation and Ranking

on the Submenu of Calculation and Ranking The results can be seen by the student and concentration rankings that best match the interest of the student.

The purpose of testing is to look for errors or errors in accordance with the criteria set, the benefits of this test is that if the system is used no errors or no problems, which in essence this application in accordance with the design and built based on the analysis described previously. There are two ways of testing that will be done that is testing the application view or using Blackbox and testing with User Acceptance Test.

1. Blackbox is an application that has been designed and built in accordance with the wishes in terms of appearance and in terms of accuracy of data calculation process. How to test the look of this application is to call the form or display of each application process and test the correctness of the process done, whether it has been in accordance with the design made earlier. Blackbox testing is done with various tests such as menus, input, and buttons.

2. User Acceptance Test is a system testing process given to the user with the aim to generate a conclusion whether the system has been developed is acceptable by the user or not. If the test results (testing) already meet the needs of users, it means that the system has been developed in accordance with the understanding and needs of end users (end users). Testing using the user acceptance test technique is done by giving some questions about the function and work system according to the user. In this test taken some users who act as respondents who then given some questions in the form of questionnaires.

VI. Conclusions

After completing several stages of research in establishing a system of concentration selection in this department of electrical engineering, some conclusions can be drawn:

a. the concentration selection system in this electrical engineering department using the Fuzzy Multiple Attribute Decision-Making method with Simple Additive Weighting has been built and is able to provide quick decisions to determine the best course for students.

b. The system may also recommend concentrations for students based on areas of expertise of interest.

c. According to the table the question of user acceptance test questionnaire that has been spread, the table approved several such terms calculation functions and decisions of the system in providing the recommendation, the rest of the system can be accepted by the resource and unfit for use. there are 11 questions with 2 users (user) system that is admin and committee and 7 questions with 5 students. With detail calculation percentage as follows: questionnaire 1 with the user (user) admin and organizer 86.36% and questionnaire 2 with its user is student 82.86%. Thus, it can be concluded that the system can be well received by the system users.

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NEEDS ANALYSIS ON INCREASING COMPETENCY TEST RESULTS STUDENTS IN S1 PROGRAM OF PUBLIC HEALTH SCIENCES STIKES HANG TUAH PEKANBARU

Emy Leonita[1], Nopriadi[2], Ahmad Satria Efendi[3], and Nizwardi Jalinus[4]

[1]Doctoral Student Faculty of Engineering State of Padang, Indonesia
[2]Lecturer of Faculty of Public Health of Andalas University Padang, Indonesia
[4]Lecturer of Faculty of Engineering State University of Padang, Indonesia
[1,3]Lecturer of S1 Program of Public Health Sciences STIKes Hang Tuah Pekanbaru, Indonesia

ABSTRACT: The competence test of public health student has been applied three times since 2015, but the result obtained by STIKes Hang Tuah Pekanbaru students is less satisfactory, that is a passing score below 68%. This study aims to analyze the causes of problems and recommendations of the needs of the study program in order to improve the competency test results. This study aims to analyze the causes of problems and recommendations of the needs of the study program in order to improve the competency test results. This research uses explorative qualitative research type with the method of need assessment of data review, focus group management, in-depth interview and using USG matrix in determining a recommendation. Informants in this study were 15 students, 10 lecturers and 4 study program managers including the head of the study program. The research shows that the cause of the low score of student competency test is the lack of student exposure to the exam questions, the method of learning to memorize, the low ability of lecturer in making the national scale to exam questions, and the lack of tryout facility and the practice of labor/field practice. The recommendations of the problems are the implementation of a tryout for the students before the implementation of competency test, training on competency test (item review for lecturers), curriculum workshop and improving MoU with government and private institution in field practice.
Keywords: Competency Test, Public Health

1. INTRODUCTION

In general, the public health student competence test which is packaged as exit exam is an effort to meet the need for good health services and strengthen the recognition to public health as health worker which has been regulated in health manpower law. The competency test of public health degree (UKSKMI) has been applied three times since 2015. The results achieved nationally and on STIKes Hang Tuah Pekanbaru students can be seen as follows:

Table 1
Comparative Analysis of UKSKMI Outcomes for Periods 1,2 and 3 between Participants STIKes Hang Tuah Pekanbaru with Participants all over Indonesia

Priode	Average Value		Standard Deviation		The highest score		Lowest Value	
	Stikes	National	Stikes	National	Stikes	National	Stikes	National
UKSKMI I	36,23	36,23	7,48	9,95	57,78	66,67	18,33	8,89
UKSKMI II	41,00	44,69	8,92	12,36	65,00	81,11	18,89	11,67
UKSKMI III	36,21	40,16	7,36	11,71	58,33	80,00	23,89	6,11

Source: UKSKMI Trainee 2015, 2016, 2017

a) The average score indicates the ability of participants of STIKes Hang Tuah is lower than the national average
b) Standard deviation indicates the value of the deviation of the national or institutional answer participants. STIKes deviation value is far from national value. The greater the standard deviation of the institutional participants is not good which means that STIKes Hang Tuah has not been able to

improve the ability of students evenly even less obtained under the national average
c) The highest score indicates the true responsibility of the constitution. When you see the highest value results are held by other institutions, and this needs attention
As one of the public health colleges in Riau, it is, of course, an important concern for managers to prepare students in following the competency test. For that researchers try to identify what are the

problems in preparation of UKSKMI, the cause of the problem and the recommendation of the requirement of Prodi S1 IKM STIKes Hang Tuah in increasing result of competency test

2. Method

This research uses explorative qualitative research type with the method of need assessment of data review, focus group management, in-depth interview and using USG matrix in determining a recommendation. Informants in this study were 15 students, 10 lecturers and 4 study program managers including the head of the study program. The method of implementation at each stage of activity can be seen in table 2 below:

Table 2
Use of Need Assessment Methods on Activities
Needs Analysis on Increasing Graduation Results of Competency Test
Bachelor of Public Health at Undergraduate Program Students
STIKes Hang Tuah Pekanbaru

No	Activity / Stage	Need Assesment Methode	Need Assesment tool	Source
1	Analyzing the condition of graduation of UKSKMI participants who come from S1 IKM STIKes Hang Tuah Pekanbaru on the implementation of UKSKMI 1 until UKSKMI 3	Quantitative / secondary data	Document / data review	Report of UKSKMI Committee
2	Analyzing the problem at the preparation of UKSKMI S1 IKM STIKes Hang Tuah Pekanbaru	Qualitative/primary data	*Manajemen Focus Group*	• Chairman • Student Group • Group of lecturers
3	Analyze the cause of the problem on the preparation of UKSKMI S1 STIKes Hang Tuah Pekanbaru	Qualitative/primary data	Discussion, fishbone	Managers study program
4	Determining the recommendation of the requirement of S1 Study Program of STIKes Hang Tuah Pekanbaru in order to increase the result of UKSKMI after March 2017	Quantitative/primary data	USG Matrik	-

3. Results and Discussion

A. The analysis of graduation condition of UKSKMI participants from S1 STIKes Hang Tuah Pekanbaru on the implementation of UKSKMI 1 to UKSKMI 3 (pre-March 2017 period) as table 1, the following analysis is obtained:

1) The ability of STIKes Hang Tuah Pekanbaru is not good in the management of learning process because the average value is below national value

2) Likewise in the ability of participants to answer correctly of all questions provided reflects the ability of participants as well as institutions in translating the learning process so that learners have the ability to answer according to the desired aspect.

3) The lower the ability of the participants to answer every aspect of the review, the lower the institution's ability to run the curriculum, human resources, process and evaluation effort

B. Problem analysis on the preparation of UKSKMI S1 STIKes Hang Tuah Pekanbaru

1. Focus Group Discussion (FGD) on the students

Before conducting FGD, students were simulated to do a test of competency tryout and after completing the question, FGD participants were asked to comment on the questions (the questions are attached) and obtained the following information:

a) All members of the discussion group cannot name 8 public health competencies as a whole.

b) All members of the group expressed difficulties in answering the question of competency test

c) All participants assume that the problem is more highlighting aspects of "Clinical reasoning" / understanding than aspects of memorization

d) All the participants stated that it would be difficult to do the test if the learning process using memorable technique rather than understanding

e) Discussion participants expressed less familiar / less exposed to the form of test questions competence

f) Participants also stated that in the process of learning the proportion of field practice felt less than getting a class theory, making it difficult to do practice questions.

2. Based on the results of FGDs with lecturers obtained the following information:

a) Lecturers assume that they have no difficulty in making competency test questions. However, in reality, the results of the analysis of the national committee, that none of the question test sent by lecturers stikes hang tuah to the central committee that entered the national selection

b) At the time of learning process and giving exam questions mid-semester and semester end, lecturer still use the method of memorizing to evaluate student ability because lecturer still focus on the syllabus that not yet renewable so that less exploring ability of the student to a problem that test aspect of field competence or psychomotor

c) Understanding of lecturers to the competence of public health students is good, but the reality is not applied to the habitually measuring student

learning outcomes through a matter of competency test

3. Based on the results of the document of the results of student competency test in the 3 years behind, interviews with the head of IKM study program, managers, lecturers and students can be concluded the problems include:

a) The average score of students in following the competency test is still below the national average

b) The ability of students in working on competency test questions is still low

c) The low participation of lecturers to prepare questions of competency test at the national level

d) Implementation of evaluation of teaching and learning process that leads to 8 community health competence is still minimal

e) The process of teaching and learning in the majority class with the method memorize so that field application is still minimal

C. Problem Cause Analysis Based on the results of interviews, group discussions to groups of students, lecturers and managers of the study program, the cause of the problems can be seen in the following fishbone diagram:

Figure 1 Fishbone Diagram
Analysis of Causes Problems Preparation of Competency Test Bachelor of Public Health
S1 STIKes Hang Tuah Pekanbaru students
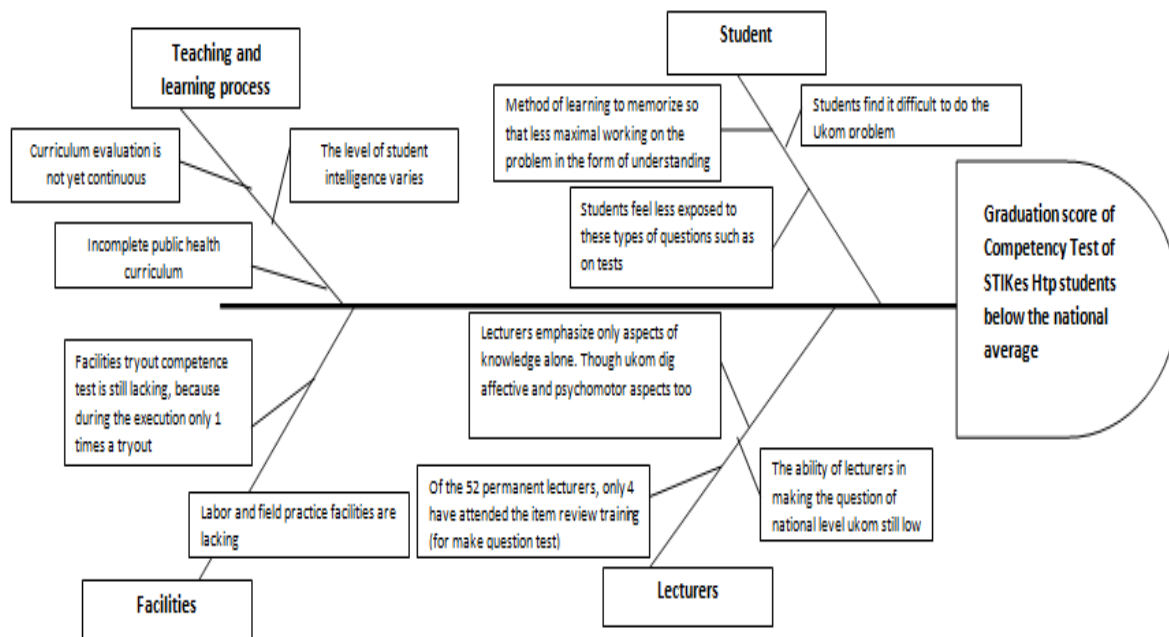
D. Alternative Problem Solving

Based on the problems listed in the fishbone diagram above, the researcher tries to make an alternative problem-solving in the following table:

Problem Cause	Alternative Problem Solving
Student Factor:	
1. Students find difficulties in working on competency test questions	
2. Method of learning to memorize so that less maximal working on the question in the form of understanding	Implementation Tryout before the implementation of competency test, so that students can prepare better
3. Students feel less exposed to the type of question as in the test	
4. The level of student intelligence varies	
Dosen :	
5. The ability of the lecturer in question making competence of national level still low	
6. 6. Lecturers only emphasize the knowledge aspect. Whereas in the competence test questioned the affective and psychomotor aspects as well	Training of competency test questionnaire (item review) for a lecturer at the national level, so that in lecturer's learning evaluation able to design mid-semester and end semester questions such as question on competence test
7. Of the 52 lecturers, only 4 people have attended the item review training (make a question)	
Teaching and learning process	
8. Implementation of a public health curriculum that has not been comprehensive	Workshop curriculum
9. Evaluate the curriculum that has not been continuous	
Facilities	
10. Facilities tryout competency test is still lacking, because during the execution only 1 times a tryout	Make planning and submission to the chairman of STIKes for fund allocation complete laboratory facilities,
11. Laboratory and field practice facilities are lacking	Increase the number of MoUs with government / private institutions in student field practice

E. Recommendation Requirement

Some problem-solving alternatives have been tried by stack researchers. The next step is to set recommendations. In choosing the priority of recommendation, the researcher discussed with the head of the study program and the manager. Techniques used scoring techniques where scoring is determined together. The method used is using a USG matrix.

1) USG Method (Urgency, Seriousness, Growth)
a) Urgency: level of emergency, if the problem is not addressed will be more serious
b) Seriousness: seriousness, if the problem is not resolved can have serious repercussions on other issues
c) Growth : large / extent of problem
2) Determining the priority order of the problem is done by using the scores on the parameters/criteria
U = Level of Urgency
S = Level of seriousness
G = Level of development
3) Scoring scores from 1-5, the greater the value is given if the level of urgency is very large or the development making concern if not addressed immediately
4) furthermore each problem is assessed through
5) multiplication between UxSxG

Table 3. USG Matrix
Determination of Priority Recommendations on Problems
Preparation of Competency Test Bachelor of Public Health at Student
S1 IKM STIKes Hang Tuah Pekanbaru

Parameter	Workshop curiculum	Tryout for student	Item review for lecturer	Increase MoU
Level of Urgency (U)	4	5	5	4
Level of Seriousness (S)	5	5	5	4
Level of Growth (G)	4	5	4	4
UxSxG	80	125	100	64
Rank/priority	III	I	II	IV

Based on the above matrix calculation, the priority of recommendation that can be implemented by IKM S1 study program is rank I and II that is: to conduct tryout competency test before the implementation of competency test and training of competency test material for lecturer STIKes Hang Tuah Pekanbaru.

4. CONCLUSION
5.

Based on the results of the analysis in this study it can be concluded: The average value of students in following the competency test is still below the national average, the ability of students in doing competency test questions is still low, the low participation of lecturers to prepare questions of competency test at the national level, evaluation of teaching and learning process that leads to 8 community health competence is still minimal, the process of teaching and learning in majority class with the method memorize so that field application is still minimal. Several recommendations that are tailored to the conditions of the IKM S1 STIKes Hang Tuah Pekanbaru study programs include conducting competence test tryouts, training on competency test materials for lecturers, curriculum workshops, and increasing the number of MoUs with government / private institutions in student field practice.

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8. AUTHOR'S BIOGRAPHY

Emy Leonita is a Doctoral Student Faculty of Engineering State of Padang, Indonesia and she accomplishes her Master in Gadjah Mada University Yogyakarta. She is a lecturer of S1 Program of Public Health Sciences STIKes Hang Tuah Pekanbaru, Indonesia. She has made a lot of research about public health behavior. Her email is   leonitemy@yahoo.com

THE READINESS OF STUDENT TO ENTREPRENEUR THROUGH INCORPORATION OF THE PILOT PROJECT PRACTICE

Ernawati

Department of Family Welfare, Tourism and Hospitality Faculty,
The State University of Padang

Abstract: This paper used the experimental method to the design of the one group pretest-posttest design to determine the increase of student readiness to entrepreneurship in the program of dressmaking study at the State University of Padang. Treatment in the form of pilot projects for the practical course of Clothing Business Management to realize the real Clothing Business Management in the form of boutiques and true convection". Venture capital is given in the form of company stock to 40 students as respondents in the form of loans that must be restored after a business advantage. The results of the research showed that the student readiness to entrepreneurship has significantly increased after doing the experiment.

Keywords: Student readiness to entrepreneurship, venture capital, company stock.

1. INTRODUCTION

Indonesian student readiness for entrepreneurship is very important to know and improved. Therefore, the employment opportunities that are available today for the educated labor force of college graduates is extremely unbalanced with graduates produced so that there are a lot of educated unemployment everywhere.According to the Statistics Agency Central (BPS), in August 2014 recorded the number of unemployment in Indonesia 7.24 million people, in the same period of 2015 the number increased by 320 thousand or 4.42% higher than the prior period. Of the total unemployed, the highest number of educated unemployed have graduated from college, which is 13.94% (Level S1 Degree and Diploma), while graduates of vocational schools (SMK) is lower than that, which is 12.65%, graduate high school (SMA) 10.32% Junior secondary school (JSS) 6.22%, and 2.74% Primary School, the remaining approximately 54.13% are unemployed who are not in school (Rini, 2017). Given the gravity of unemployment that has graduated from college then it is proper for the college management seeks to know and improve the readiness of students to entrepreneurship, employment readiness for opening standalone or as a job creator, no longer oriented as job seekers

In the study program dressmaking in several universities in Indonesia, there is a course Clothing Business Management. The main purpose of the lecture is to foster entrepreneurship skills of students in the field of modest, convection, and boutiques. Applied Practical Model to this subject is "Build the fashion boutiques Business and convection on campus".

In 2015, at the State University of Padang, the practical subject is taught by as practicum courses related subjects as a pilot project by providing funds for students to make a real Business in the form of fashion boutiques business and convection on campus. Boutique showroom space for rent of the university management. Capital for the purchase of equipment room, such as furniture and installation wage, the complete electrical equipment and installation wage, mannequin and hanger purchase, purchase fashion items, and the cost of the overall company's opening ceremony event provided by the lecturer of the course concerned. Total capital is USD 150 million. Venture capital will serve as student debt related to the lecturers to be paid after the business began to walk and benefit. The main objective of the pilot project is to investigate and foster the readiness of entrepreneurship students through the self-management of business under the guidance and supervision of lecturers.

In fact, starting the entrepreneurship for students is not easy like lecturer suggests. Because, according to Wiratmo (1996: 22) entrepreneurs bear the heavy financial risk, psychologically and socially, especially in the cultural environment of people who think the entrepreneur profession as a less honorable employment low, dishonest, greedy, aggressive, expansive, full competition, the income is not fixed, and so on. Negative attitudes formed in the society to the profession of entrepreneurs byAlma(2000: 2) cause the parents are trying to drive their children to become civil servants after getting the title of bachelorhood. Therefore, entrepreneurship interest which has grown through entrepreneurship subjects and other business sectors have not managed to drive the growth of new businesses among the students.

The entrepreneurship interest that has been growing can weaken or even disappear if it is not strengthened and improved until transformed into a reliable entrepreneurial behavior. Influential factors in strengthening the interest and ability to initiate entrepreneurship by Alma (2000) (1) motivation, (2) knowledge, (3) skills, (4) work experience, (5)

cooperative group, (6) bear to the risk, and (7) the availability of capital in the form triggering factor the opening of new businesses. Indonesian students are generally come from poor families, the initial capital opening of new enterprises they cannot be provided. The entrepreneurship Interest has been built through entrepreneurship subjects and other business sectors eventually fade away.

There are various models of the entrepreneur's growth and new business units in Indonesia. According to research results of Lestari (2009) there are 18 growth models of a new business unit in Indonesia that he grouped into four models, namely: (1) Formal BusinessModel, (2) Non-Formal Business Model, (3) Informal model, and (4) Government Program Model (Figure 1).

Figure 1 shows that education, training, and mentoring programs including a non-business model of business units growth and new entrepreneurs. In practice, the college has introduced Student Creativity Program(PKM), a program of capital support the opening of a new venture for interested students in entrepreneurship, total funds up to Rp 10 million for each student group, while the Student Entrepreneurial Program (PMW) to fund a larger, improved up to Rp 40 million per college student group. For lecturer is provided the science and technology program for Campus Innovation and Creativity (IbIKK) with the help of funds reached Rp 300 million for three years of activity (Higher Education, 2009). The three program included the growth models of business units and new entrepreneurs through education, training, and mentoring.
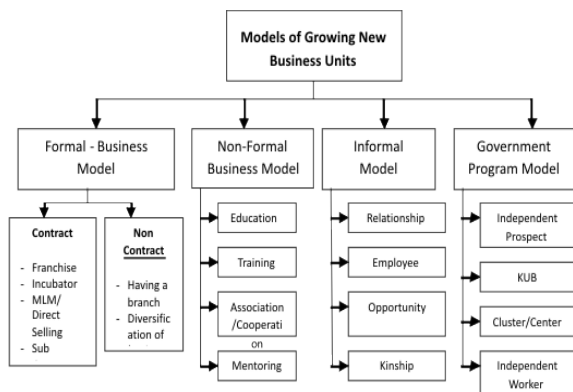
Figure 1, Models of Growing New Business Units in Indonesia

In the Ministry of Agriculture has long been applied the growth model of entrepreneurs (farmers) and unit-farming businesses through the Corporate Program of Nucleus-plantation or abbreviated PIR-BUN (BIP West Sumatra, 1985). In this program, the government provides loan funds/credit card for every farmer in the amount not less than USD 50 million. The use of this fund is organized and guided by the experiencedGreat Gardening in the field to foster new businesses in the form of palm plantations, rubber, cocoa and other commodities for comprehensive and garden 2 ha for each farmer regardless of the education level. PIR-BUN program that has managed to grow millions of entrepreneurs (farmers) palm, rubber and cocoa, include the growth model of entrepreneurs in the government programs.

2. METHOD

This study uses Experimental Design, the design of the one-group pretest-posttest design or the design of a single group research through the provision of pre- and post-treatment questionnaire. Experiments conducted on dressmaking Studies Program, Department of Family Welfare, Engineering Faculty, the State University of Padang in Odd Semester, January to June, Academic Year 2014/2015. The study population was dressmaking students, Family Welfare Department, Engineering Faculty of UNP who took the course of Clothing Business Management from January to June, Academic Year 2014/2015. Due to the number of population members is not too large, listed as many as 40 students, all members population become sample.

The treatment of this study in the form of giving a capital loan Rp 150 million to the students from the lecturer concerned to set up a fashion business. The use of such capital to rent a building, hire purchase and installation of furniture, fittings and power tools to install wages, purchase mannequin and hanger, the cost of the opening ceremony event, and the purchase of fashion items.

Planning for learning in this treatment as follows: "Knowledge of the fashion business management, including the form of business entity, the organizational structure and production units (design, pattern, sewing, accessories, and costing), plan, arrangement of the showroom, and capable of opening and managing the fashion business".

Material subject of learning include: (1) Understanding and the business clothingorientation, (2) Procedure of fashion business establishments, (3) Creating a fashion business proposal (4) The comparative study / observation to related companies, (5) Structuring the fashion showroom, (6) Promotion and marketing (7) excellent service for business clothing, (8) Management space for fashion production, include: the selection of design, procurement patterns, cutting, sewing and packaging, and (9) Evaluation of the business, including profit / loss and term long planning.

Some competencies should be mastered by students after the completion of the lecture are: (1) capable of designing the organizational structure of the fashion business and assign job desscription each part, (2) is able to make a fashion business proposal, (3) capable of establishing cooperation with other

companies related to getting fashion items, (4) is able to open a fashion business firm, (5) is able to organize the business fashionshowroom, (6) is able to hold the fashion promotions and bussiness marketing, (7) capable to run the fashion business, (8) capable of managing the clothing production room, and (9) is able to evaluate the fashion business.

The task given to the students of them are looking for relationships and build partnerships with other companies to supply clothing, supplies fashion accessories, and textiles to be sold in the showroom, as well as the promotion of looking for customers who want to create clothes. Each student must obtain at least two customers until the fourth week of lectures and complete that order until eight weeks of lecture.

At the fourth week, students were given the task of field observations to: (1) review several existing clothing business in Padang city in order to get a real picture of the business model that they will work and plan the business that they will open in the practicum, (2) explores the location and the building will be leased business premises, and (3) explore the point of sale and the price of furniture and equipment needed to be purchased.

In week 5, 6, and 7, the results of field observations and customer orders that have been obtained previously discussed in class to get the right way in realizing products. The results of discussions organized into clothing business plan that they will work and be recorded in the minutes of the meeting.

The business plan includes: the organizational structure, infrastructure, capital and the source, location and place of business, promotion, subscription/targets, manpower, feasibility studies, and business analysis. In a period of weeks, this course also made leasing business premises, purchase of tools and machines needed, as well as providing all the facilities and infrastructure of a boutique. Especially with regard to capital, the student must make an effort capital loan agreement between lecturers and students were signed during this period. Capital is invested in shareholding companies and can be resold to the lecturer concerned to pay the loans. Furthermore, at eighth week, it is carried the Middle Semester Exam.

At week 9th to 16th, the action plan began to be implemented, starting with the arrangement of the showroom, corporate offices, production space, followed by the opening ceremony of the fashion business. Since that time a fashion showroom to be opened every day to serve visitors who come buy the clothing/equipment and accept orders for the stitching.

The research instrument is a questionnaire following the model Likert scale with four levels of alternate answers. Pretest and posttest questionnaire is the same questionnaire, consisting of 52 items of questions, grouped into seven indicators of readiness of entrepreneurship, namely: (1)Motivation of Entrepreneurship with 7 questions, (2) Knowledge of Entrepreneurship 9 with questions, (3) Skills entrepreneurship with 15 questions, (4) Experience entrepreneurship with 5 questions, (5) Ability to Establish Cooperation with 5 questions, (6) The courage to risk with six questions, and (7) entrepreneurship trigger factor with 5 questions.

The research sample of pretest and posttest is paired samples. That is, the provision of a number of respondents for data collection and processing should be the same at the time of the pretest and posttest. If the number 1 is given to a respondent at the time of the pretest, posttest responded then when it still was given the number 1, and so on for all respondents. Pretest meeting held on the second week of lectures and posttest at the sixteenth week or after completion of final exams.

The average score obtained from the questionnaire is transformed into the form of a percentage and grouped into five categories: Very High (85.00 - 100.00), High (70.00 - 84.99), Medium (55.00 - 69.99), Low (40.00 - 54.99), and Very low (25.00 - 39.99).

The value of the average percentage score and the category of the interpretation presented in tables and graphs. Furthermore, the average percentage score of each sample is tested statistically by using t-test to see the level of significance or difference between the pre-test to post-test.

3. RESULTS

3.1 Pretest and Posttest Data of Students' Entrepreneurship Readiness

The results of the questionnaire before treatment (pretest) and after treatment (posttest) was treated with Program Exel and SPSS version 16 for each indicator. The details are shown in table 1.

Table 1 shows almost all indicators of student entrepreneurship readiness before treatment (pretest) are in the category of "medium". After treatment (posttest) category was increased significantly to "very high". On the other hand, the average score of students in entrepreneurship readiness variables (measured with 52 items of questions) before treatment include the category of "moderate" with an average score of 2.72 or 67.95% of the ideal score (score or the ideal or highest score is 4.00). After treatment of these categories was significantly increased to "very high" with an average score of 3.52 or 86.16% of the ideal score.

No.	Indicator	Item Qty	Pretest			posttest			test T
			The average scores	% Score	Category	The average scores	% Score	Category	
1	Motivation	8	3.16	78.98	High	3.70	92.42	Very high	significant Increase
2	Knowledge	8	2.62	65.39	moderate	3.45	86.33	Very high	significant Increase
3	skills	15	2,73	68.17	moderate	3.50	87.50	Very high	significant Increase
4	Experience	5	2.70	67,50	moderate	3.46	86.38	Very high	significant Increase
5	Cooperation	5	2,68	66.88	moderate	3.58	89.38	Very high	significant Increase
6	Bravery	6	2.35	58.65	moderate	3.44	86.04	Very high	significant Increase
7	Triggers	5	2,79	69.75	moderate	3.53	88.25	Very high	significant Increase
	Variables	52	2.72	67.95	moderate	3.52	86.16	Very high	significant Increase

Table 1. The category of achievement and significance test pretest and posttest

Differences entrepreneurship readiness of each student from research samples before treatment and after treatment were measured in paired samples clearly demonstrated by the graph 2. The graph shows that the average percentage of student entrepreneurship readiness score for each respondent prior to treatment largely middle category (55.00 to 69.99%). After treatment, the bulk of its category increased and are at the very high category (85.00 to 100.00%).
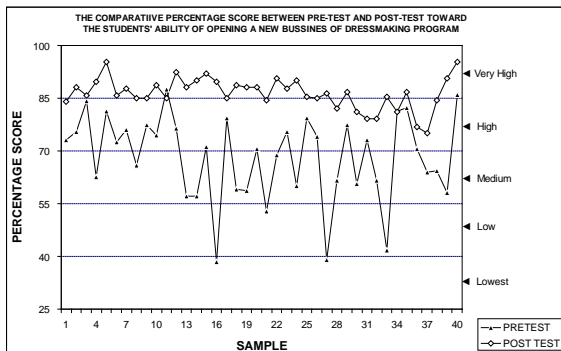
Figure 2. Graph of score average percentage between pretest and posttest

Lastly, different test (t-test) parametric statistical sample two pairs or Paired-Samples T-test by using SPSS Version 16 help show t = 9.039. Table t on the real level $\alpha = 0.05$ with degrees of freedom or df = n - 1 or 40-1 = 39 was 1.685. Therefore t> t table it can be concluded that there are significant differences between the score average percentage pretest to posttest at the 95% confidence level. At first, the entrepreneurship skills of students before the treatment is in the category "medium" after treatment was significantly increased to "very high".

4. DISCUSSION

The high degree of entrepreneurship readiness of dressmaking students of UNP after following a pilot project of practicum courses in the Fashion

Business Management, from the category of "Medium" (67.95%) was significantly increased to the category of "Very High" (86.16%) is physically evidenced by the establishment of a business unit of fashion boutiques, have a fairly large initial capital of Rp 150 million, and business activities went well.

In non-physical level of preparedness of the student entrepreneurship besides evidenced by the increase the average score of the students entrepreneurship readiness during the pretest (2.27) to 3.52 when posttest reinforced by the absence of the desire of students who took off the company stock after the completion of their course, when they were given the freedom to sell its shares to the lecturer of related subjects as payers of loans they have received. All students of the respondents maintain its stake as the owner of fashion business company that they founded.

Therefore, a business that opened by the student is a boutique business can grow into a large business then, of course, it will be able to employ tens or even hundreds of students later.

Currently, DGHE has pioneered the growth of new entrepreneurship among students with a variety of programs, such as CRP and PMW. But the program is not associated with lectures so that the level of business success and the loan repayment is not guaranteed.

On the other hand, as a pilot project practicum courses of Clothing Business Management is associated with learning curriculum so that the success rate of business and loan repayment is guaranteed. Faculty and students certainly strive earnestly to do it because it is associated with job performance ratings of faculty and students learning outcomes.

If within four years students successfully repay their capital to the faculty related to the means 4 times injection of successive governments to related lecturers then certainly every lecturer of the course line of business could open at least one new business unit each semester and grow dozens of student entrepreneurs through learning course of business fields.

5. CONCLUSION

First: The purpose of the pilot project of practicum teaching of Clothing Business Management as contained in the synopsis of learning has been achieved well. Implementation of the pilot project of this lab can improve student readiness for entrepreneurship from the "Medium" category (67.95%) before experimental (pretest) rose to the "Very High" category (86.16%) after the experiment (posttest).

Second: Statistical t-test showed that the differences in pretest to posttest results were significantly different at the 95% confidence level,

meaning that the increase happened not by chance but because of the treatment effect.

Third: Physically increase student readiness for entrepreneurship is evidenced by the establishment of a business unit of fashion boutiques, have a fairly large initial capital of Rp 150 million, and business activity was going well.

Fourth: improvement of student readiness for entrepreneurship is reinforced by the absence of the students desire to release the company's stock after completing the course, when they are given the freedom to sell its shares to the lecturer of related subjects as payers of loans they have received. All students of the respondents maintain ownership of a company that they have set up.

6. SUGGESTION

First: Lecturer in the business field, especially in Indonesia Clothing Business Management advised to carry out practical lectures as a pilot project of this lab to improve the student's entrepreneurship readiness after graduation.

Second: Lecturer of business subject lines using a model such as the learning lab such as pilot project is suggested has an own business according to their field in order to become an entrepreneur who truly knows and understand the business world. Therefore, only entrepreneurs also who can perfectly produce the new entrepreneurs as well as himself.

Third: The management of the college and its staff are advised to provide the widest opportunity and encourage the use of laboratory models of learning as the project pilot for the course of business, in particular subjects Fashion Business Management. Therefore not all lecturers courses in entrepreneurship business sector suggested it to the person concerned to be trained to be able to self-employed and open a business in accordance with the subjects to be learned.

Fourth: The Directorate General of Higher Education recommended to provide the widest opportunity and encourage the use of laboratory models of learning as a pilot project to subject fields of business by providing a variety of policies and facilities to enable the lecturers to prepare students to become entrepreneurs. Parties to the Directorate General of Higher Education is expected to finance budgeted for faculty training, preparing institutions or courses, faculty, and the opening of new enterprises seeking capital for lecturers. In addition, DGHE also expected to fight to convince the government in providing budget loans for students opening new businesses that have grown from this pilot project.

Fifth. Researchers in the field of learning and the curriculum are advised to make similar studies in different places that the results are expected to be used to strengthen the Directorate General of Higher proposals to the government about the importance of the provision of loans for students opening new businesses as a pilot project.

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8. BIOGRAPHY AUTHOR:

Dr. Ernawati, M. Pd., born in Pariaman, West Sumatra province on May 3, 1953, graduated from elementary school in Kampung Dalam, Pariaman in 1965, junior high school in Kampung Dalam 1969 Pariaman and Padang State SKKA 1971. Then get a Bachelor's degree (BA) in study program of dressmaking of IKIP Padang in 1976, the title of Doktoranda (Dra) Bachelor S1 of dressmaking in IKIP Jakarta, 1980, Master of Education (M.Pd.) from Graduate Program of Padang State University in 2005, and last Doctoral degree in Educational Science, Vocational Education Concentration 2015. From 1981 till now works as a lecturer at the Department of Family Welfare, Tourism and Hospitality Faculty, the State University of Padang. In addition also holds the position of Chairman for Integrated Services Business Unit and fashion Industry, IbIKK of Padang State University since 2009 and as a Commissioner of PT. Rumah Gadang Cendikia engaged in general trading. The areas of research interest are entrepreneurship, small and medium enterprises, and learning methods.Married to husband, Ir. H. Suhatril Malik, President Director of PT. Rumah Gadang Cendikia engaged in general trading and former clerks of BLPP Bandar Buat, Padang.

EFFECT OF PROJECT BASED LEARNING MODEL IN IMPROVING STUDENT LEARNING RESULT

Erwinsyah Simanungkalit

Program Study Pendidikan Teknik Kejuruan, Universitas Negeri Padang, Indonesia

ABSTRACT: One of the learning models that can overcome the problems in the process of learning management information system is to use the model Project Based Learning. This research aims to improve the learning results of students on lecture management information systems. This research is focused on the influence Model of Project-Based Learning against the teaching of management information system in the course of administration, Commerce State Polytechnic Medan. The purpose of this research is: (1) describe the activities of students in learning course management information systems during the learning process; (2) know the significant influence against the results of the learning of students who are given the Model Project-Based Learning and not given the Model Project-Based Learning. The population in this study was a 4 semester Study Program Of Business Administration, State Polytechnic Medan. From the results obtained in the study that there is a significant difference in the results of studying management information systems that are taught with a model Project-based learning and conventional learning model. It is proven the truth through the calculation of a test statistic retrieved the price tcount =3.00 and ttable= 2.0231. Later seen from the average of the results of their learning results learning management information system which is taught by learning model 17.85 higher than the average of the results of learning management information system which is taught by learning model conventional 16.35.

Keyword: Project-Based Learning, learning, Learning Outcomes, Management Information Systems

1. INTRODUCTION

Theory construction looking that the success of learning from a student not just hanging by the environment or conditions of learning but also knowledge of the early students who could not be moved as a whole directly from the mind of the lecturer to the students, will be but student himself who should be actively building knowledge through real experiences [8]. A real challenge in the world of education is the education should be able to produce human resources competencies, i.e. the emphasis is focused on the skills of learning and innovating. These skills with regard to the ability of the creative thinking and ability to solve problems, the ability to communicate and collaborate, as well as the ability to create and innovate [1]. The third skill is believed to be the main skill is able to answer the challenges of life. Thus, the learning process should be oriented to equip learners with the skills of third in addition to equip learners with the knowledge of science.

Management information systems is one of the courses featured in the study program of Business Administration in Medan State Polytechnic. These courses are courses that combine the two academic in the field of management and information systems. Based on observations during this process that the understanding in this subject is still very low. Based on those conditions, then need to choose a suitable learning model and can be increase the results of student learning in the courses management information systems. The learning model used by

lecturers must comply with the objectives and content, so that it can engage students actively in the learning activities. The learning model used must be able to improve the results of a study on management information system of courses students

One of the learning models that can be used to resolve the issue is to implement a model of project-based learning (Project Based Learning). project-based learning (PBL) is the application of active learning. Project-based learning is simply defined as a lesson that try to associate between technology with issues of daily life that is familiar with the student, or with a school project. Project-based learning model has a very great potential to make the learning experience more interesting and useful for learners [11]. In project-based learning, learners compelled more actively in learning. According to the great Indonesian Language Dictionary 'project is a plan of work with specific targets and deng an explicit completion time'. Joel l. Klein et. Al in Widyantini explained that 'project-based learning is a learning strategy that empowers students to acquire new knowledge and understanding based on her experience through a variety of presentation'.

Project-based learning (Project Based Learning) is learning that gives the opportunity to the lecturer for managing learning in the classroom with engaging work project. Project-based learning has very great potential to make the learning experience more interesting and useful for learners [12]. Project based learning is one of the innovative learning model [13]. Project-based learning methods according to the Buck Institute for Education is a

systematic learning methods that involve students in learning science and skill through the process of the investigation against the real problems and the manufacture of a wide range of works that are carefully designed [4].

Project-based learning has great potential to provide learning experiences that are more interesting and meaningful for students. While the characteristics of project-based learning, according to the Center For Youth Development and Education Boston is 1) Students take own decisions within the framework of determined together before. 2) Students trying to problem solving or challenge that does not have a definitive answer. 3) Students are encouraged to think critically, solve problems, collaborate, as well as trying out different forms of communication. 4) Students are responsible for finding and managing your own information they collect. 5) Evaluation is performed continuously during the project progress. 6) Regular Students reflect and think about what they have done, both process as well as result [4].

2. RESEARCH METHODS

This research uses Quasi Experimental design model in analysis of variance (ANAVA) 1 line design with 2 x 1. Will be compared to the use of the system and the system of Project-based learning, without using Project-based learning system as a free variable, and the acquisition of student learning outcomes as bound variables. The next variables will be included in the design of research such as table 1 here:

Table 1 Experimental Design

Group	The results of the Study
Eksperimen 1 (E$_1$)	µE$_1$
Eksperimen 2 (E$_2$)	µE$_2$

Description :

E$_1$: Classes are taught by Project-based learning models

E$_2$: Classes are taught with a conventional model

µE$_1$: The average results of study on a group of students who are taught with a model Project-based learning,

µE$_2$: The average results of study on a group of students who are taught by using the conventional model

The overall population is the unit which is equipped with discrete problems examined. The overall population is a unit that has the same characteristics according to the criteria of the research that is being performed [5]. Defenisi other Populations is a generalization of/subjek Project that has certain characteristics and nestling quantity set by researchers to study and then drawn the conclusion.

Researchers determined that the entire population of the research was to become students of the semester 4 Department of business administration, Business Administration Courses, State Polytechnic Medan.

Population numbers are all 80 students a semester 4 Department of business administration, Business Administration Program Studys, State Polytechnic Medan. The spread of the population can be seen in table 2 below:

Table 2. Distribution Table Of Students

Class	Total		Total
	Man	Women	
X$_1$	10	30	40
X$_2$	12	28	40
Total	22	58	80

The sample is part of the population who have the traits of certain circumstances are examined, the sample in this research is a part of the population which is considered to represent an existing population numbers are taken from the two classes. Basic sample withdrawal on both this class is on the assumption in common at the level of the class in the absence of a superior class, the average age of students of the same curriculum and the same learning facilities. The technique of sampling done in cluster random sampling techniques, namely sampling randomly clump that intent a lot all that individuals in the sample class became the subject of research. From the above population, selected a sample of 4 semester Courses on business administration, State Polytechnic Medan.

The data source is anything that can provide information about the data. Based on the source, the data are differentiated into two, namely, primary data and secondary data [10].

1. Primary Data is data that is created by the researcher for the purpose of completing the special problems that are currently be handled. Data collected by researchers directly from the first source or object of the research is done.

2. Secondary Data is data that has been collected for the purpose other than to resolve the issue at hand. This data can be found quickly. In this study, which became a secondary data source is literature, articles, journals and websites on the internet that deal with the research in question.

In this study, researchers from the primary data source is the program chair of the study and Professor of management information systems courses, while the secondary data source is the books that deal with research and educational journals which also related to this research .Before using the instrument, first conducted trials that is aiming to obtain a valid instrument. Valid here is meant to see the extent to which a measuring instrument capable of measuring what measure and how far a these gauges reliable (reliable) and can be trusted. The test results of the study drawn up by as much as 25 question test instrument test results of the study include:

1. Test validity

Validity test is a test level something to measure what mapu is measured. While the test is an

instrument drawn up specifically because measuring something that nature is important and definitive. to test the test results of studying management information systems, used the validity of the content and validity of invalid constructs. The validity of this is done with the drafting and detailing compliance with the course material used lecturers had been invited by Professor of management information systems courses.

The validity of invalid constructs do with detailing and a pair each grain of matter with aspects of the competency base on management information systems courses. Based on the analysis of the tests obtained amount reserved is 25. Valid test results of grains studied management information system is calculated by using the formula of Biserial correlation Point at 0.05 significance level. The validity of the tests in the test by using the product moment test revealed significant grain, when the calculated correlation coefficients greater than the coefficient table (r count > r table).

3. Reliability test

A measuring instrument has a high reliability in these instruments provides a consistent measurement of the results. To test the reliability of tests used the formula Kuder Richardson (KR. 21) as follows [2]:

$$r_{11} = \left(\frac{n}{n-1}\right)\left(\frac{St^2 - \sum pq}{St^2}\right) \qquad (1)$$

Description :

$r_{11} =$ **Reliability test**
n   = Many questions
p   = the proportion of subjects who answered the item correctly
q   = the proportion of the maximum score minus the score obtained
$\sum pq$ = number of results the multiplication between p and q
St^2 = variance total variance is score total

$$St^2 = \frac{\sum Y^2 \frac{(\sum Y)^2}{N}}{N} \qquad (2)$$

Description:

St^2 = variance total variance is score total
$\sum Y$ = Total score (all items)

4. Difficulty level

Test difficulty based on the results of the test instrument test obtained a matter easy, medium and difficult problem solved. To determine the level of difficulty of a question can be used the following formula [9]:

$$P = \frac{B}{JS} \qquad (3)$$

Description :
P   = Index of difficulty
B   = The number of students who answered the question correctly
JS   = The number of student participants test

5. Differentiator

Different power reserved aims to find out the capacity problem in differentiating students classified as having the ability with high low-capable students. To know the power criterion item reserved used the following formula:

$$DP = \frac{BA}{JA} - \frac{BB}{JB} \qquad (4)$$

Description:
DP   = Power Differentiator
BA   = The number of participants of the group above who answered the question correctly
JA   = The number of participants of the group over
BB=   The number of participants down group who answered the question correctly.

The Results Of Learning Information Systems Which Are Taught With A Model Project-Based Learning

Based on statistical calculations using the t test showed the value of thitung is greater than the value of 3.47 ttabel 2.0231. Thus it was concluded that there is an impact on the results of studying management information systems that are taught with a model Project-based learning. This means that the magnitude of the resulting thitung value in testing this purely comes from the effects of the treatment strategy of the Project-based learning model is given to the students. This is in accordance with the results of studying management information systems with a value of pre test average 16.08 while learning outcomes management information systems student at time of post test an average of 17.85. Application of the model of learning is done in this research can improve learning outcomes management information system because of an increase in the results of the study between before and after the application of the model of learning in which an increase in score This was 1.77.

The Results Of Learning Information Systems Which Are Taught By The Conventional Learning Model

Based on statistical calculations using the t test showed the value of thitung is greater than the value of 5.28 ttabel 2.0231. The results of studying management information systems at the time of pre test with an average of 13.55 while learning outcomes management information system after post tests with an average of 16.35

The difference in learning outcomes management information system between the application of the model Project-based learning with a model knvensional

Based on statistical calculations using the t test shows the value thitung value is greater than 3.00 ttabel 2.0231. Thus it was concluded that there is a significant difference in student learning outcomes in courses taught by management information system with a model Project-based learning, and the learning model of conventional

This is in accordance with the results of studying management information systems that were taught by implementing a model Project-based learning, with an average of 17.85 while learning outcomes management information system which is taught by applying a model of learning conventional with an average of 16.35. In this case it can be seen that the results of the learning management information system that is taught with a model Project-based learning, higher than the results of studying management information systems that are taught with the conventional learning model. The above research findings indicate that to achieve optimal learning outcomes in subjects more appropriate management information system using model-based learning Project

The application of the model of learning in the process of learning management information system that is by using a model of learning that can enhance the learning outcome of students ' management information system. A learning strategy that is able to change the negative view towards students management information systems into a fun lesson, a lesson that gives many opportunities to children to enable physical elements, train responsibility and cooperation. Learning strategies such as these not only gave rise to keasikkan learning, but will also provide a positive impact. This can be understandably because through project-based learning models can encourage students to actively learn because students can learn the material through an activity that is done when the implementation of the project-based learning model. Therefore, the role of teachers in the learning management information system as a facilitator that directs students to discover and construct their own knowledge and facilitate their learning needs.

6. CONCLUSION

Based on the results and discussion of the research then it can drawn some conclusions that 1). There is a difference in learning outcomes management information system which is taught by learning strategies-based project. It is proven the truth through the calculation of a test statistic t retrieved the price thitung price ttabel 3.47 while 2.0231. Likewise with the acquisition of the average value of the results of the study management information systems before the pre test is 16.08 and average value of the results of the study management information systems after the post test is 17.85 so that an increase in score 1.77. Statistical calculations through an increase of 1.77 through significant value. 2). There is a difference in learning outcomes management information systems courses are taught with the conventional learning model.
It is proven the truth through the calculation of a test statistic t retrieved the price thitung price ttabel while 5.28 2.0231. Likewise with the acquisition of the average value of the results of studying management information systems at the time of pre test is 13.55 and average value of the results of the study management information systems after the post test is 16.35 so improved scores 2.80. Statistical calculations through an increase of 2.80 through significant value. 3). There is a significant difference in the results of studying management information systems that are taught with a model Project-based learning and conventional learning model. It is proven the truth through the calculation of a test statistic t retrieved the price thitung price ttabel 3.00 whereas 2.0231. Later seen from the average of the results of their learning results learning management information system which is taught by learning model 17.85 higher than the average of the results of learning management information system which is taught by learning model conventional 16.35

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DESIGNING LEARNING TOOLS BY USING PROBLEM BASED INSTRUCTION (PBI) MODEL ON ENERGY RESOURCE MATERIAL INTEGRATED TO ENERGY SAVING CHARACTER

Estuhono

Faculty of Teacher Training and Education, Universitas Dharmas Indonesia, Indonesia;

ABSTRACT: The purpose of this research is to design science learning Tool by using PBI Model on energy sources material integrated into energy saving character. The research was designed by using Research and Development method. The Learning materials were developed using 4-D model consisting of 4 stages: Define, Design, Develop and Disseminate. However, this research is still at the Design stage. In the Define stage, curriculum analysis is performed, analysis of student characteristics and analysis of science materials. Stage Design designed science learning device based on the Model of Integrated Character Education PBI. The results of the Define stage study were obtaining Competency Standard in this research are "Understanding the various forms of energy and how to use them in everyday life". The results of the research at the Design stage obtained a syllabus, lesson plan, module, worksheet, an assessment designed following the steps of PBI model integrated energy-saving character

Keywords: Design, Learning Tool, Science, PBI, and Character

1. INTRODUCTION

Organizing character education is one thing that is done in every level of education, especially in elementary education level. This is very reasonable because basic education is the main foundation for young people's growth. Reference [5] explains that "Character education is interpreted as an education that develops students' character values so that they have values and character as their own character, apply those values in their life, as members of society, and religious citizens, nationalist, productive and creative". This shows that the students' character values can be nurtured through a continuous and integrated education process.

The values of character education obtained by the students from the result of integrating the value into the learning process that is implemented for all subjects. This means that, in a learning process, besides targeting students to master a particular learning material, students also should recognize, realize and internalize the values of character education through the integration of the character's values in each subject.

Natural Science as one of the subjects taught in elementary schools, of course, can also be used as a means of implementing the values of character education. Natural science is a subject that explains various physical phenomena that occur in nature, both theoretically and mathematically. This clearly indicates that there are spaces that can be used as a means of developing the values of character education to students in science learning.

Based on the results of discussions and interviews conducted by researchers at the time of carrying out Community Service Activities on the integration of character education together with elementary school teachers in Dharmasraya Regency on January 23, 2017, it was obtained that, the primary school learning has not integrated the values of education character in the learning process and the development of learning tools. The learning process that has occurred so far has not linked to the learning materials with the character education values. This is suspected because the development of learning tools conducted by teachers so far also still not integrate the values of character education.

The achievement of science learning objectives is determined by the learning tools used by teachers. In general, the learning tools used in science teaching in elementary schools are quite diverse. However, some components of learning devices used still need to be fixed. The learning tools that must be improved include syllabus, Lesson Plan, module, Student Worksheet and assessment. The syllabus used has not specific yet and does not accordance with the characteristics of students. This can be seen from the indicators of achievement competence and learning activities contained in the syllabus. Beside that, the lesson plan used by teachers also needs to be improved. Lesson plan actually already have guided by [8], but there are some components of lesson plan that have not complete. The fundamental thing that needs to be improved is the lesson steps integrated to the character values especially the energy-saving character. Furthermore, the science materials cannot accommodate the character values with the characteristics of students. Other learning tools that should be improved are the Students' Worksheet. Meanwhile, in terms of assessments used by teachers, it appears that the indicators of student competence do not appropriate with the

assessment used by teachers. Based on the analysis of all learning devices used by teachers, the material has not integrated to the character values, especially energy-saving characters.

One of the strategic efforts that can be done to overcome the problems above is by developing science learning device that integrates the character values in accordance with the characteristics of students. Science learning tools that will be developed consist of the syllabus, lesson plan, teaching materials, worksheet, and assessment. Meanwhile, teaching materials will be developed in form of learning modules that are expected to facilitate students in learning anytime and anywhere. The development of integrated science learning tools to character values follows the steps of Problem Based Instruction (PBI) model. This model is effective because the PBI model is a constructivist-based learning model that accommodates students' involvement in authentic learning and problem-solving. Through the application of the PBI model into the learning tools, it enables students to learn actively and fun. So that, it is expected to grow a positive character, especially energy-saving characters for students.

Some efforts to develop PBI-based learning tools have been done before, such as research conducted by [4] which concluded that the development of high-school physics learning devices based on character education with PBI model can improve students' character behavior such as honest character, hard work, discipline, curiosity know, religious, critical thinking, and cooperation. Reference [4] developed learning tools not for science subjects in elementary school but for physics subjects at the high school level. Furthermore, research conducted by [1] which concluded that the development of inquiry-based physics-based learning tools integrated character education is able to foster the values of students' character. However, learning tools are also developed for high school physics while the model used is a guided inquiry model. Based on this description, it is necessary to do research on the development of science learning tools based on PBI Model on Integrated Energy Sources Energy Saving Resources.

2. METHOD

The type of research used in this research is research development (Research and Development). In developing learning tools based on PBI Model on Integrated Energy Source Materials Character of Save Energy, this study uses 4-D model consisting of 4 stages: define, design, develop, disseminate. However, this study only reached the design stage. In the define stage, curriculum analysis is done, analysis students' characteristics and analysis science materials for elementary school. The design stage is done by designing learning device Integrated

to Energy Sources Energy Saving Materials.

3. RESULT AND DISCUSSION

3.1 Definition stage (define)

The defining stage is the first stage in the development of learning tools with the aims to define the requirements of learning by analyzing the learning objectives of the materials developed learning tools. In this defining phase, curriculum analysis is done, analysis of student characteristics and analysis of science materials.

a. Curriculum Analysis

Reference [6] shows, the development of curriculum is accordance with the principles of development such as student-centered and environmental interests, diverse and integrated, relevant to the needs of life. At the stage of curriculum analysis, the Competency Standards and Basic Competence analysis are devoted to Alternative Source Energy materials. In line with the standard content of science subjects at the Elementary School level, the Competency Standards in this study are "Understanding the various forms of energy and how they are used in everyday life" consisting of two Basic Competencies namely "Explaining the various alternative energies and ways of using them" and "Making a work / model to show changes in motion of energy due to air influences, eg rocket from paper / propeller / paper plane and parachute ". This material will be studied by students with 12 hours time allocation. Therefore, to achieve the indicators that have been established then prepared RPP for 3 meetings.

Based on the two basic competencies above are compiled several indicators of learning. The explanation of Competency Standards, Basic Competence, and Indicator of alternative energy source materials is useful in constructing learning tools. Indicators are used to formulate learning objectives at each meeting where in one indicator can be used to achieve one or more learning objectives. The indicators are formulated as follow:

1. Find information about various alternative energy whichare integrated to character values
2. Mention different kinds of alternative energy that are integrated to character values
3. Explain how to use alternative energy types that are integrated to character values

Reference [8] shows on the standard process established by the government for the first educational unit includes the planning of learning process, the implementation of the learning process, assessment of learning outcomes, and supervision of the learning process. Planning the learning process includes the Syllabus and Lesson Plan. The facts in the field indicate that most of teachers are poorly prepared in planning as for example in making

Lesson Plan for each meeting. The Lesson Plan used usually still uses pre-existing and has not developed innovative Lesson Plan and integrate character values especially energy-saving characters.

Lesson plan includes activities in the learning process. Implementation of learning requires the inculcation of positive character of students, especially energy saving character in supporting the achievement of one of the principles of learning objectives, especially affective aspects. Based on field observation, each teaching implementation tends to be centered on the teacher (teacher centered) so it tends to give less opportunity to the students to develop their thinking creativity. Students are also less interactive in the learning process because the strategies used by teachers have not provided a vehicle to create a learning climate that accommodates character development, especially energy-saving characters in students.

Analysis of assessment tools shows that teacher still prioritize cognitive aspects. Affective aspects / characters and psychomotor cannot be found in the assessment process in the classroom

b. Material Analysis

Material analysis is important before the development of the tool because it is used as a basis in knowing the relevant materials with the curriculum demands so that it can be used to synergize the learning model suitable to achieve the learning objectives. Material analysis also provides an overview of the models and approaches that are effectively used in achieving the expected goals. Material analysis is the identification of the main materials that will be taught and arranged systematically in order to find relevance concepts into everyday life reality. This analysis is aimed to identify, detail, and systematically prepare the key principles of energy source materials by integrating the inner energy-saving character.

Material analysis of alternative energy sources is divided into four, namely solar energy sources, wind energy sources, water energy sources, and geothermal energy sources. The author develops one of these alternative energy sources, the alternative source of solar energy, because the sun is a source of energy for all living things and is a renewable energy source. Solar energy is the only alternative energy that can be directly converted into electrical energy by using solar cells as a tool to change it.

Broadly speaking, the materials in alternative energy sources that will be integrated with energy-saving characters can be seen in the concept map contained in Figure 1
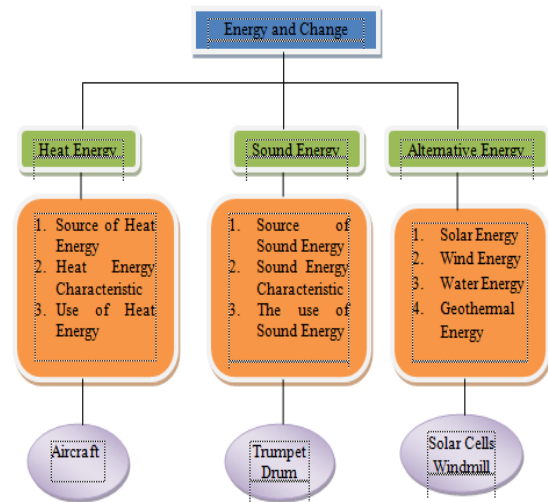
Fig.1 Concept Map

Based on the analysis of the material conducted, it can be seen the general description of the appropriate learning tools for energy source materials and simple works as well as the syllabus, lesson plan, module, worksheet and assessment used in the learning. Learning tool of alternative energy source is a set of teaching materials that can be used by students in studying alternative energy source materials in growing energy-saving character in students and assisting teachers in implementing learning alternative energy sources. Worksheet is used as a guide to find the concepts studied, while the assessment is used to determine the students' competence.

c. Analysis of Students' Characteristics

Analysis of the students' characteristics is a study of the characteristics in accordance with the design of development of science learning tools on Energy Sources material Integrated Energy Saving Character. Analysis of student characteristics is a study of the characteristics of students related to alternative energy sources. This analysis is done to get a description of the characteristics of students, among others: (1) the level of ability or intellectual development, (2) the background of experience, (3) cognitive development, (4) learning motivation, (5) as well as skills possessed participants educated, this stage is done to obtain information about the actual conditions that occur in the field. The main problem faced by students is the absence of integration of energy-saving character in the learning process that is on science subjects of alternative energy source material, so that impact on the development of energy-saving character in student self. Based on the analysis found it can be a foundation to develop learning tools in accordance with the needs of students on the material of alternative energy sources is the Development of Science Learning Tools based PBI Model On the Material Integrated Energy Sources Energy Saving Character

3.2 Design Stage

The design stage is the second stage in device development. Based on the results of the design obtained model of learning Problem Based Instruction (PBI). The PBI model is a model of learning that centers on problem-solving skills through the development of broad-minded creativity in order to apply learned concepts to solve everyday phenomena. This is highly relevant to the concept of the PBI model which is a constructivist-based learning model that accommodates students' involvement in authentic learning and problem solving. Through the application of the PBI model into the learning tools that are enabled to enable students to learn actively, fun so it is expected to grow a positive character, especially energy-saving characters in students. The result of design of learning device that is produced include syllabus, Lesson Plan, module, Worksheet, assessment based on Problem Based Instruction (PBI) based learning model integrated with character value in alternative energy source material in order to grow energy saving character in student self.

4. CONCLUSION

Based on the research that has been done can be concluded several important points as follows:

1. Based on the curriculum analysis it can be seen that the material of the energy source covered by the Basic Competence "Explains the various alternative energies and how to use them" and "Making a work / model to show changes in motion energy due to air influences, eg rocket from paper / paper plane and parachute ". has an effective relevance to explain alternative energy sources in order to shape energy-saving characters in the upcoming masses.

2. Based on the analysis of student characteristics, the integration model has an opportunity to develop students' character values in problem solving as well as the opportunity to grow energy-saving character for students.

3. Based on the analysis of the material, it can be found general description of the appropriate learning model used in studying energy sources and know the form of effective learning tools to be developed by integrating the character values especially energy saving characters.

4. The results of the design stage obtained a model Instructional strategy used is a model of Problem Based Instruction (PBI) learning that is integrated with the values of the character. Therefore, this study produces learning tools in the form of syllabus, Lesson Plan, module, Worksheet, and assessment-based Problem Based Instruction (PBI) model.

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THE DESIGN OF LECTURER PERFORMANCE EVALUATION MODEL BASED ON ANALYTIC NETWORK PROCESS (ANP)

Fenny Purwani[1], Nizwardi Jalinus[2], Ambiyar[3]

[1,2,3]Faculty of Engineering, Universitas Negeri Padang, Indonesia

Abstract: One effort to improve the quality of higher education is a service to students, to improve the quality of lecturers. In an effort to develop the quality and career of a lecturer, then the lecturer's performance is important to be evaluated to get the right information. Most lecturer performance evaluations are generally limited only from the assessment of the students on the learning process in the classroom. In this research, an evaluation model using Multi Criteria Decision Making (MCDM) is designed to evaluate the lecturer's performance of factors affecting lecturer performance problems. Factors that affect the performance of lecturers will be seen from the variables of motivation, self-esteem, competence and job satisfaction. To reflect the correlation of dependence between factors on lecturer performance evaluation is proposed by using Analytic Network Process (ANP) method which is one of MCDM technique. ANP method is considered capable to present the level of importance of various parties by considering the various criteria and sub criteria that exist and can be used to build a prediction of human resource performance measurement based on weighting factors affecting the performance of lecturers. In this research expected to produce an effective lecturer performance evaluation model that can support decision making for lecturers quality development.

Keyword: Lecturers-Performance, Motivation, Self-esteem, Competence, Job Satisfaction, ANP, MCDM

1. INTRODUCTION

In Undang-Undang No. 14 Tahun 2005 About Teachers and Lecturers Pasal 1 ayat (2), that the lecturer is an educator who must be professional and scientist with the main task of transforming, developing and disseminating science, technology, and art through education, teaching and community service. One of the important qualities to be considered in universities is the human resources of students, lecturers, and staff [1]. This shows the role of lecturer which is very important in the implementation of teaching and learning process.

Globalization and the Asian Economic Community (AEC), a great effect on employment and enhance competition in search of work. Every citizen who are members of the AEC-free into the workforce in the countries that are members of ASEAN [2]. It makes people more aware of the importance of education and expected the process and product development is high-quality education that can compete both nationally and internationally.

The phenomenon of the quality of lecturers in college up to now is still a concern of many parties. As revealed by Suryadi (2008) and Jalal (2009) that the universities in Indonesia, in general, face a similar case in the issue of qualifications, competence, and commitment of human resources [3]. The existence of low-quality paradigm of lecturer, dedication, and lack of mastery of subject matter taught to be the cause of our underdeveloped education with other countries.

Many factors can affect the performance of lecturers in carrying out their duties in universities. The performance of lecturers can be influenced by motivation, work environment, job satisfaction, job leadership, and cultural views on lecturer performance [4], [5]. There are a significant and significant correlation between competence, motivation, personality, job satisfaction on performance [6], [7]

Fuzzy based methods such as AHP and ANP [8], [9], [10], [11], is a technique that is considered capable to solve the problem of decision making with many criteria. Evaluation of performance by adding an engineering point for the evaluation process with the approach of Multi Criteria Decision Making (MCDM) using the Analytical Network Process (ANP) and Choquet Integral (CI) showed an efficient way to handle the quantitative and qualitative data simultaneously.[12]

This research aims to design a faculty performance evaluation model in terms of factors suspected to affect the performance of lecturers such as motivation, self-esteem, competence and job satisfaction with the ANP method is one technique MCDM. ANP method is considered capable to present the level of importance of various parties by considering the various criteria and sub-criteria that exist and can be used to build a prediction of human

resource performance measurement based on weighting [13]

2. LITERATURE OVERVIEW

Job Performance or Actual Performance shows the performance of human resources in the form of work results in quality and quantity achieved by a worker, in accordance with his duties and responsibilities are given to him. Each lecturer must have a criterion as an educator who aims to assist within *1) improve performance, capabilities, and output of educational, 2) facilitate communication and exchange of information on best educational practices with various types of educational institution, and 3) as a tool for understanding and improving performance of education institutions as well as guidance in strategic planning* [14]

The success of a person's performance is a combination of ability, effort, and opportunity that can be assessed. As pointed out performance can indicate the function of the interaction between the ability or abilities (A), motivation (M), and opportunity (O), and can be formulated; Performance = f (A x M x O). Meaning: performance is a function of ability, motivation, and opportunity. [15]

Performance of a lecturer in the result achieved by the lecturer in carrying out its duties and functions in accordance with Tri Dharma Perguruan Tinggi. Performance is seen from achieving the tasks assigned to the lecturer based on the skills, skills, experience and seriousness and time with the resulting output reflected by the quantity and quality**.**

2.1. Dimension of Lecturer Performance Evaluation

In [16] "*Motivation is a process that starts with a physiological or psychological deficiency or need that activates behavior or a drive that is aimed at a goal or incentive. Thus, the key to understanding the process of motivation lies in the meaning of, and relationship between, needs, drives, and incentives*". The motivation of work is the desire that encourages or motivates the lecturer to do his job. The motivation of work is a strong impulse so that the lecturer to do his job to achieve the goals of achievement and job satisfaction.

Job satisfaction is a picture of the feelings or emotional or affective response of a worker to the situation and working conditions that can meet everything related to the needs and expectations faced by workers in looking at the work and results obtained. Job satisfaction not only from one aspect but also reflects a person's attitude towards his job. A person can be relatively satisfied with one aspect of the job and not satisfied with one or several other aspects or vice. Luthans (2002) divides job satisfaction in 3 aspects ie: (1) *Job satisfaction a kind of employee responds to condition of working environment*, (2) *Job satisfaction is often assessment based on work output of performance*, and (3) *Job satisfaction relates to the attitudes performance of every employee* (Arifin, 2015:39).
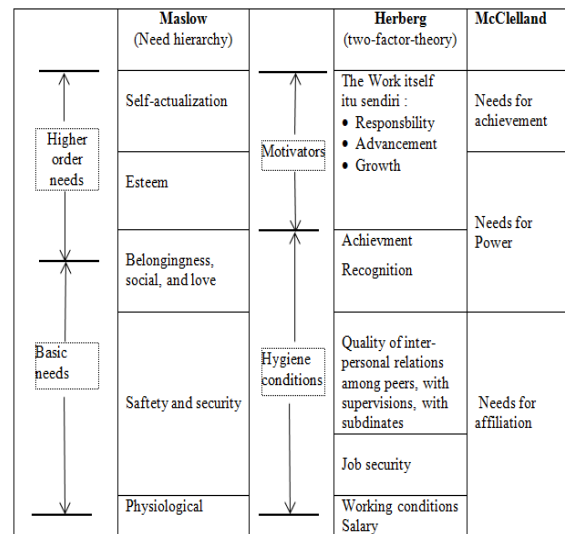
Fig. 1 Adaptation Comparison of Motivation Theory [17]

Self-esteem we refer to the evaluation which the individual makes and customarily maintains with regard to himself : it expresses an attitude of approval or disapproval, and indicates the extent to which the individual believes himself to be capable, significant, successful and worthy [18] *In short, self-esteem is a personal judgment of worthiness that is expressed in the attitudes the individual holds toward himself.* Self-esteem in this research relates to self-reliance of lecturers based on four aspects of Coopersmith concept which includes significance, power, virtue, and competence**.**

In [19], "*A competency is an underlying characteristic of an individual that is causally related to criteria on referenced effective and/or superior performance in job situation*". PP No. 19 Tahun 2005 on National Education Standards Pascal 28 affirms that educators are learning agents that must have four types of competence, namely pedagogic, personality, professional and social competence. This is in line with the dimensions of competence Spencer and Spencer have presented as follows;

1) Pedagogic competence in accordance with achievement and action,
2) Professional competence is similar to cognitive,
3) Personal competence in accordance with the impact and influence) and personal effectiveness
4) Social competence in accordance with the helping and human service and managerial.

2.2. *Analytic Network Process* (ANP)

2.2.1 Concept of ANP

The ANP method is the development of the Analytic Hierarchy Process (AHP) method, which has a higher complexity than AHP. ANP method is one method that is capable of presenting the level of interest of various parties by considering the interplay of criteria or alternatives in making decisions related to a range of interconnect and defense [13].

Saaty stated that in the implementation of ANP problem solving depends on alternatives and criteria that exist [12] [20]. ANP analysis uses pairwise comparison of alternatives and criteria. Next [13] explain the network in the AHP there is a level of objectives, criteria. Levels in AHP are called clusters in ANP networks that can have criteria and alternatives in them called nodes. ANPs are formed in the network structure and there are also feedbacks, which can improve the priority generated from the assessment and can make predictions more accurate. In addition, the criteria themselves can depend on alternatives and on each other feedback fixes the priorities generated from the assessment and makes predictions more accurate.
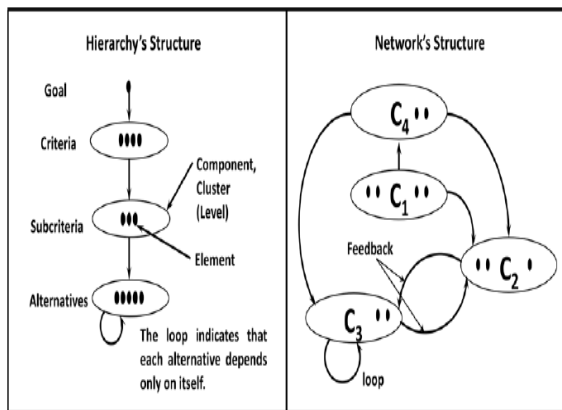
Fig.2 AHP & ANP Component Type [13]

The ANP calculation process, based on the priority of each cluster depicted in the n x n matrix, gives a paired pair ratio scale**.** If the system has N clusters, where elements in each cluster can interact with some or all of the existing cluster. The cluster is denoted by Ch (h = 1, 2, 3,..., N) with elements of nh (eh1, eh2, eh3 ...., ehn). Value of supermatric awarded as a result of the assessment of priorities derived from pairwise comparisons.

Fig.3 Basic format of Supermariks

Fig. 4. Matriks Block i and j

2.2.2 ANP Stages

Stages of making decisions using the ANP method [13] :

Stage 1: Develop problem structures and develop decision models, aimed at identifying the alternatives that will be most significant in decision making.

Stage 2: A matrix of pairwise comparisons interrelated variables, to calculate the impact of the alternatives is mutually compared by measuring the ratio scale of 1 to 9.

Table. 1 Scale of Absolute Numbers

Intensity of Importance	Definition
1	Equal importance
3	Moderate importance
5	Strong importance
7	Very strong importance
9	Extreme importance
2,4,6,8	Intermediate values

Step 3: Calculate supermatrix (weighting element), with the value of the reciprocal (inverse), ie aij = 1 / aij indicates the level of importance of the element of i or j. Consistency ratio should be <= 10%. If the value is more than 10%, then the assessment of decision data should be corrected.

$$A * w = \lambda max * w \qquad (2.1)$$

Stage 4: Determine the weight of interest using the limited supermatrix of the model.

$$CI = \frac{\lambda \max - n}{n-1} \qquad (2.2)$$

CI $\qquad$ = *Consistency Index*

$\lambda_{max\,I}$ $\qquad$ = Max eigen value

n   = number of elements compared

3. CONSTRUCTION OF THE MODEL
3.1. Problem Definition

In planning development and coaching to improve lecturer's performance hence very important to conduct an evaluation of lecturer's performance. Evaluation of lecturer performance is generally from questionnaires filled by students related to the learning process. Therefore, it is important for lecturers to conduct self-evaluation based on factors that are suspected to affect lecturer's performance. Model of lecturer performance evaluation in this research is designed based on the factors that allegedly affect the performance of lecturers with the variables of motivation, self-esteem, competence and job satisfaction.

Most models have been used in performance evaluation, assessment, as well as social studies using statistical methods by increasing or decreasing some variables, rarely developing models with analytical methods. This study aims to produce a flexible lecturer evaluation model design using MCDM approach with ANP method.

3.2. Problem Criteria

The lecturer's performance evaluation criteria in the study consisted of lecturer performance, work motivation, self-esteem, competency and job satisfaction. Each criterion has several sub-criteria as follows:

- Lecturer performance criteria (KD),
- Motivation Criteria (M), this cluster consists:
  - Needs for achievement (MAc)
  - Need for power (MP)
  - Needs for affiliation (MAf)
- Self-Esteem Criteria (SE) :
  - Respecfull Power (SEP)
  - Significance (SES)
  - Virtue (SEV)
  - Competence (SEC)
- Competence Criteria (C) :
  - Pedagogy (CP)
  - Personality (CK)
  - Social (CS)
  - Professional (CPro)
- Job Satisfaction Criteria:
  - Enjoyment to work (KKS)
  - Satisfaction on the work (KKH)
  - Award of work (KKP)

Alternative selection of priority strategy decisions:
- Alternative 1: Guidance and facilitation of lecturers, by developing competence and career.
- Alternative 2: Optimizing lecturers' performance by developing lecturer career patterns with rewarding and measurable compensation and transparency.

- Alternative 3: The deepest coaching pattern required improves lecturers' ability to focus on learning and teaching.

3.3. Proposed Model

Figure 3 shows a network model framework designed by ANP method. All criteria and sub-criteria are associated with each factor in evaluating the lecturer's performance. All criteria and sub-criteria are associated with each factor in evaluating the lecturer's performance.
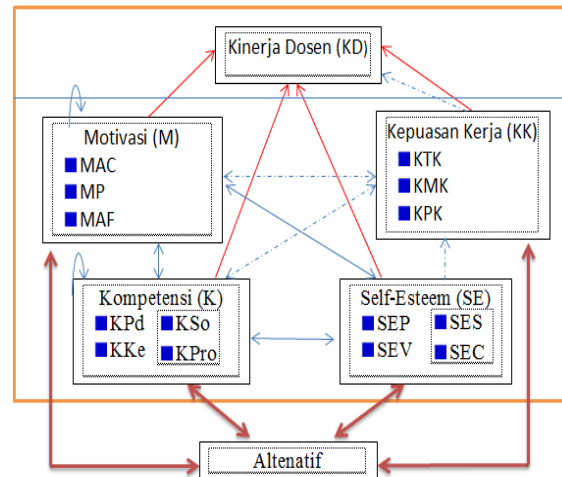
Fig.5 Proposed Model Evaluation

The relationship between criteria and sub-criteria:
- ⟶ The direct influence of criteria on KD
- ⇢ Shows the relationship indirect effect through KK criteria against KD
- ⟷ Showed a correlation between the criteria
- ⟷ Alternative selection decisions based on the results of weighting
- ↻ Dependency between elements of the criterion (inner dependence)

The lecturer's performance evaluation model based on the ANP method, forming a network that allows illustrating some problems without focusing on beginning and ending.

4. CONCLUSION

Performance appraisal is the process of determining one's performance level. To obtain information about the performance of a lecturer then it is important to do performance evaluation in accordance with the duties and functions as an educator.

Lecturer performance evaluation model based on ANP able configure to measure direct and indirect influence and the correlation between lecturer performance factors, motivation, self-esteem, job satisfaction, and competence. The designed model does not close the possibility to be developed based

on the addition or subtraction of other performance factors.

5. ACKNOWLEDGMENT

This research is still limited to the design of lecturer performance evaluation model. Further research is needed to calculate weighting, supermatrix, limiting supermatrix and limiting priority and perform testing of lecturer performance evaluation models designed.

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DEVELOPMENT OF ONLINE EXAMINATION SYSTEM USING WONDERSHARE QUIZCREATOR BASED ON WEB

Fitri Yanti[1], Rijal Abdullah[2], Krismadinata[3]

[1]Jurusan PTIK, Fakultas Teknik, Universitas Negeri Padang
[2]Program Studi Magister Pendidikan Teknologi dan Kejuruan, Fakultas Teknik

ABSTRACT: This research aims to develop an online examination system in SMA Negeri 3 Padang. The application for this web-based online examination used wondershare quiz creator. The research method used was RnD (research and development) by using IDI development model (define, develop and evaluate). The results of this research were effective to be used and the examination can use this application with the system randomly.

Keywords: Online examination system, Wondershare quiz creator, Web

1. INTRODUCTION

The examination can be defined as evaluation of learning outcomes. Evaluation was something that must be done to knew how far was the change of students rare reached after doing the learning process. Evaluation examination technique was one of the technique or the way was used to do the activities of measurement, consisting of a various question, statement, or a series of task that must be done by student to measure student behavior aspect. Whereas, online defines showing connectivity through a network. Thus, the author concludes that online examination was an evaluation technique that is done through network connectivity of intranet or internet.

The information of technology in education field develops quickly especially in quality, rapidly and easy to use from conventional examination change into computerization with using online examination [Didik 2014].

The online examination uses wondershare quiz creator application was given because it was not only easy to used but also was supported by school's facility that is adequate such as computer's lab is complete and also use wifi network.

This development research is Research and Development (R&D) which was used the process of development and validation education product. The model of development that used by IDI who have 3 steps, they are defined, develop and evaluate.

Wondershare quiz creator is software for making question, quiz or online test web-based. By using wondershare quiz creator in making a question to make student easy in doing an examination. Using flash player feature by using wondershare quiz creator software is appropriate to be used for online examination [Dwi 2015].

There are some facilities that are given by wondershare quiz creator, not only in user-friendly the question produced, they are 1. Feedback facility based on response or answer from the student, 2. A facility that shows test score and steps will be followed by the student based on response and question that is entered. 3. The facility of change the test and language on the keypad and label related to the willing or question is a maker, 4. Hyperlink facility is sending result or score the test to email or LMS, 5. The facility of making randomly questions, 6. The facility of security with user account or password, 7. The facility of display setting that can be modified, etc.

Producing evaluation media program based on e-learning used wondershare quiz creator and then did analysis using the percentage formula so overall this evaluation media declared feasible to used [Rendik 2014].

The web browser is a program or software that used to rove internet finding information in a web that is saved in a computer. The Internet is a computer network that connects globally by using hardware and software in connected each other.

Based on the previous research in relevant research so in development, online examination system must do through evaluation stage, validation, practically, and effectivity examine from an expert. The expert is from the lecturers and the teachers in the same major. For the researcher, this online examination system was develop to decrease paper examination system which the school had been facilitated by good computer laboratory and wifi network.

2. METHODE

This research used research development (R&D). And the model of this research development was model IDI (Instructional Development Institute).

IDI model maintains the principles of approach system that consist of 3 stage, they were defined, develop, and evaluate. The first stage was defined that explains the steps to identify the problem, analyze students characteristic, and analyze concept or lesson plan. The second stage is developing that consists of arranging prototype product that will be develop. The third stage was evaluated that explains validation test, practicality test and effectively also the comparison test manual and online test.

The result of stage is the development stage. The design of the online examination display is as follow :
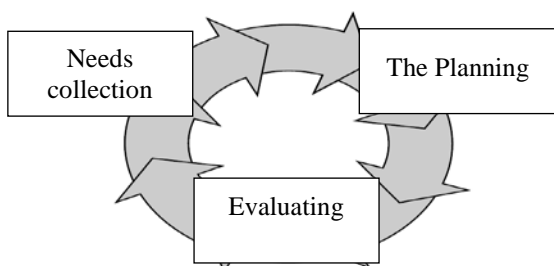
Figure 2.1 prototype model design

The process of online examination system by using wondershare quiz creator based on the web can be explained that 1. Collection of need: preparing the question material lesson that is got from the teacher and other sources. 2. The Planning: making of online examination system by using wondershare quiz creator based on the web. 3. Evaluating: evaluation of online examination system by comparing manual test process become an online test.

The stages to did online examination were:

a. Validation Stage
   In this stage, the research will do validation test to validate or to assess the feasibility of product and this case by doing to the expert.

b. Practical Stage
   Practicality is using online system web-based that had been develop. To know practicality from media that has been developing so the research did to try out in TIK lesson at grade XI MIPA1 SMA 3 Padang.

c. Effectiveness Stage
   After doing the practicality test so for the effectiveness was done after giving

questionnaire to teacher how is the process of a system that was done, whether the result from this system was better than before.

The type of data used in the development of online examination using wondershare quiz creator based on the web is the primary data. Primary data were taken directly such as data in the form of validity test result and online exam provided by the validator.

The instrument used to collect data in this study was:

1. Validity Instrument
   a. Manual test
   b. Online test

The indicator of this instrument in column 2.1:

Table 2.1 Validity Indicators

Validity	Aspect	Indikator
Manual Test	Material	a. The suitable of alphabet b. Using Text c. Direction d. Language features e. Perception f. Grammar
Online Test	Material	a. The suitable of alphabet b. Using Text c. Direction d. Language features e. Perception f. Grammar
	Design	a. Presentation the material b. Lesson of material c. Suitable for material and indicator d. Supporting features e. Grammar f. Using direction

2. Practicality Instrument
   a. Manual Test
   b. Online Test

The indicators of practicality can be shown in this table:

Table 2.2 Practicality Indicators

	Assesment's Indicator
Manual and online	The quality of content and purpose

test for students	Technique Quality
	Doing the test
Manual and Online test for teachers	The quality of content and purpose
	Technique Quality

3. Effectively Instrument

Product effectivity is gotten based on some aspect of questionnaires given to teachers through a short time in making question and result.

Before using the instrument of research, it must do the try out to know difficulty index and the difference, this is the explanation from instrument try out:

a. The validity of each question

$$r_{pbi} = \frac{Mp - Mt}{St} \sqrt{\frac{p}{q}}$$

b. Level of question difficulty

$$P = \frac{B}{Js}$$

The number shown the difficulty and ease a question said difficulty index. The difficulty index is between 0,00 until 1,00 like in this table:

Table 2.3 Classification of difficulty index

No	Difficulty index	Classification
1	0,00 – 0,29	Difficult
2	0,30 – 0,69	Moderate
3	0,70 – 1,00	Easy

The technique of data analysis in this research used:

1. Validity Analysis
   The questionnaire data online examination system web-based from validator to all of indicator using statistic formula, it was:

   $$V = \sum s / [n (c - 1)]$$

2. Practicality Analysis

   The technique of giving assessment analysis has the formula:

   Practicality score $= \frac{Amount\ of\ practicality\ score}{Score\ of\ \max\ practicality}$ x 100%

3. Effectivity Analysis
   The effectiveness online examination determines by distributing the questionnaire to the teachers how to do

their response from using online system development. The assessment is:

1 = Disagree
2 = Less Agree
3 = Agree
4 = Really Agree

3. THE RESULT AND DISCUSSION

A. The presentation of the trial data

This part is shown all of the data collected of each stages development in learning media.

1. Test data validity

This research used IDI, where the taking of validity online examination was using questionnaire. In this step, the research gives questionnaire to 3 people of validator who had evaluated the development media. The aspect that has been validated consist of 2 aspects, they are material and questions construction.

Table 3.1 The result of validity examination manual and online test

No		Indicator	Result validator 1	Result validator 2	Result validator 3	Category
1	Manual test	Content material	0.92	0.83	1.00	Valid
		Construction of aech question	0.83	0.83	0.80	Valid
2	Online test	Content material	0.92	0.83	0.75	Valid
		Construction of each question	0.73	0.80	0.84	Valid

2. Test data Practicality

a. Teachers response of manual test practicality
   Practicality relates to easiness in using online test system web-based development. The data of practicality is gotten by a questionnaire filled by 2 TIK teachers. The result of research from practicality online test system web-based concluded in this table:

Table 3.2. The recapitulation of practicality teachers response in manual test

NO	The aspect Of assesment	The presentation score Teacher 1	The presentation score Teacher 2	Category
1	The quality of content/ material and purpose	71.43	75.00	Practical
2	The quality of technique	75.00	75.00	Very practical
	Mean	74.12		Practical

For online test web-based to examine data practicality of teachers can be sum up in table 3.3:

Table 3.3. The recapitulation of teachers response online test

No	The aspect Of assesment	The presentation score Teacher 1	The presentation score Teacher 2	Category
1	The quality of content/material and purpose	78.57	71.43	Practical
2	The quality of technique	85.00	80.00	Very practical
	Mean	78.75		Very practical

b. Student's response to online test web-based practicality

For practicality needs suggestion like student's response. This data have been gotten after doing manual test and online test, through the questionnaire given by students.

Table 3.4. The recapitulation of student response online test

No	The aspect of assessment	Percentage	Category
1	The quality of content and purpose	92.33	Very Practical
2	The quality	93.00	Very

	of technique		Practical
	The implementation of test	97.00	Very Practical
	Mean	94.11	Very Practical

3. The Effectiveness of data test

To examine the effectiveness of data test, the researcher distributed the questionnaire to TIK teachers. The assessment can be seen from this table:

Table 3.5 The analysis of teacher effectiveness

No	Teacher	Percentage	Category
1	Teacher 1	84.38	Very effective
2	Teacher 2	81.25	Very effective
	Mean	82.82	Very effective

This online test system has been passed the stage of validity test, practicality test, and effectively test. In validity test, the researcher did the research by asking the opinion to validator with a questionnaire. From validity test, the result got shown that this online test system web-based valid to be used as one of the alternatives in the online test. The try out of practicality is done by asking practical to be used as one of media test.

This case showed there is an influence using the online test in student interest because the model in question is more interactive, interaction and online. The students directly know the result of their lesson and teacher can analyze the student result so that the students can correct their result by confirming with the teacher.

Thus, the online examination system gives the benefits not only in education but also in the evaluation of students. The learning outcomes evaluation in education world is done to the student to know the level of student's ability and success in doing learning process, especially the achievement of each basic ability, both cognitive, affective and pilomotor gotten by students in doing learning process.

4. **CONCLUSION**

Based on the result of the research that has been done by using online examination web-based on TIK lesson at XI MIPA 1 SMAN 3 Padang, the researcher concludes:

The examination test web-based on TIK Lesson is computerization system that can be known the result of the test and can analyze the student's answer by using wondershare quiz

creator application. The result of the test development of online examination web-based has been rated from any study with material aspect also online examination system can be said valid, practical and effective so that online examination web-based is ready to be distributed to students in SMAN 3 Padang grade XI.

Therefore, the implication of online examination system can be used in all aspect's examination both exercise, quiz, daily exam, school exam and national exam in raising and implementing IPTEK in a school.

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6. AUTHOR'S BIOGRAPHY

Fitri Yanti was born in Padang, August 8, 1982, an Associate expert in Politeknik Universitas Andalas 2004, The bachelor of degree in the department of electronics PTIK FT UNP 2014. In 2017 got a master degree in education Technology Department and pascasarjana vocational program in education concentration TIK subject.

THE VALIDITY OF TRAINER ON MATERIALS SCIENCE AND DEVICES SUBJECT AT DEPARTMENT OF ELECTRICAL ENGINEERING

Fivia Eliza[1], Dwiprima Elvanny Myori[1], Hastuti[1]

[1]Department of Electrical Engineering, Faculty of Engineering, Universitas Negeri Padang

ABSTRACT: Devices characteristics of electrical and electronics is an important thing that must be mastered by students majoring in electrical engineering. This can be obtained through practice of materials science and devices. But the problem that arises is the absence of trainer model to facilitate the practice, so that students need more time to practice. While the time available for this course is only 1 credit (100 minutes). This study aims to develop the device trainer model to assist students in practice. The research was adopted Borg and Gall model that have 10 development steps. Validity of the trainer model was measured by instrument of validity that had been validated before. The average calculation result from the validity analysis of the trainer model is 94% with very valid category. So it can be concluded that trainer model on materials science and devices was valid to be used as a learning media.

Keywords: Material sciences and devices, trainer, electrical, engineering

1. INTRODUCTION

Material sciences and devices is one of the compulsory subjects of electrical engineering. In this study discussed the concept of semiconductor diodes, diode as half wave rectifier, diode as full wave rectifier, zener diode characteristic, zener diode application, bipolar transistor, bipolar transistor characteristics, transistor as amplifier, Silicon Controlled Rectifier (SCR), SCR ignition, Triode for Alternating Current (TRIAC), switching with TRIAC (TRIAC switch), Alternating Current Diodes (DIAC), and DIAC applications. From this basis, substantial training will prepare them to analyze real-world circuits**.** Material sciences and devices is one of compulsory courses for students in department of electrical engineering, faculty of engineering, Universitas Negeri Padang. So that the students must achieve good grades in this subject, both theoretically and practice learning.

Since 2008, students who take this course practice it manually. They make a circuit by arranging electronic components on a circuit board and using a cable to connect to a power source and measuring device. The results obtained are often incompatible with previously learned theories, 100 minutes of available time often does not get any results. Beside the students must work in groups. This causes the learning process less than the maximum practice so that the ability to catch students to what is practiced to be reduced, the discipline of students who are still lacking (not good). The same thing also revealed that "In fact many students who follow the lab activities but have not mastered the theory so that the implementation of the lab does not follow the Standard Operational Procedure (SOP) and even many labs that failed because of mistakes in stringing" [1]. This shows that the results obtained by the student learning is not maximal or can be said that the student concerned has not been completed. Students tend to be passive and have not been able to know the meaning of the results of learning activities, students are still not able to grow the potential that is on him and has not been able to cultivate a great motivation in following teaching and learning activities.

Based on the results of the above observations, indicators of non-achievement of learning objectives are caused by several factors such as limited resources available, both from students and from lecturers, learning models are still dominated learning model, the interaction between students and lecturers are still lacking, which is less conducive and less of learning media such as unavailability of teaching media in the form of props and trainers as appropriate. Learning media is one of the important components in supporting the process of learning practice. Media learning is an important factor that will affect student learning outcomes [2]. This cause the students are still confused and less understood with the material presented by the lecturer. By using trainer, lecturers can more easily deliver learning materials and facilitate students' understanding in the subject practice of materials science and devices.

2. LEARNING MEDIA REVIEW

When the media carries messages or information that is appropriate instructional or contains teaching purposes then the media is called learning media [3]. Media is defined as a means whose functions can be used as a goal [1]. If we want to select learning media need to consider several things. It could be the media used even complicate the achievement of learning objectives. The use of appropriate media will greatly support the success in the learning process. Conversely, improper use of media will only squander costs and energy, especially for the achievement of learning goals will be far from what is expected. In order to use media in accordance with their needs, it is necessary to know the criteria of media selection in learning. Criteria of media selection as follows:

a. In accordance with the goals to be achieved. Media is selected based on predetermined instructional goals that generally refer to one or a combination of two or three cognitive, affective, and psychomotor domains.

b. It is appropriate to support the content of the lesson in terms of facts, concepts, principles, or generalizations. In order to help the learning process effectively, the media must be aligned and in accordance with the needs of learning tasks and mental abilities of students.

c. Practical, flexible and enduring. The selected media should be used anywhere and anytime with the equipment available in the vicinity, as well as easy to move and carry around.

d. Skilled teachers use it. Whatever the media, teachers should be able to use it in the learning process. The value and benefits of the media are greatly determined by the teachers who use them.

e. Grouping of goals. Effective media for large groups is not necessarily equally effective if used in small groups or individuals.

f. Technical quality. For example, the visuals on the slides should be clear and the information or messages that are highlighted and want to be submitted should not be interrupted by other elements of the background [3].

3. PRACTICE MATERIALS SCIENCE AND DEVICES REVIEW

Practice Materials science and devices is one of the compulsory subjects for electrical engineering students at the Department of Electrical Engineering Faculty of Engineering Universitas Negeri Padang. The purposes of this course is the students mastered about the basics of semiconductors, diodes, transistors and understand the characteristics and working principles of SCR, DIAC and TRIAC. From the job sheet it appears that this is a basic practice of semiconductor components. Semiconductor materials are materials that conduct their electrical conductivity between conductors and insulators. Semiconductors are atoms containing four valence electrons. Since the number of valence electrons in a semiconductor is in the middle between one (conductor) and eight (isolators), then the semiconductor atom is not a good conductor and not a good insulator [4].

4. METHODOLOGY

The research uses a research and development approach (R&D). The R & D approach is a process used to develop and validate educational products, such as modules and instructional media. Research and Development is a research method used to produce certain products and products of that effectiveness [5]. The research step of R & D according to the following figure:
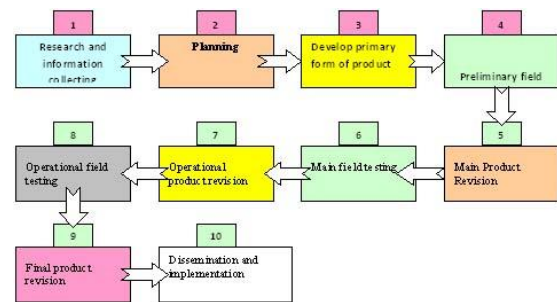
Fig 1 Borg & Gall step of R&D

5. RESULTS

5.1 Research and Information Collecting

Information collected through observations at the learning process of practice materials science and devices subject. It is known that practice equipment is not enough for each student, so that they have to practice in group (4-5 students). They have to arrange manual electric circuit and it takes more time (time available only 100 minutes for the subject).

Table 1 Need Assessment of Research

No.	Indica-tors	Sub Indicators	Learning Media
1.	Diode Charac-teristics	a. Introduction of semiconductor diodes.	White Board
		b. characteristics of semiconductor diodes	Trainer
		c. Analyzing forward and reverse bias circuits on a semiconductor	Trainer

		diode	
2.	Diode as Half-Wave Recti-fier	a. Benefits of diodes as rectifiers.	White Board
		b. How a half-wave rectifier works.	Trainer
		c. Analyzing half-wave rectifier circuit.	Trainer
		d. How the full-wave rectifier works	
3.	Diode as Full-Wave Recti-fier	How a full-wave rectifier works	Trainer
4.	Charac-teristics of Zener Diodes	a. Introduction of the zener diode as a device	White Board
		b. Characteristics of zener diode	Trainer
5.	Bipolar Transis-tors	a. How to find the leg of the transistor (Emitter, Base, Collector)	White Board
		a. Determine the value of α, β and current	Trainer
6.	Characteristics of Bipolar Transis-tors	Understanding the characteristics of a bipolar transistor	Trainer
7.	*Silicon Control-led Recti-fier* (SCR)	Understanding trigger current (IGT), saturation voltage (VAKsat), and holding current (IH)	Trainer
8.	Ignition of *Silicon Control-led Recti-fier* (SCR)	a. Able to operate SCR circuit at source dc and ac source.	Trainer
		b. Able to analyze the currents and voltages contained in parts of the SCR ignition circuit	Trainer

5.2 Planning

This step started with make a design that referring to the principles of good learning media. The results of the information gathering stage are used as references for product design. Media validation tools (instruments) should also be planned.

5.3 Develop Primary Form of Product

Primary Face of Product:
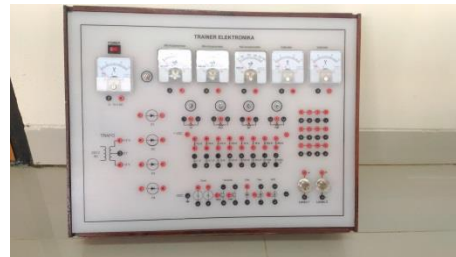
Fig 2 Face of Trainer

Fig 3 Face of Trainer

5.4 Product Validation

Validity of the trainer was measured by instrument of validity. This trainer tool is tested for use in front of the validator, then validator rate and provide the trainer's recommendation is valid or not. If this trainer is declared to be valid then proceed to the next process that is trial usage by user. The measurement scale used in the validation is Guttman scale. This measurement scale only has two answer interval "agree" and "disagree". The answer would agree to be worth 1 and the answer disagrees to 0. Guttman Scale can be made in the form of multiple choice, also can be made in the form of checklist. Answers can be made the highest score of one and the lowest zero. For example, the answers agree to be given a score of 1 and do not agree a score of 0. The analysis used the Likert scale [5]. Data were analyzed with the formula:

$$\text{Validity} = \frac{obtained\ score}{Maximum\ score} x\ 100\% \qquad (1)$$

After obtaining the validity number then adjusted with table criteria:

Table 2 Criteria of validation category

No	Level of Achievement (%)	Category
1	81 – 100	Very Valid

2	61 – 80	Valid
3	41 – 60	Quite Valid
4	21 – 40	Less Valid
5	0 – 20	Not Valid

Validation is performed by validators who have competence in the field of instructional media and learning materials practice materials science and devices. The goal for validation results can be recognized and accounted for. Validation activity begins with product observation by validator, trainer system demonstration, then validator fill validation sheet (10 there are 10 statements with the choice agree or not) as validation data. Validation activities by validators in detail can be seen in the following table:

Table 3 Validation Result

Validator	Score	%	Category
1	10	100	Very Valid
2	9	90	Very Valid
3	10	100	Very Valid
4	9	90	Very Valid
5	9	90	Very Valid
Validity score		94	Very Valid

The average calculation result from the validity analysis of the trainer model is 95% with very valid category. Validation result stated that valid trainer is used as learning media. Assessment given by the validator reveals that the material contained in the trainer in accordance with the contents and objectives of the course Practice Materials science and devices. The learning information delivered using the trainer becomes clearer. This is in accordance with the terms and criteria of media selection In accordance with the objectives to be achieved, appropriate to support the content of the lesson [3]. The role of the trainer as a learning media makes the learning of the abstract becomes more concrete. Application of trainer in learning makes students active, more independent and increase student's learning motivation.

Data validation results show that the media create a more interactive learning. This is in line with the benefits of the media according to laying the concrete foundations for thinking [7]. Many aspects are taken into consideration in making learning media. These aspects must be met so as to produce good media, suitable media used in learning. This is in line with the criteria of media selection according to Practical, flexible and enduring [8]. The time required to use the media in accordance with the time available in the Materials and Tools Practice course. The lecturer responds that the media has the same equivalence and is easily interpreted. The effectiveness of instructional media is a measure related to the success rate of a learning process [9]-[11]. The success of the learning process is indicated by the success of the students mastering the given material.

6. CONCLUSION

In this paper, a trainer for training students in the framework of teaching practice materials science and device was presented. The novelty of the R&D research is that it is making the students centered learning and increasing students interesting to practice. Furthermore, the Material sciences and devices learning process can be students centered learning.

The main benefit is that trainer on practice materials science and device was valid to be used as a learning media. The result of research and development is expected to provide new innovations in education or provide solutions to existing problems. So that can be conclude that the trainer as a model can be used to specify quality models that provide valid automated quality assessments of learning. Future work will focus on developing the trainer into a universal trainer that can be used for other basic courses (e.g. basic and electrical measurements, power electronics, and electrical circuit) to refine the impact evaluations in order to achieve better results with regard to diversification among practice materials science and devices. Moreover, we plan to extend the quality model to include more quality characteristics and measurements.

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9. AUTHOR'S BIOGRAPHY

Fivia Eliza, was born in Kerinci, in 1985. She received the Bachelor and Master degrees in electrical engineering from Universitas Negeri Padang, Padang,West Sumatera Indonesia in 2007 and 2009, respectively. Since 2009, she has been with the engineering faculty of Universitas Negeri Padang, where she is currently Master Program fresh graduate. Her contact E-mail is fivia_eliza@yahoo.com

Dwiprima Elvanny Myori was born in Palembang, South Sumatera, in 1988. She received the bachelor and Master degree in Mathematics from Andalas University, Padang, in 2010 and 2012, respectively. Since 2012, she has been with the engineering faculty of Universitas Negeri Padang.

Hastuti was born in Tembilahan, Riau, in 1976. She received the bachelor degree in Electrical Engineering from Andalas University and Master degree in Electrical Engineering from Bandung Institute of Technology in 2002 and 2007, respectively. Since 2008, she has been with the engineering faculty of Universitas Negeri Padang.

10. AUTHOR'S CONTRIBUTIONS

Fivia Eliza: Study conception and designed, compile validation instruments, analysis and interpretation of data and drafting the article. Critical reviewing and final approval of the article to be submitted,

Hastuti: Study conception and designed, compile validation instruments analysis and interpretation of data and drafting the article to be submitted,

Dwiprima Elvanny Myori: Study conception and designed, compile validation instruments, Critical reviewing and final approval of the article to be submitted.

TRAINING MODEL-BASED KNOWLEDGE MANAGEMENT SYSTEM FOR VOCATIONAL HIGH SCHOOL TEACHERS SKILLS ENGINEERING COMPUTER NETWORK

Gunawan Ali[1], Kasman Rukun[2] and Syahril[3]

[1]Fakultas Ilmu Komputer, University of Dharmas Indonesia, Indonesia
[2,3]Fakultas Teknik, Universitas Negeri Padang, Padang, Indonesia.

ABSTRACT: Teacher professional development is the key to extend the knowledge of novelty in the field of education, helping teachers in implementing the result of the new learning. Innovation, and improve their teaching (Tantangan Guru SMK Abad 21, 2013:244). Considering the professional competence is a necessary competency by a teacher in supporting the learning process to procedure graduates who are competent and able to develop themselves in the field of engineering computer network as well as for support the deliberations of teachers in subjects in developing the competence of professional teachers then need to develop a model of training engineering computer network based knowledge management system for vocational high school teachers of engineering computer network. This model aims to develop professional competence of vocational high schools teachers engineering computer network. Knowledge management system is a system designed to document, classify and disseminate knowledge. Knowledge management system need to be developed to help teachers develop their professional competencies. Another reason was the existence of the training model of network based on computer technique expertise knowledge management system for vocational high schools teachers engineering computer network, then all things related to engineering computer network will be in document and distributed to all teachers appropriately and quickly.

Keywords: Training Models, Knowledge Management System, Professional Competence Teachers, Engineering Computer Network

1. INTRODUCTION

The development and improvement of professional skills must be based on the real needs or problems faced by the teacher. Law of the Republic of Indonesia no. Law No. 14 the Year 2005 concerning teachers and lecturers article 20 paragraph (b) mandates that in order to carry out professional duties, teachers are obliged to improve and develop academic qualifications and competencies on an ongoing basis in line with the development of science, technology, and art.

Law of the Republic of Indonesia. Law no. 14 of 2005 on teachers and lecturers, in essence, requires teachers to have: (1) minimum academic qualification S1 or DIV, (2) Competence as a learning agent of pedagogical, professional, personality and social competence, and (3) educator certificate. The Act provides an appropriate opportunity for teachers to continually improve their professionalism through training, research, scientific work, and other professional activities both conventionally and online web-based.

Vocational education develops in accordance with the development of the world of work and the demands of society, through two social institutions. First, social institutions in the form of job structure with the organization, the division of roles or tasks, and behaviors related to the selection, acquisition, and stabilization of careers. The second social institution, in the form of education with its double function, namely as a media of cultural preservation as well as the media of social change.

This policy requires both the school and industry to jointly develop the concept, this is intended to have a match between school and industry. Compliance is intended for the competence gained by students in school is a required competence in the industrial world. Industry must also play an active role in delivering technological advances to the school so that synchronization between the industrial world with the world of education.

This synchronization certainly requires human resources that have professional competence. Various efforts have been made to improve the professional competence of teachers, one way is by the Subject Teacher Consultation. The Subject Teachers' Meeting is a forum or a professional forum of subject teachers located in a province, district, city, sub-district, studio, and school cluster. But in its activities the role of forum Teachers Computer Techniques Teacher Training Network West Sumatra Province is still not optimal in the development of professional competence, but if the attention of the usefulness of this forum is very important to support the improvement and mining of professional competence of teachers Vocational High School Skills Computer Network Engineering.

The ineffectiveness of such forums is strengthened based on the results of field studies conducted with teachers who are members of the Teachers' Computer Techniques Teacher Training

Network of West Sumatra ie some teachers from Vocational High School in Sijunjung district (SMK N 7 Sijunjung) and some Vocational High School teachers in the region Dharmasraya regency (SMK N 1 Pulau Punjung and SMK N 1 Sitiung) stated that in the implementation of professional competence development through this container is still not optimal, sharing facilities such as practical equipment, workshop, and laboratory can only be done among members of the adjacent location, while sharing knowledge and expertise are still relatively rare.

This kind of sharing activity is still limited to regular meeting events in the form of Computer Network Teacher Training Subjects held once in 2 or 3 months, so it can be said sharing resources in Computer Teachers Teacher Training Subject Network has not functioned maximally in improving the professional competence of school teachers Secondary Vocational Computer Networking Expertise Networks, it also recalled: (1) The Computer Teacher Conference Program Computer Network Lessons Generally can not be attended by all teachers from Vocational School Computer Engineering Competency Competency Network, due to time and budget constraints.

Therefore, teachers who do not attend the meeting often do not know the issues discussed at the meeting, (2) The discussion that fills in the event is still minimal in terms of expertise, (3) Database documentation of the results of each meeting is still done manually, ie in the form of CD or stored in harddisk Computer Teachers Subject Computer Networking Lesson. This condition reflects that the management of knowledge in the container of Teachers' Consultation Techniques Computer Network Lessons has not been conceptualized and has not been well managed so as not to give each other positive benefits among members.

Whereas teacher professional development is a key tool to broaden understanding of new issues in the field of education, assist teachers in implementing new learning innovation results, and improve their teaching (Tantangan Guru SMK Abad 21, 2013:244). Professional development of teachers can be done in various forms of activities such as mentoring, modeling, workshops, coursework, entry in structure, observation and training during holidays (Brown, 2002:1, Tantangan Guru SMK Abad 21, 2013:244).

One of the professional development models of teachers is training. Snelbecker (1974: 32) states: "A model is a concretization of a theory which is meant to be analogous to or representative of the processes and variables involved in the theory". In line with the views of Joh JOI (2004: 123) and Snelbecker (1974: 32), the model in this study is essentially a conceptual concretization used to describe the processes and variables contained in the Knowledge Management System-based training theory for

School teachers Secondary Vocational Skills Computer Network Engineering, namely: 1) component of the concept of training based Knowledge Management System, a definition in the form of scientific language that describes the theory of training and Knowledge Management System; 2) the procedure, that is the steps that must be done toward the set goal; and 3) the purpose, in the form of mastery of competence of Computer Network Engineering expertise.

Given the professional competence is a competency that is needed by a teacher in supporting the learning process to produce graduates who are competent and able to develop themselves in the field of Computer Network Engineering as well as to support the Teacher Consultative Subjects in developing the professional competence of teachers it is necessary to develop a model of computer engineering skills Network-based Knowledge Management System for Vocational High School Teachers Computer Networking Techniques.

This model aims to develop the professional competence of vocational teachers Computer Network Engineering Skills. Knowledge Management System is a system designed to document, classify and disseminate knowledge. Knowledge management involves the activities of an institution in managing knowledge as an asset, with strategies for proper distribution of knowledge to the right person and in a fast time so that they can interact, share knowledge and apply it in their daily work to improve performance and maintain institutional sustainability. Knowledge Management System needs to be developed to assist teachers in developing their professional competence.

2. LITERATURE REVIEW

2.1 Competence of Vocational High School Teachers

Spencer and Spencer (1993) stated competence is as follows, a competency is an underlying characteristic of an individual that is casually related to criterion-referenced effective and/or superior performance in a job or situation (Tantangan Guru SMK Abad 21, 2013:32).

Competence by Australia National Training Board (NTB), competencies bring all these elements of task, skill, and knowledge together add a performance standard. Thus a competency is written in the form of a task to be carried out, the skill required to do it and the standard to which the task must be performed. In a bid standardize the construction of competency statements, the NBT has divided the nation into following: 1) unit of competency referring to the general area of the job; 2) elements of competency describing the precise tasks to be carried out and the skill required; 3) Performance criteria defining the standard that

should be met before the trainee can be described as competent (Tantangan Guru SMK Abad 21, 2013:33).

According to Law No. 14 the Year 2005 on Teachers and Lecturers, competence is a set of knowledge, skills, and behaviors that must be owned, experienced and mastered by teachers or lecturers in performing professional duties.

2.2 Training Model

One of the professional development models of teachers is training. Snelbecker (1974:32), a model is a concretization of a theory which is meant to be analogous to or representative of the processes and variables involved in the theory. While Joh J.O.I Ihalaw (2004: 123) states that the model essentially the same as the theory, namely the system of postulates or an integrated sequence of the propositions. It is further explained that different models of the theory are viewed from the level of abstraction. A model is constructed from a set of high abstraction level propositions.

In line with the views of Joh JOI (2004: 123) and Snelbecker (1974: 32), the model in this study is essentially a conceptual concretization used to describe the processes and variables contained in the Knowledge Management System-based training theory for School teachers Secondary Vocational Skills Computer Network Engineering, namely: 1) component of the concept of training based Knowledge Management System, a definition in the form of scientific language that describes the theory of training and Knowledge Management System; 2) the procedure, that is the steps that must be done toward the set goal; and 3) the purpose, in the form of mastery of competence of Computer Network Engineering expertise.

The training steps according to Pont (in Haris Mudjiman, 2011) constitute a continuous cycle of activities consisting of: (1) training needs analysis, (2) training program planning, (3) preparation of training materials, (4) training implementation, and (5) training assessments. Schematically the training cycle can be seen in Figure 1 below.
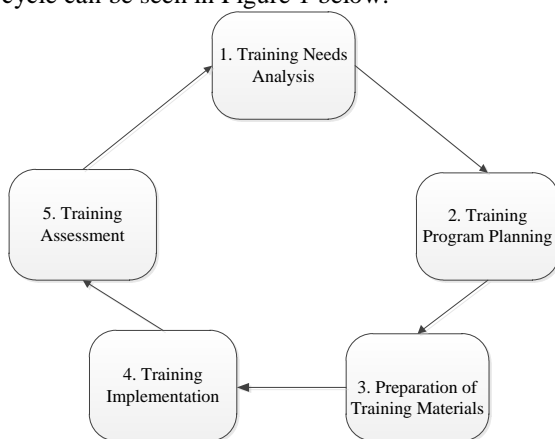
Figure 1 Pont Training Cycle

2.3 Computer Network Engineering Expertise

Technology is progressing very rapidly nowadays. All industries that use the technology base need a lot of skilled, competent and skilled workers in their field. From the above, Vocational High School becomes a major choice to print skilled and ready-to-work experts in the face of technological developments in accordance with the needs of the industrial world. One of the majors in Vocational High School that accommodate the graduates who are ready to work in the face of technological developments is majoring in Computer Engineering and Networking.

In its development, the Department of Computer Network Engineering is currently a popular choice of majors among junior or equivalent graduates who continue their studies to the level of Vocational High School. Department of Computer Network Engineering has increased significantly since the department was first introduced. Department of Computer Engineering Network according to the definition of Wikipedia is a science-based Information Technology and Communications related to the ability of algorithms, and computer programming, computer assembly, computer network assembly, and the operation of software, and the Internet.

In the process of education during the Vocational High School majoring in Computer Network Engineering, students will be taught from the basic level of assembly, computer repair, peripheral repair, computer network, up to computer network security. With all the skills taught in full from the first level to the end, students are expected to compete in accordance with expertise in the technology-based workplace.

Students who have graduated from the Department of Computer and Network Engineering will be equipped with network science and servers that are currently very much needed in companies, students can work as a computer technician, networked technician, Server Administration, SysAdmin, Network Administration, EDP (Electronic Data Processing), and also IT Staff.

2.4 Development of Training Models Computer Networking Expertise Network Based Knowledge Management System

On this occasion the development of training model Computer Networking Expertise Network based Knowledge Management System for Vocational Secondary School Computer Networking Expertise Network was chosen in this research, because the development of training model Computer Networking Expertise Knowledge Management System based network is considered suitable to develop the professional competence of Vocational School teachers Computer Network

Engineering Expertise and as a supporter of Computer Teachers Subject Computer Networking Lessons in empowering the competence and professionalism of teachers Vocational High School Skills Computer Networking Engineering.

Development of Knowledge Management System as a form of Sharing Knowledge and for self-mining of Vocational High School teachers Computer Networking Expertise Networks can provide opportunities for teachers and institutions to share knowledge in order to develop teacher competence and as support of empowerment of competencies through Subject Teacher Consultation.

Training model Computer Networking Expertise Network based Knowledge Management System for teachers Vocational High School Computer Networking Expertise a valid, practical and effective network is organized in the form of training activities and online in order to develop the professional competence of Vocational High School teachers Competence Computer Network Engineering Competencies.

Training model Computer Networking Expertise Network based Knowledge Management System for Vocational High School teachers Computer Networking Skills Networks will be developed using development procedures Five systematic development steps of the ADDIE model or abbreviations Analysis, Design, Development, Implementation and Evaluation. The following are presented ADDIE model images used in the development of skills training model of Computer Science Network based Knowledge Management System.
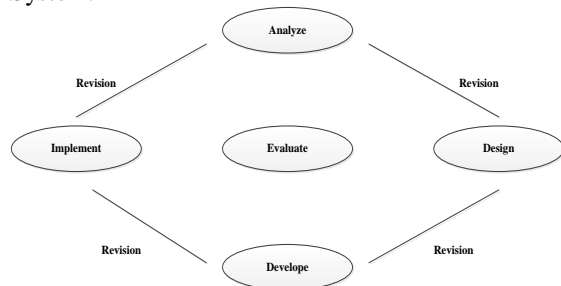
Figure 2 The development stages of the ADDIE model

2.5 Knowledge Management System

The concepts and definitions of Knowledge Management are, among others, proposed by Davidson and Philip Voss (Ismail Nawawi, 2012: 2), Knowledge Management as a system that enables the company to absorb the knowledge, experience and creativity of its staff for the improvement of the company. In the opinion of Batgerson (Ismail Nawawi, 2012: 2), Knowledge Management is a systematic approach to managing intellectual assets and other information so as to provide competitive advantage for the company.

According to Skyrme (Yuyun Estriyanto et al, 2008) put forward the definition: "Knowledge Management is the explicit and systematic management of vital knowledge and its associated processes of creation, organization, diffusion, use and exploitation". According to Jay Liebowitz (1957: 2) "Knowledge management is the process of creating value from an organization's intangible assets". The definition is not the only absolute true definition because there is no universal definition of knowledge management. This definition is the definition of the formulation of Skyrme (Yuyun Estriyanto et al, 2008) which most represents the notion of knowledge management based on experience and expertise. Another definition says Knowledge Management is the process through which organizations generate value from intellectual and knowledge based assets.

Based on the above definitions, it can be concluded Knowledge Management is a process of identifying, capturing, organizing knowledge, documenting it and disseminating knowledge possessed by individuals as intellectual based asset.

3 RESEARCH METHOD

The research methods used in this study are as follows:
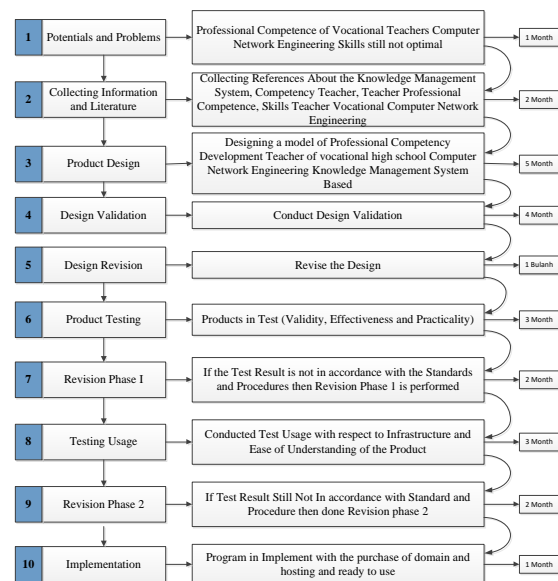
Figure 3 Research Methods

4 DISCUSSION

Training model Computer Networking Expertise Network-based Knowledge Management System for vocational high school teachers Computer Engineering This network was developed from the weaknesses and strengths of the implementation of the Subject Teachers Consultative Program in achieving the expected goals. Implementation of Subject Teachers' Consultative Teachers has not

been able to significantly improve the quality of teaching practice by vocational high school teachers. Training model Computer Networking Expertise Network-based Knowledge Management System for vocational high school teachers Computer Engineering Networks designed to improve the professionalism of vocational high school teachers Computer Networking Techniques Networks, the image of this model can be seen in Figure 4 below:
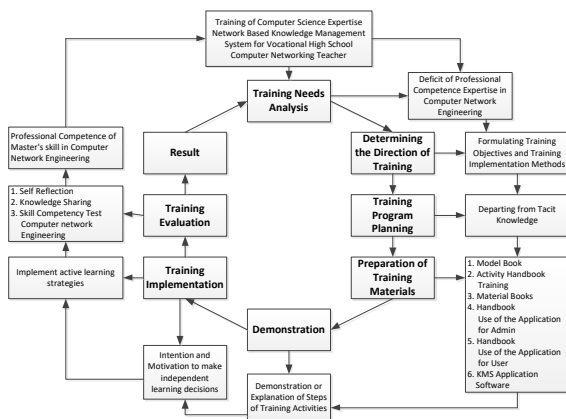
Figure 4 Model of Training Skills Computer Network Techniques Based Knowledge Management System for Vocational High School Teachers Computer Network Engineering

From Figure 4 above can be seen, the skills training model of Computer Engineering Network based on Knowledge Management System consists of 8 syntax, as follows: (1) Needs analysis, (2) Determining the direction of training, (3) Planning of training program, (4) preparation of training materials, (5) Demonstration, (6) Implementation of training, (7) Training evaluation, (8) Results. The following is a drawing of the construction of a skills training model of Computer Science Network based Knowledge Management System for Vocational High School Teachers Computer Network Engineering.
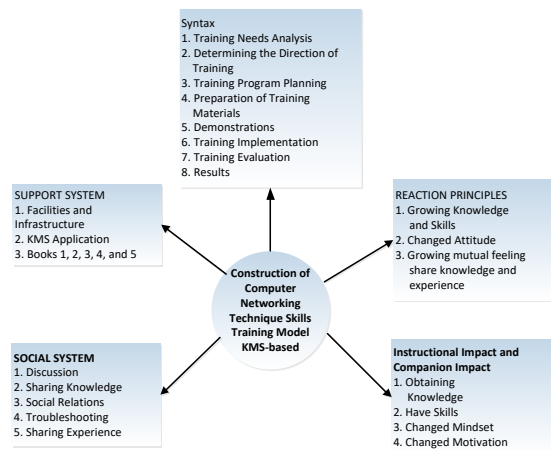
Figure 5 Construction of Skills Training Model Computer-Based Techniques Knowledge Management System for Vocational High School Teachers Computer Network

In this study also produced a product in the form of application Knowledge Management System as one of the supporting media of Computer Network Engineering skills training for vocational high school teachers Computer Network Engineering Expertise, which has a web address at www.kmsgtkj.id. The details of the application can be seen in the picture as follows.

Page Design for Users
The menu structure in the application Knowledge Management System (KMS) is for the user is as follows:

Login View
Here is a picture of the login view of the user. Before entering into the main page system, then the user must login first in accordance with their respective accounts.

Figure 6 Login View

Display Home Page
Here is a picture of the main page view. On the main page there are menu tabs that will be used by the user. In the main page view can also be seen news related to the field of expertise Computer Network Engineering in inputkan by admin this system

Figure 7 Display Home Page

Innovation Input Page Views
Here is an image of the innovation data input page. In this menu tab the user can input data innovation in accordance with the field of expertise Computer Network Engineering.
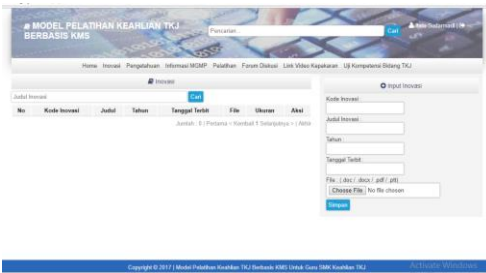
Figure 8 Innovation Input Page Views

Display Input Page Knowledge

The following is the image of the page display input data knowledge. In this menu tab the user can input data knowledge in accordance with the field of expertise Computer Network Engineering.

Figure 9 Display Input Page Knowledge

Page Display Input MGMP Information

The following is an MGMP information input page display image. In this menu tab the user can input information related to MGMP in the field of Computer Network Engineering expertise.
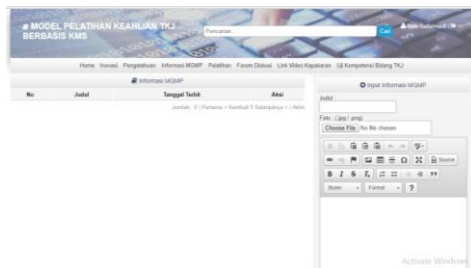
Figure 10 Page Display Input MGMP Information

Display Input Page Training

Here is a picture of the training input page. In this menu tab the user can input training data followed by the user in accordance with the field of Computer Network Engineering expertise.
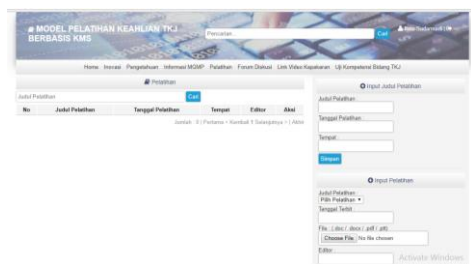
Figure 11 Input Training Page Views

Display of Discussion Forums Page

Here is a picture of the discussion forum page. In this menu tab the user can hold a discussion on the discussion forum page.
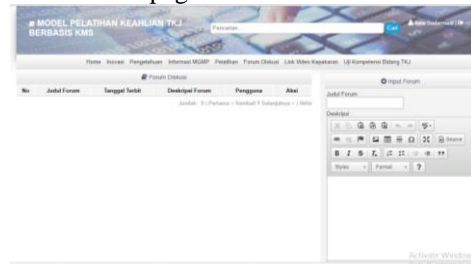
Figure 12 Page Views Discussion Forums

Pageviews Input Link Video Expertise

Users can input video links related to the expertise of Computer Network Engineering.

Figure 13 Pageviews Input Link Video Expertise

Competency Test Page Views Network Engineering Network

This page is used by the user to perform competency test in the field of Computer Network Engineering expertise.

Figure 14 Competency Test Page Scope of Computer Network Engineering

5 CONCLUSION

Dari penelitian ini dapat diambil kesimpulan sebagai berikut:

1) This research resulted in a skills training model of Computer Network Engineering based knowledge management system for vocational high school teachers Computer Network Engineering.

2) Has been produced a product in the form of Knowledge Management System application, is one of the products that will be used by teachers of vocational high school Computer Network Engineering in training based Knowledge Management System, which has web address at http://www.kmsgtkj.id.

3) The results of the Focus Group Discussion activities, input from the expert states the system already has a good performance is in accordance with the needs of teachers Vocational High School Skills Computer Network Engineering.

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FUZZY LOGIC BASED CONTROLLER FOR BUCK CONVERTER

Habibullah[1], Irma Husnaini[2] and Asnil[3]

[1,2,3] Fakultas Teknik, Universitas Negeri Padang, Padang

ABSTRACT: This research aims to make buck converter prototype for PLTS system by using fuzzy logic controller. Buck converter is required in the PLTS system if the required unidirectional voltage is smaller than the output voltage of the solar cell. Buck converter used to convert 24 Volt dc voltage to 12 Volt dc with 60 watt capability. While fuzzy logic controller is used to improve buck converter performance based on pulse generation technique for switching. The application of fuzzy logic method is expected to improve the performance of the system by maintaining the stability of buck converter output voltage of 12 volts and reduce the output ripple value. Atmega8535 microcontroller is used to generate PWM pulses for switching on power circuits.

Keywords: Buck converter, fuzzy logic, Atmega8535

1. INTRODUCTION

The solar cell is a semiconductor diode that can convert light into electricity and is a major component in a Solar Power System (PLTS). Electrical energy generated by the PLTS in the form of direct current while the load used by consumers can be alternating and direct current. To convert electrical energy from direct current to alternating current an inverter is used, whereas for converting direct current to another level of current is used dc-dc converter. If the required directional voltage is greater than the output voltage of the solar cell then used dc-dc converter type step up or also known as a boost converter. if the unidirectional voltage required is smaller than the output voltage of the solar cell then used dc converter type step down or also known as buck.

Configuration buck on PLTS system can be used for charging battery system which later can be used as source of inverter to convert to voltage back and forth. In addition, buck configurations are also widely used as drivers for LED lights for lighting systems. In PLTS systems, some of the most important dynamic performance criteria to consider are the ripple, the output voltage, and the recovery time.

Buck converter that many in the market still have a high enough ripple rate which consequently reduces the efficiency so that the extent of waste of electric energy is still happening. Therefore, this research focuses on the design of Buck converter for PLTS system using Atmega8535 microcontroller as pulse generator for switching by using fuzzy logic method. The advantages of this buck configuration are better efficiency, simpler circuit, ripple at lower output voltage so that the filter or filter needed is relatively small.

2. LITERATURE REVIEW

2.1 *Buck converter*

Buck converter shown in Figure 2.1, the output voltage of the buck converter is always lower than the input voltage. Buck converter consists of one active switch (mosfet) and one passive switch (diode). For low working voltage, the passive switch is often replaced by an active switch so that the shrinkage of power that occurs can be reduced. Both of these switches work alternately. At any time there is only one switch that closes. The average value of the converter output voltage is proportional to the ratio between the time of switching of the active switch to its switching period (work factor) [3][4][5][6]
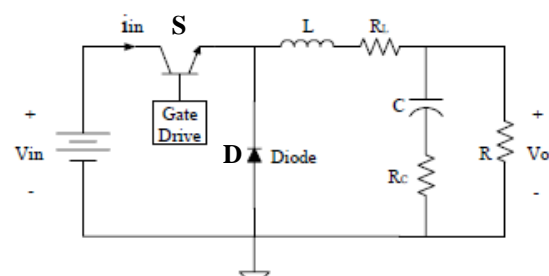
Fig. 2.1 Topology of buck converter

There are three circuit states:
a. Switch S on, Diode D off;
b. Switch S off, Diode D on;
c. Switch S off, Diode D off.

Switch S is controlled using pulse width modulation (PWM) technique. In this circumstance the sawtooth voltage is compared to the DC voltage. If the sawtooth voltage is lower than the DC voltage then the S switch is closed, otherwise the S switch

will open. When the switch is ON, the dynamic current on the inductor IL (t) and the voltage of the capacitor VC (t) can be obtained from the following equation;

$$\begin{cases} \dfrac{di_L}{dt} = \dfrac{1}{L}(V_{in} - v_o) \\ \dfrac{dv_o}{dt} = \dfrac{1}{C}(i_L - \dfrac{v_o}{R}) \end{cases}, \quad 0 < t < dT, \quad Q:ON$$

and when the switch OFF is obtained the following equation;

$$\begin{cases} \dfrac{di_L}{dt} = \dfrac{1}{L}(-v_o) \\ \dfrac{dv_o}{dt} = \dfrac{1}{C}(i_L - \dfrac{v_o}{R}) \end{cases}, \quad dT < t < T, \quad Q:OFF$$

The equation of Buck converter function is written in the form;

$$\frac{\hat{v}_o(s)}{d(s)} = \left(\frac{v_o}{D}\right)\left[\frac{1 + sRcC}{1 + s\left(RcC + [R//RL]C + \dfrac{L}{R+RL}\right) + s^2 LC\left(\dfrac{R+RC}{RL}\right)}\right]$$

2.2 Fuzzy Logic

Fuzzy logic is said to be the old new logic, because the science of modern and methodical fuzzy logic was discovered only a few years ago, when in fact the concept of fuzzy logic itself has been in us for a long time. Fuzzy logic is an appropriate way to map an input space into an output space. The word "Fuzzy" means "vague, vague" and can also mean "fuzzy or impure ideas". Fuzzy logic takes from the second definition, where it starts from an impure idea, then transforms the idea into something pure. This impurity often occurs in a plant system where disturbances from the environment make its variable inputs uncertain. The basic scheme of fuzzy logic can be seen in Figure 2.2. The fuzzy input is a crisp number (declared) expressed in the input set. [8] [9] [10]
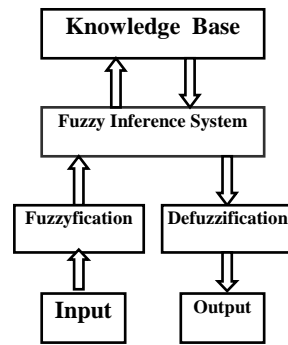
Fig. 2.2 The basic scheme of fuzzy

Fuzzy membership functions there are several kinds:

a. Triangle membership function
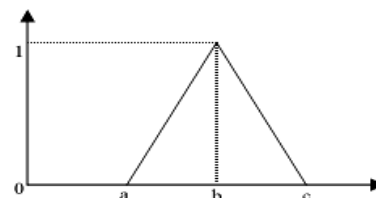
Fig. 2.3 The set of triangular membership functions

$$S(x;a,b,c) = \begin{cases} 0 & for \_\_ x < a \\ (x-a)/(b-a) & for \_\_ a \le x \le b \\ (c-x)/(c-b) & for \_\_ b \le x \le c \\ 0 & for \_\_ x > c \end{cases}$$

b. Trapezoidal membership function
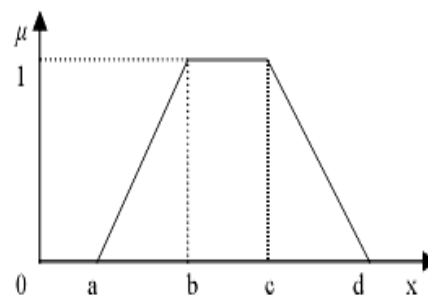
Fig. 2.4 The set of trapezoidal membership functions

$$S(x : a,b,c,d) = \begin{cases} 0 & for \_\_ x < a \\ (x-a)/(b-a) & for \_\_ a \le x \le b \\ 1 & for \_\_ b \le x \le c \\ (d-x)/(d-c) & for \_\_ c \le x \le d \\ 0 & for \_\_ x > d \end{cases}$$

The fuzzy logic control mechanism is shown in Figure 2.5
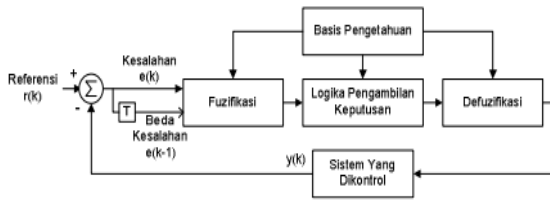
Fig. 2.5 The mechanism of the closed loop fuzzy logic control

Fuzzy logic control uses error e (k) and error change Δe = e (k) - e (k-1). Errors are defined as the difference between the reference and the output measurement values. If the reference voltage and output voltage, then the error voltage can be calculated using the following equation [1] [10] [11]

$$e(k) = v_{ref} - v_O(k)$$
$$\Delta e(k) = e(k) - e(k-1)$$

Fuzzy inference system

Fuzzy inference system is part of the conclusion (reasoning) and decision. Knowledge base contains rules. In general fuzzy rules expressed in the form of 'IF-THEN' which is the essence of fuzzy relation, expressed by R, also called fuzzy implications in basic knowledge can be defined as the set of fuzzy implication phases. If -Then rules consist of two main parts, namely:
a. The antecedent part (premise) is the word between if and then which is the fuzzy input.
b. The consequent part (conclusion) is the word after then which is the fuzzy output.

Thus fuzzy if then rules is the link between the antecedent (fuzzy input) with the corresponding consequent (output fuzzy). So If then rules can be written with:
    IF .... (antecedent)
    THEN .... (Consequent)
    The basic rules of fuzzy are in a general form:
    R: IFx_1 is F_1^1 AND ... AND ... Xn is F_n^1, THEN y is G^1
    Where F_1^1 and G^1 are the fuzzy sets respectively in $U_i \subset R$ and $V \subset R$, and $\underline{x} = (x^1, ..., x^n)^T \in U_1 X .... X U_n$ and $y \in V$ are linguistic variables.

A collection of if-then rules can be made into a table connecting fuzzy input and fuzzy output called Fuzzy Associative Memories (FAM's). The mapping mechanism of fuzzy input to fuzzy output can be mathematically connected with various inference engine methods.

Mamdani Method

In this model the fuzzy rule is defined as:
IF x1 is A1 AND ..... AND .... Xn is An, THEN y is B
Where A1 ....., An and B are linguistic values (or fuzzy sets) and X1 is A1 states that the variable value of x1 fuzzy member set A1
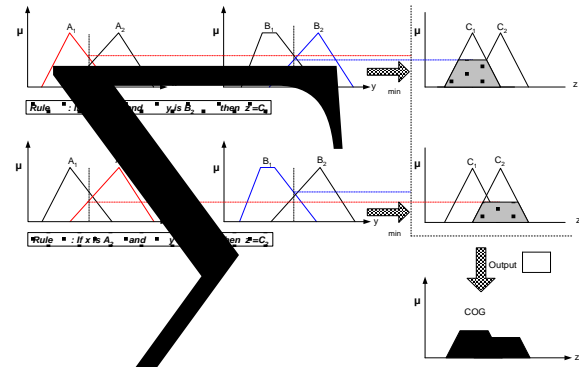
Fig. 2.6 Inference Engine method of Mamdani model

2.3. Atmega16 Microcontroller

Microcontroller is a programmable IC repeatedly, either written or deleted. Usually used for automatic and manual controls on electronic devices. AVR Atmega 16 microcontroller has a fairly complete feature. ATmega16 AVR microcontroller has been equipped with internal ADC, internal EEPROM, Timer / Counter, PWM, analog comparator, etc. The features possessed by the ATmega16 microcontroller are as follows [12]:
a. I / O channels of 32 pieces, namely port A, port B, port C, and port D.
b. Internal ADC of 8 channels.
c. Three Timer / Counter with benchmarking capability.
d. The CPU consists of 32 registers.
e. SRAM of 512 bytes.
f. Flash memory of 8 kb with Read Write Write capability.
g. SPI interface port
h. EEPROM of 512 bytes that can be programmed during operation.
i. The analog comparator interface.
j. USART port for serial communication.
k. 8-bit microprocessor system based on RISC with a maximum speed of 16 MHz.
l. And others.

PDIP

(XCK/T0) PB0 □ 1   40 □ PA0 (ADC0)
(T1) PB1 □ 2   39 □ PA1 (ADC1)
(INT2/AIN0) PB2 □ 3   38 □ PA2 (ADC2)
(OC0/AIN1) PB3 □ 4   37 □ PA3 (ADC3)
(SS) PB4 □ 5   36 □ PA4 (ADC4)
(MOSI) PB5 □ 6   35 □ PA5 (ADC5)
(MISO) PB6 □ 7   34 □ PA6 (ADC6)
(SCK) PB7 □ 8   33 □ PA7 (ADC7)
RESET □ 9   32 □ AREF
VCC □ 10   31 □ GND
GND □ 11   30 □ AVCC
XTAL2 □ 12   29 □ PC7 (TOSC2)
XTAL1 □ 13   28 □ PC6 (TOSC1)
(RXD) PD0 □ 14   27 □ PC5
(TXD) PD1 □ 15   26 □ PC4
(INT0) PD2 □ 16   25 □ PC3
(INT1) PD3 □ 17   24 □ PC2
(OC1B) PD4 □ 18   23 □ PC1 (SDA)
(OC1A) PD5 □ 19   22 □ PC0 (SCL)
(ICP1) PD6 □ 20   21 □ PD7 (OC2)

Fig. 2.7 Configuration pin ATmega16

From Figure 2.7 can be explained the function of each pin Atmega16 as follows:

a. VCC is a pin that serves as a power supply input.
b. GND embeds the Ground pin.
c. Port A (PortA0 ... PortA7) is a two-way input / output pin and an ADC input pin.
d. Port B (PortB0 ... PortB7) is a two-way input / output pin and and a special function pins

Table 1. Special Function of Port B

Pin	Special function
PB7	SCK (SPI *Bus Serial Clock*)
PB6	MISO (SPI *Bus Master Input/ Slave Output*)
PB5	MOSI (SPI *Bus Master Output/ Slave Input*)
PB4	SS (SPI *Slave Select Input*)
PB3	AIN1 (*Analog Comparator Negative Input*) OC0 (*Timer/Counter0 Output Compare Match Output*)
PB2	AIN0 (*Analog Comparator Positive Input*) INT2 (*External Interrupt 2 Input*)
PB1	T1 (*Timer/ Counter1 External Counter Input*)
PB0	T0 T1 (*Timer/Counter External Counter Input*) XCK (USART *External Clock Input/Output*)

e. Port C (PortC0 ... PortC7) is a two-way input / output pin and a special function pin

Table 2. Special Function of Port C

Pin	Special function
PC7	TOSC2 (*Timer Oscillator Pin2*)
PC6	TOSC1 (*Timer Oscillator Pin1*)
PC5	*Input/Output*
PC4	*Input/Output*
PC3	*Input/Output*
PC2	*Input/Output*
PC1	SDA (*Two-wire Serial Buas Data Input/Output Line*)
PC0	SCL (*Two-wire Serial Buas Clock Line*)

f. Port D (PortD0 ... PortD7) is a two-way input / output pin and a special function pin

Table 3. Special Function of Port D

Pin	Special function
PD7	OC2 (*Timer/Counter Output Compare Match Output*)
Pin	Fungsi khusus
PD7	OC2 (Timer/Counter Output Compare Match Output)
PD6	ICP (Timer/Counter1 Input Capture Pin)
PD5	OC1A (Timer/Counter1 Output Compare A Match Output)
PD4	OC1B (Timer/Counter1 Output Compare B Match Output)
PD3	INT1 (External Interrupt 1 Input)
PD2	INT0 (External Interrupt 0 Input)
PD1	TXD (USART Output Pin)
PD0	RXD (USART Input Pin)

g. RESET is the pin that is used to reset the microcontroller.
h. XTAL1 and XTAL2 are external clock input pins.
i. AVCC is the input voltage pin for ADC.
j. AREFF is the input pin of the ADC reference voltage

3. RESEARCH METHODS

This research activity is planned to produce a prototype of Buck converter with 60 VA capability. Stages of activities undertaken to conduct this research can be described as follows

Use at most three levels of headings that correspond to chapters, sections and subsections. The first level headings for chapter titles should be in 10pt, bold, justified, and upper case font. Leave one-blank line before and after the first level headings, respectively.

3.1 Buck converter simulation

In the early stages of this research, Buck converter simulation was performed with the intention to get a good performance in accordance with the desired prototype

3.2 Component Selection

The next stage is to select the design components based on simulations that have been done in the early stages. At this stage a list of required components and their specifications will be obtained.

3.3 Purchase of Parts / Equipment

At this stage the purchase of components / equipment required to implement the Buck converter design model with performance according to expected criteria.

3.4. Assembling

At this stage the assembly is based on the tested development model and the selected components. The results to be achieved at this stage is the assembly of Buck converter prototypes

3.5 Testing

In this stage, the feasibility test of the technical results of the assembly. If the test results do not provide the expected performance, then its required the improvement of the design system. The results to be achieved at this stage is the operation of Buck converter prototypes that can optimize the use of solar energy

3.6 Reporting

At this stage conducted reporting of research results. Reporting of results is made in the form of a report book

4. RESULTS AND DISCUSSION

4.1 Buck Converter Simulation

Before making a prototype buck converter with 60A capability, then first do the design and simulate it. This simulation result is needed to see the characteristics of this type of converter buck
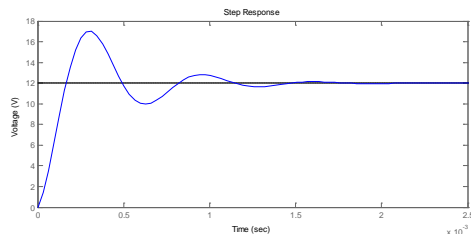
Fig. 4.1 Response system without a controller

Fuzzy logic control uses error e (k) and error change $\Delta e = e (k) - e (k-1)$. Errors are defined as the difference between the reference and the output measurement values
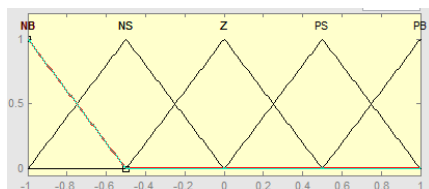
Fig. 4.2 Input variable error (e(k))
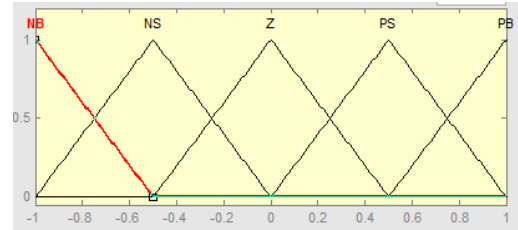
Fig. 4.3 Input variable delta error (Δe)
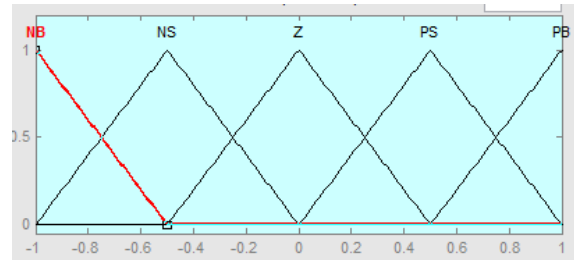
Fig. 4.4 Output variable of pwm
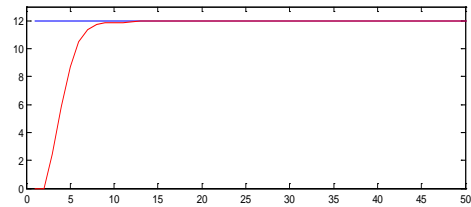
Fig. 4.5 Response system with a controller

3.2 Buck Hardware Converter generated

The following figure shows the hardware of the completed buck converter

Fig. 4.6 Buck Converter circuit

Fig. 4.7 Gate Drive circuit
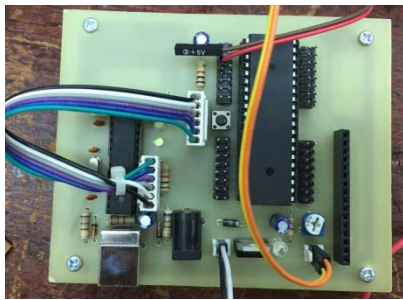
Fig. 4.8 Microcontroller circuit

3.3 Buck Converter Testing
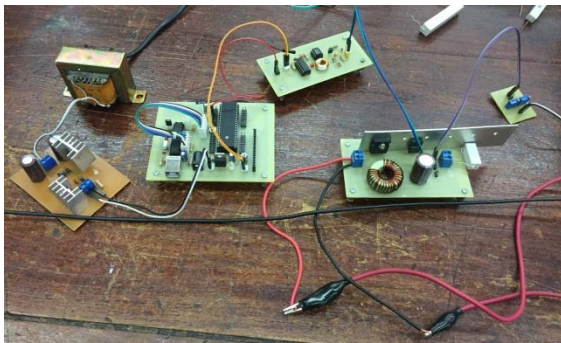
Fig. 4.9 Testing circuit Buck Converter
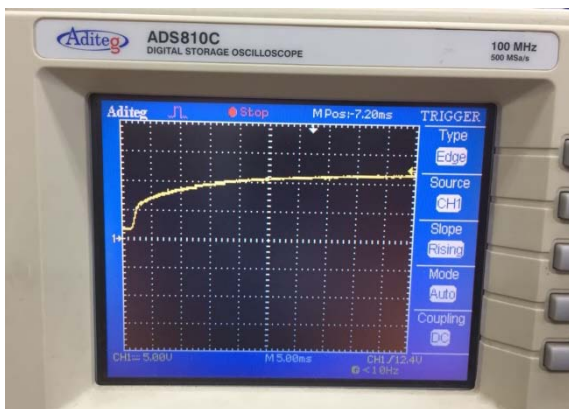
Fig. 4.10 Open loop response output of buck converter without a controller

Figure 4.10 shows the slow system response to the steady-state state, although there is no ripple because the load is too small.

Fig. 4.11 Closed loop response output buck converter with controller

Figure 4.11 shows the rapid response of the system to the steady state, although there is a ripple, it does not result in overshoot. From the picture also seen the output voltage generated is 12.4 VDC.

5. CONCLUSION

The converted buck converter has 24 VDC input with 12 VDC output capability of 60 VA maximum.

Testing a buck converter using a 100 Ohm 5 watt load shows a fairly good response with an output voltage of 12.4 VDC.

This Buck Converter circuit can be used for PLTS system with maximum ability of 60 VA

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A NEW DESIGN OF HANDLESS STIRRED DEVICE

Hanne Aulia and Riki Mukhaiyar

ISPAI Research Group, Faculty of Engineering, Universitas Negeri Padang, Indonesia

ABSTRACT: In Chemistry or Biology laboratories, in term of to get a homogenous liquid, a laborist is used to mix the liquid using a vessel and shakes it for a certain time based on the thickness level required. Sometime, this process should be done several times depend on numbers of reaction needed. Consequence, the laborist has to consume more time in the laboratory if they had more than one liquid mixing process. Based on this condition, nowadays, we can find a device that is able to mix the chemical liquid automatically. The device works by combining a magnetization principle and motorization concept. It is separated into two components which is vessel as a top part and dc motor on the bottom. The bottom one functions as a rotating magnetic motor to drive a magnetic stir bar placed inside the vessel. The bar helps the liquid mixed homogenously. In this paper, this device is improved by providing not only one magnetic drive, but two. Moreover, each drive could rotate into two different directions, right or left, depend on inputting command given by the user.

Keywords: Stirred Process, Magnetic Stirred

1. INTRODUCTION

Talking about chemistry laboratory, the first expression flashes in our mind is a picture of laborists shaking their vessel to mix some chemistry liquid. This activity is practiced to produce a homogenous liquid. Observing the method used by laborist in shaking the liquid, they do it manually by shaking, moving, rounding, even using a stick to mix the liquid inside the vessel/reaction bottle.

These conventional methods often consume more time and energy for the laborist to finish their work. Suppose to, there are five kind of homogenous reactions that should be completed in one term. Since the process is done using both hand, then laborist would finish their work five times more than a normal time. Moreover, in any case, a laborist has to stir his/her two chemistry's bottles to two different directions and speeds. For some people, this job is quite difficult since it requires a good balance with both hands. Hence, an automatic stirring device would be so helpful for all labor participants.

A handless stirred device is created to help lab's participants to stir and mix their chemistry's liquid for homogenous proposed. In a conventional way, a lab participant would occupy their both hand to complete their work. Meanwhile, the purposed device will help the laborist could let the device finish the work awhile they complete another occupations.The device works by combining two basic concepts that are motorized and magnetism. The later concept is used because the device utilizes magnetic bar inside the vessel to mix the liquid inside. Moreover, to drive the bar, a magnet is mounted onto a motor placed under the vessel. So, the bar inside the bottle would be driven at the time the motor is working. [1]. This device works automatically since it would be controlled by user depend to the need.

By utilizing this device, a working in chemistry laboratory would be very helpful. The laborist could perform some works at the same time. Consequence, the time used in the laboratory could be cut significantly.

2. RELATED WORKS

This concept was introduced for the first time by Arthur Rosinger at 1944 [1]. Here, the inventor invented a new tool to help a laborist to mix their chemistry liquid by using a coated bar magnet inside a reaction bottle as a stirrer. In 1917, an inventor named R.H. Stringham had invented an early concept to rotate the stirrer by utilizing a stationary electromagnet in the base of a mixer rather than using a rotating permanent magnet. However, a complete version of a magnetic stirrer was introduced by Salvador Bonet in 1977. Besides, Mr. Bonet also invented a standardized level of a stirring power in "liters of water". This standard is used globally in the market nowadays.

3. PROPOSED METHOD

The idea of this work is to generate an innovative design of an automatic stirrer device for laboratory's purposed. This device is used to mix chemistry liquid inside a reaction bottle to obtain a homogenous solvent handless. Normally, lab's workers do it either by shaking the bottle or stirring it using a stick. This activity consumes more time since the worker has to stick me their work along a time. In this paper, a different concept is purposed to help them by implementing motorizing and magnetic application to create a handless device to stir the vessel of chemistry liquid.

The purposed device utilizes a motor and a magnet stick, placed on top of the motor, asa driver to move a magnetic bar placed inside the vessel. The bar would move at the time the motor is moving because on the top of the motor is mounted a magnet brick. This magnet will drive the magnet bar inside the vessel moving along the movement of the motor. This movement is going to stir the liquid in the vessel automatically.

This product is quite different with the kind found in the market. The idea of this device is as a tool that is able to cover all works of the laborist regarding of their stirring work entirely in the laboratory. What does it mean? The device has two motors that are able to rotate to two different directions separately. Each motor can be operate according to time and speed that are commanded by a keypad. Moreover, this device is also provided with a buzzer as an alarm for the laborist to recognize their stirring process finished.

3.1 Design of Product

The design of this product is illustrated as two below figures. The first figure shows the block diagram of the design. Meanwhile, the latter is a flowchart of the design.
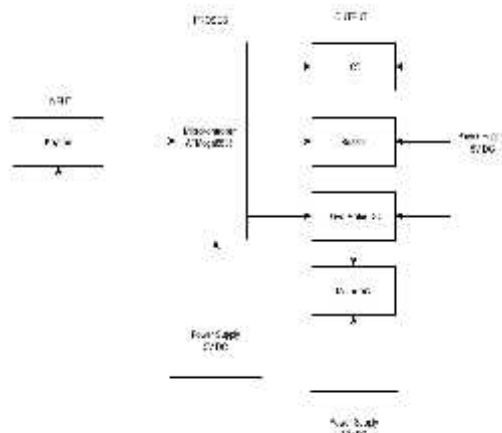
Fig.1 Block Diagram of Design.
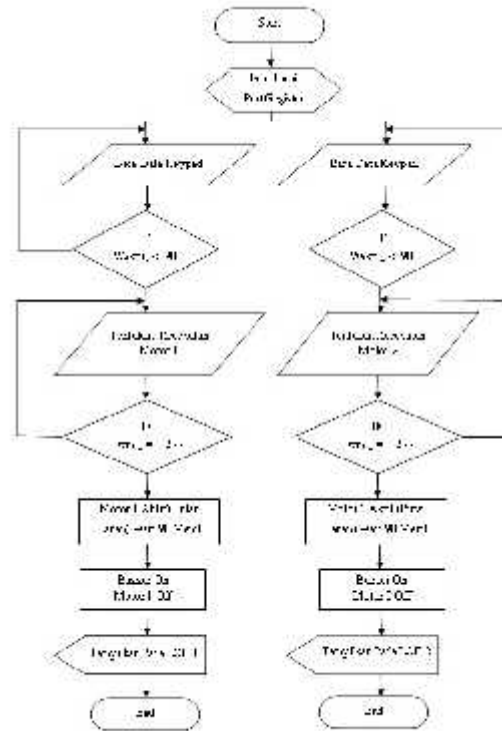
Fig.2 Flowchart of Design.

3.2 Superiority

Compare to an existence product, the idea of the proposed product is to provide a stirring magnetic device that has two motor that is able to rotate separately into two different directions depend on command inputting throwing its keypad. Moreover, the duration and speed of the stirring process could be controlled as well according to the need of the laborist. To give a complete expression of the device, the following picture illustrates the view of the design of the device.
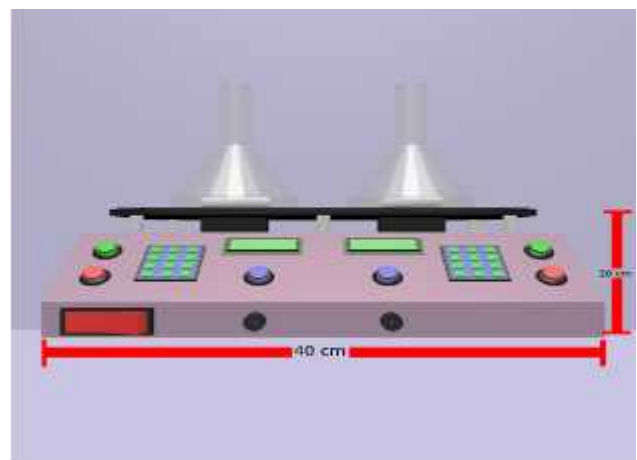
Fig.3 Front View of Design.
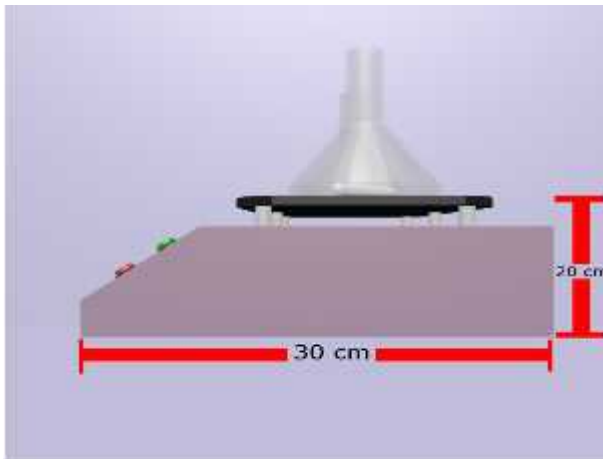
Fig.4 Side View of Design.
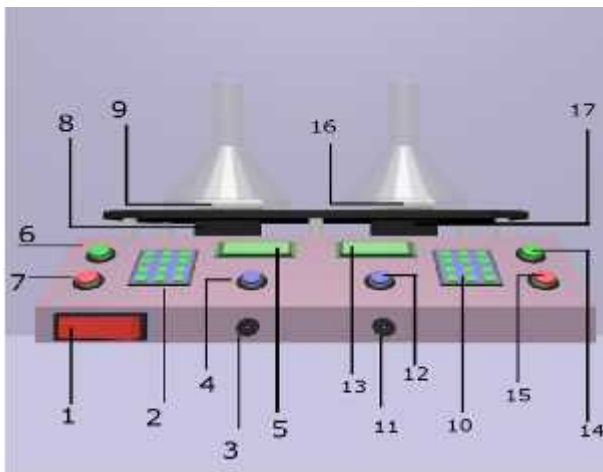
Fig.5 Parts of Design.

As shown in Fig. 5, the detail of each numbers is described in the below.

1. On/Off Button
2. Keypad 1
3. Buzzer1
4. Direction Button for motor
5. LCD as a display
6. Start button 1
7. Stop button 1
8. DC Motor 1
9. Magnet Bar 1 inside the vessel
10. Keypad 2
11. Buzzer 2
12. Direction Button 2
13. LCD 2
14. Start button 2
15. Stop button 2
16. Magnet bar for the second vessel
17. DC Motor 2

4. DISCUSSION

The main aim of the proposed idea is to provide a very helpful device for laborist in stirring or mixing their liquid to obtain a homogenous liquid. So, job after job could be finished completely without worrying the time in laboratory just be consumed for getting a homogenous liquid. Based on this reason, the magnetic stirred laboratory device with two motor working separately is introduces in this paper.

The basic principle of this device is motorization and magnetic. A magnetic bar is put inside a chemistry bottle as a tool to stir the liquid in the bottle. A magnet brick placed on the top of a motor will drive the bar at the time a command throwing a keypad given by user. The user also could select a time and speed of the mixing process depends on the need. The time and speed of the process is adjusted with a kind of reaction process required by the laborist. The following table illustrates the examples of the kind of the reaction process.

Table 1 Kind of Reaction Processes

Items	Reaction Processes		
	Kinds	Time Consumed (second)	Speed Consumed (second)
1	Pb Adsorpton	-	150
2	Fungi Biosorption	-	130
3	Calsium Solvent	>1200	-
4	Sendiment Filterization	35	-
5	Electrolite Adsorbtion	9000	-
6	Extraction of Silver with rate emulsion 1:1	20	1100

5. CONCLUSION

As explained above, the aim of the purposed device is to help a laborist stirring or mixing their liquid handless. So, they could do anything experiment awhile the mixing process is working. Moreover, the device offers a new innovation

regarding to the driving direction of the motor. It can be driven into two different direction depend on the need required by the laborist.

However, in the future research, an upgrade innovation could be implemented as well such as adding a heating element beneath the reaction bottle to warm the liquid inside the bottle. More, number of motor could be added as well to cover many works of stirring and mixing in the laboratory.

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ACADEMIC INFORMATION SYSTEM OF STIKES PERINTIS PADANG

Harleni[1], Marisa[2]

[1]Sekolah Tinggi Ilmu Kesehatan (STIKes) Perintis Sumbar
[2]Jl. Adinegoro KM 17 Simp. Kalumpang Padang

ABSTRACT: The aim of this research is to know how the use of Academic Information System in STIKes Perintis Padang. Academic Information System is a system which is applied to analyze data and a process of academic activity involving students, lecturers, and academic administration officer. It is a qualitative research in which the data collection have been obtained from the observational result and direct interview with the informant such as lecturers, administration staffs, students and other related stakeholders in STIKes Perintis Padang. Moreover, the data were analyzed by using data reduction, data presentation, and drawing conclusion or verification.

Keywords: Information System, Academic, User

1. INTRODUCTION

The national education system is all educational components which relate each other systematically to achieve national education goal. One of the national education goals is the availability of facilities and infrastructure of education to support the educational process.

The use of information technology is one of the facilities which is conducted to support the educational process. The advantage of applying it can be enjoyed by lecturers, students, and university management.

Information technology can be in anything technology which is able to produce information, including computer technology and communication technology (Jogyanto, 2009:3). A technology information system is basically not only about physical forms such as computer and printer but also nonphysical form like software. The role of a human being is also considered as the significant factor of this system. As Abdul Kadir (2003: 70) stated that Primary components of technology information system are hardware, software, and brain ware (human being).

Issue or problem which mostly occurs in the interaction between human being and computer frequently happens in term of misleading about human perception (user) toward software. It may impact on the effectively and efficiently performance which lessen and even nothing. Besides, the user also always has a difficulty in using software since they are not familiar with that. Therefore, the use of information in an organization is hoped to be able in solving the problem and in taking decision applied to a service facility.

Supriatna dan Tjhai (2006:112) stated that in order to make information technology can be used effectively and give contribution toward quality of

work, member of the organization must be able to operate the technology properly. So that, it is important for all member of the organization to understand, comprehend and predict the function of that system. Handoko in Eko (2010:32) said that the application of information technology system generally might be seen from these following aspects. They are data security system, time, accuracy, relevancy, report variation, and physical convenience.

In university environment, the operation of information technology is usually to employ in managing the schedule of lecture, student`s planning of study, and result of student`s learning. The management in academic will be effective and efficient after being helped by information technology in form of Academic Information System (SIAKAD). Relevant to this, STIKes Perintis Padang has applied Academic Information System (SIAKAD) to support academic activity. The utilization of information technology in an institute is really significant in order to make the management of this institute runs effectively and efficiently by conducting Academic Information System (SIAKAD).

Some facilities are provided by SIAKAD such as registration information, student`s personal information, schedule of lecturing, information progress of student`s learning outcomes, recapitulation of student`s academic mark, lecturer`s teaching task, and others statistics data. Moreover, SIAKAD also provides printing facilities for academic purposes.

Academic Information System (SIAKAD) is a system of data processing to assist academic activity process which involving students, lecturers, and academic administrative officer. Academic Information System carries out the administrative process of students in doing academic administration,

in helping students- lecturers interaction which related to the learning process, in running academic administrative process of documents and finance which publish in the process of student`s academic registration. Academic Information System (SIAKAD) is not only a source of information in campus but also as media of communication between lecturers and students, students and others students, lecturers and campus stakeholders, and everyone in the campus area.

Based on pre-research on a preliminary interview with Mr. Andre Ronald (IT STIKes Perintis Padang Coordinator) said that SIAKAD is not fully operated well and is not effectively used by students since there are many students who are late in filling study planning card (KRS). Referring to this problem, researcher limits the case of research. The researcher only focuses on Academic Information System based on COBIT framework in monitor and evaluation domain.

COBIT firstly released in 1996, however, the new version has been established recently. It is 4,1 version, the newest one, which released in 2007. COBIT (*Control Objective for Information and Related Technology*) is a framework and standard of information technology management which are a group of measurement. It has been legalized and approved for information technology management by ISACA and ITGA- a nonprofit organization which concerns about information technology governance (www.isaca.org).

The process of COBIT works in Control Objectives such as monitoring the work, holding a good planning in order to make the organizations interact each other. Furthermore, it can help organization or institute to build, implement, and apply the rules by training and giving an explanation to employees or to whoever related to the work. As the result, the work can be done very well.

COBIT Framework provides referential model process and language which can be understood by management officer to see and operate information technology activities. The application of the operational model of information technology framework is the first way and very important to obtain a good management. To manage information technology effectively, the introducing and defining all activities and risks related to it are needed. These activities are divided into three steps. They are planning, building, implementing, supervising, and evaluating. Consequently, control is required for those information technology processes.

In accordance to the above explanation, the purpose of this research is to find out the utilization of Academic Information System (SIAKAD) in STIKes Perintis Padang and to know the Academic Information System management (SIAKAD) in STIKes Perintis Padang based on COBIT framework in the monitor and evaluate domain.

The previous research which was related and relevant to be a reference for this research is about a lecturing information system by Aditya Sita Mahendra (2012). He concluded that lecturing information system can assist or help Finance Administration Bureau (BAK) to lessen and ease them in managing lecturing data. Furthermore, Chairil Anwar (2009) also stated in his research about Online Academic Information System. This online system has helped everyone such as university`s side and students to support lecturing schedule.

2. RESEARCH METHOD

Based on the purpose of this research, the appropriate method of this research is qualitative research. According to Bogdan in Moleong (2005), qualitative research is defined as an observational process to understand the social problem or human problem relying on the complete holistic picture which is constructed by words. Further, it conveys informant point of view in detail and is arranged in the scientific background.

The result of this qualitative research is descriptive data in the form of written text (words) or oral text and informant behavior as well as all things related that issue.

The research was done in STIKes Perintis Padang in February- April 2013. The preference of this location can fulfill three important elements in deciding and determining social situation research. These three elements are the place of doing research, the actors in the location, and series of activities which were done by the actors in that location (Sugiyono, 2005).

Snowball sampling technique was used to choose the source of data. The researcher was chosen informant who already known about the issue which is examined to complete researcher`s information. The source of data was taken from administration staff, lecturers, students and structural authorities who are competent in their field. There are 7 informants; they are Head Representative I STIKes Perintis Padang, information system operator of STIKes Perintis Padang, Lecturers of Health Analysis, Lecturer of Computer, Students of D III of Health Analysis, Undergraduate Students of Nutrition, and Student of D III of Nutrition.

There are three techniques for collecting data which were applied. Firstly is observation. This technique is to observe the running activities when using and managing academic information system. In

this technique, the researcher conducted participant observation. According to Burhan Bungin (2001), that participant observation is a process of collecting data through observation toward the object of study directly by living, feeling and staying together in the life cycle of the objects.

Secondly is collecting data through documentation of archives, reference books, reports and supporting data related to the research problem. Thirdly is an interview. It is conducted in a direct interview with the informant to dig up information as much as I can which are relevant to the purpose of research.

Verification of the data validity was done in two ways. First is the long observation which means the researcher did observation directly and repeatedly in collecting data. Second is researcher used triangle technique to verify, validate, and check on it.

Data collection is always completed with note-taking. Note taking technique aims to take note result of interview and result of observation. Moreover, the data which have been collected were analyzed in three phases. They are data reduction, data presentation, and drawing conclusion or verification.

Data reduction is a process of choosing that focuses on simplification, abstraction, and transformation of raw data of Academic Information System existing via notes in the field. Then, in the process of analyzing data was presented precisely and clearly so that the data can be read easily. It is delivered in the form of the narrative way and supported by conveying table, diagram, and scheme. Further, in the process of drawing conclusion was done. It began by observing oral data, written data or behavior related to Academic Information System whether they were taken from interview and files documentation. Those data were analyzed and specified to be concluded in the form of complete configuration.

3. RESULT OF RESEARCH AND ITS OUTPUT

Result of the utilization of Academic Information System (SIAKAD) in STIKes Perintis Padang began with collecting information about user`s educational background related to knowledge and skill of information system. The result of an interview taken from informant 05 stated that the last educational background of the user was Senior High School majoring social science. He recognized computer skill and its application from the subject of computer information technique. He also admitted that the utilization of academic information system (SIAKAD) has been held at the beginning of online registration and filling out the students planning card.

Interview with informant 06 had senior high school as his latest educational background. He said that he has achieved instruction and guidelines when he first entered campus as new students. Then, the interview also did with informant 07 who was a graduated student of senior high school majoring social. He stated that before using Academic Information System, campus officer of STIKes Perintis Padang has given socialization of how to operate it when he started as a new student there.

Interview with informant 04, he was a graduated student from Putra Indonesia University majoring system of the computer. Before using Academic Information System, He got training directly from SUTEKI about the way to operate Academic Information System for students personal data. Interview with informant 03, she was a graduated student of Master Degree at Andalas University majoring Biology. She mentioned that she also got training from SUTEKI about the utilization of Academic Information System for lecturer user. Meanwhile, interview with informant 02 who was a graduated student from the undergraduate degree of the computer system could be concluded that he knew about Academic Information System directly from Coordinator of Information System STIKes Perintis Padang for admin. The reason was that he is a fulltime employee started from March 2007 until now. He also learnt Academic Information System through the module.

Based on the above explanation, it can be concluded that user of Academic Information System STIKes Perintis Padang has different educational background and various informants (users) such as students, lecturers, and educational employees. The function and its performance for every user are also different in accordance with the need of each user.

Then, in term of user knowledge about Academic Information System, most of the users have already got the socialization of it. It is important to measure the degree of understanding the system. The result of an interview of informant 04 showed that online bases of Academic Information System which can be accessed easily. He was satisfied to know that he could check his mark (learning outcomes), fill the students planning card, and others facilitation which could help him in running his study.

Informant 02 stated that Academic Information System is a useful tool to help the process of data administration for students, lecturers, and employees. Academic Information System functioned as a tool to save data numerically so that there is no need of special space to spare and no need to worry to waste the time in looking some needed data. You just can go online through Academic Information System. Besides that, informant 03 remarked that basically,

the function of Academic Information System is effective and efficient. Helping students to check and access their learning outcomes every time and everywhere is good. So, His duty as academic administration officer lessens because he did not have to report the students learning outcomes directly to the students one by one.

Meanwhile, from the student point of views such as informant 05, 06, and 07 agreed that Academic Information System is a helpful system in managing registration, student planning card, students learning outcomes and temporary transcription. From here, it can be summarized that the knowledge of user about Academic Information System is good enough since they already know the function of it.

The use of Academic Information System of users required them to know how to operate it. Here are some results of this research related to the given training of the users before applying Academic Information System. According to student's interview, most of them knew the information of this was not from training but from pictures which full of description on operating Academic Information System produced by ICT in announcement board. The reason was that Academic Information System was used in 2014 after they had run the first semester, in which different from students in 2015 who directly got instruction of operating Academic Information System when students orientation hold.

Interview with informant 03 and 04 stated that that got training from SUTEKI. However, informant 02 said that he did not get training from SUTEKI. He got training from Coordinator of Information System STIKes Perintis Padang. Informant 01 stated that because Academic Information System operated in 2014, so they only distribute pictures containing a way of operating Academic Information System for students in 2009 and for newly students 2015, they were given socialization directly when the student`s orientation activity held. Besides, for lecturers and employees, they have got it from SUTEKI training.

Through Academic Information System, it is hoped that users are satisfied because Academic Information System is designed to meet organization needs. The opinions from respondents of Academic Information System are mostly positive. Informant 04 mentioned that he felt satisfied since it helped in his tasks to announce students learning outcomes, to control students of academic guidance in taking their next planning subject for next semester. Informant 03 said, she also felt helped in managing students learning outcomes. Informant 06 said that he was happy to know that he could do registration online. Informant 02 was also satisfied because he was assisted in managing students personal data, lecturers

data, whether recapitulation of learning evaluation or subject of lectures of lecturers per semester.

From the interview with several informants\, the researcher can conclude that most of them are satisfied and felt helpful in applying Academic Information System. It means that the operation and application of Academic Information System in STIKes Perintis Padang is effective in helping and assisting activity of students, lecturers, and employees.

Furthermore, after doing this research, I as the researcher is hoping for the outcome of this research in the form of Proceeding of National Science Seminar in which the abstract has been sent on 2nd September 2017. Then, I can participate in the seminar of communication and information technology in Pelita Harapan University Medan which will be held on 22nd -23rd November 2017.

4. CONCLUSION AND SUGGESTION

Based on the result of research, the researcher can get several things, they are;
1) The use of Academic Information System in STIKes Perintis Padang has been used very well by users
2) By using Academic Information System in STIKes Perintis Padang can help lecturers, staffs, students to access it everywhere online.
3) With this research, it is hoped that the institute can evaluate again the arrangement of using the standard of Academic Information System and can prepare the treatment to against coming issues related to Academic Information System.
4) In accordance with the above research, I can give some suggestion as follows;
5) To the Chief or Stakeholders of the rule can take these results as input and consider this before determining academic rules for the best future. Besides, I hope the supporting facility of Academic Information System can be repaired so that the function can run well and adequately for users.
6) To users of Academic Information System, these results can be a material for self-introspection so that we can be more aware in understanding the instruction of Academic Information System, knowing the rules of Academic Information System and applying this system to achieve good learning process.

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DESIGN OF ELECTROMAGNETIC REGENERATIVE SHOCK ABSORBER AS A TOOL OF HARVESTING VIBRATION ENERGY ON VEHICLE

Hasan Maksum[1], Aslimeri[2], Putra Jaya [3] and Wanda Afnison[1]

[1]Department of Automotive Engineering, Faculty of Engineering, Universitas Negeri Padang
[2]Department of Electrical Engineering, Faculty of Technology, Universitas Negeri Padang
[2]Department of Electronic Engineering, Faculty of Technology, Universitas Negeri Padang

ABSTRACT: This article discusses vibration energy on the vehicles shock absorber which was converted to electrical energy by using magnet and coil. Principally, vibration energy on the shock absorber will be wasted into friction and heat form. But, we are able to obtain the vibration energy and utilize it as a new energy source for the vehicle by adding the mechanism of harvesting energy electromagnetic type. Linear movement of the shock absorber is captured by electromagnetic generator mechanisms which are consist of a coil and a permanent magnet. The produced output of the electromagnetic generator can be used as new energy source for the vehicle. The mechanism of harvesting energy used electromagnetic generator was chosen through literature study that has been done by the researcher. Which was electromagnetic generator has the smallest of loss of energy value of all type of harvesting energy. The testing data which used galvanometer, it was obtained that the resurrection energy was 2.5 mV on 1.5 Hz excitation frequency, 4.24 mV on 2.0 Hz excitation frequency and 5.6 mV on 2.5 Hz excitation frequency.

Keyword: shock absorber, harvesting energy, electromagnetic generator,

1. INTRODUCTION

Based on the data which was obtained on Center for Energy, Transportation and the Environment (CETE), it is known that vehicles will work effectively using 16% of fuel energy from the result of combustion used. The rest 62% will be engine losses in heat and vibration form, 11% engine idling, 6% transmission losses, and 2% from the adding of accessory such as Air Conditioner (AC), wiper, etc. Shock absorber is a component which is used as the pedestal of vehicle's body and to isolate the vehicle from the vibration cause of the road's contour. The changes of mechanism energy happened on the conventional shock absorber (up and down energy of vehicle's body) into heat energy which was happened because the movement of fluid on the shock absorber. Meanwhile, the design changes happened on the electromagnetic regenerative shock absorber which was the up and down energy on the shock absorber captured and changed it into excitation energy to actuate the electromagnetic mechanism which is set on the Shock absorber. So, the loss energy on the shock absorber can be reused. This regenerative shock absorber is expected to be able to keep down the looses energy value on the heat and vibration sector which is 62% until the efficiency value of vehicle increase.

2. LITERATURE REVIEW

There are several studies relate to a Regenerative shock absorber which was used as the background of this article. One of them is Li Chuan, et al [1] with regenerative shock absorber by using hydraulic

rectifier as rectification flow and then go through the hydraulic motor.
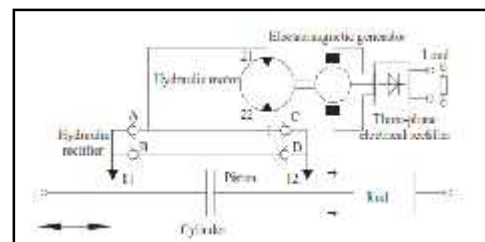
Picture 1. Regenerative shock absorber with a hydraulic motor

Compression and rebound movement of the shock absorber is rectified through a rectifier and then goes to the hydraulic motor. The function of the hydraulic motor is to spin the generator. The source of motor movement on the generator is obtained from the pressure fluid which has come from the rectifier. The generator spin produces electrical energy which is used as a new energy source.

Next, a shock absorber liquid damper type [2] from Indian Institute of Technology.
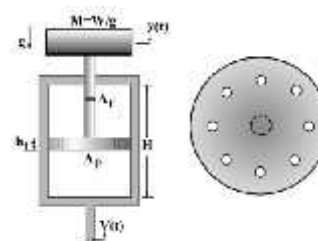
Picture 2. Liquid damper shock absorber

From the test, it was obtained that the damping energy is a nonlinear curve. This is the damping energy's value of the test:
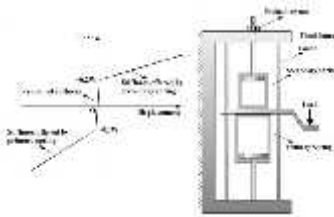
Picture 3. Force dumper curve of liquid dumper shock absorber

Last, HEMSA (Hydraulic Electro Mechanic Shock absorber) from Institut Teknologi Sepuluh Nopember [3]. The following picture is the design of HEMSA from Institut Teknologi Sepuluh Nopember
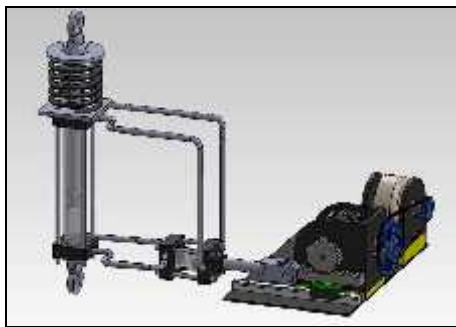
Picture 4. Hydraulic Electro Mechanic Shock absorber (HEMSA) from ITS

From the test with the load 85 , 125 , 250 , it was obtained the resurrection energy on 1.7 Hz excitation frequency in sequence based on the load, are 0,52 watt, 0,39 watt, 0,32 watt. With the cylinder variation 40:40, double port pipe and 85 , 125 , 250 load, it was obtained velocity sprung mass value in sequence based on the load, are 2.270 m/s^2, 2.084 m/s2, 1.744 m/s^2.

Based on those literature sources, the writer was interested to make a regenerative shock absorber with the electromagnetic mechanism. Besides the simple construction design, this electromagnetic system also has a small loss of energy.

3. BASIC THEORY

3.1 Harmonic Vibration

Usually, vibration not only occurs on the spring system nor the prop, the base of the system will also experience the vibration in harmonic vibration form.
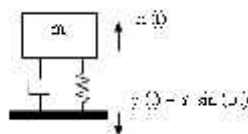
Picture 5. Excitation on the base
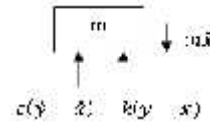
Picture 1. Free Body Diagram excitation on the base

From the free body diagram on picture 5 and excitation on the base on picture 6, the equation of movement that was obtained is:

$$m\ddot{x} + c(\dot{x} - \dot{y}) + k(x - y) = 0$$

The Steady-state response of the mass is $x_p(t)$ which is can be formed into this following equation:

$$x_p(t) = \frac{kY\sin(\omega t - \theta_2)}{[(k-m\omega^2)^2 + (c\omega)^2]^{1/2}} + \frac{\omega c Y \sin(\omega t - \theta_1)}{[(k-m\omega^2)^2 + (c\omega)^2]^{1/2}}$$

So, the system equation above can be written as:

$$x_p(t) = X\sin(\omega t - \theta_1 - \alpha)$$
$$= \left[\frac{k^2 + (c\omega)^2}{(k-m\omega^2)^2 + (c\omega)^2}\right]^{1/2} \sin(\omega t - \theta_1 - \alpha)$$

Where the value of $\theta_1 = tan^{-1}\left(\frac{c\omega}{k-m\omega^2}\right)$

That equation can be simplified into:

$$x_p(t) = X\sin(\omega t - \theta)$$

Where $\frac{X}{Y}$ is displacement transmissibility:

$$\frac{X}{Y} = \left[\frac{k^2 + (c\omega)^2}{(k-m\omega^2)^2 + (c\omega)^2}\right]^{1/2} = \left[\frac{1 + (2\zeta r)^2}{(1-r^2)^2 + (2\zeta r)^2}\right]^{1/2}$$

And,

$$\theta = tan^{-1}\left[\frac{mc\omega^2}{(k-m\omega^2)^2 + (c\omega)^2}\right] = tan^{-1}\left[\frac{2\zeta r^3}{1 + (4\zeta^2 - 1)r^2}\right]$$

The relevance of damping ratio, frequency ratio, and displacement transmissibility is shown in the following graphic:
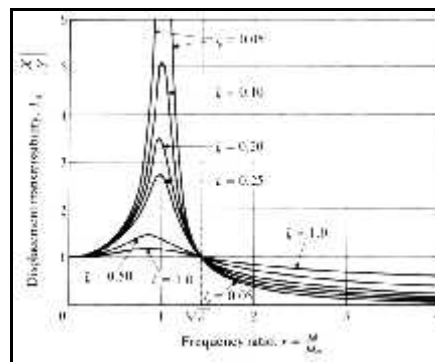
Picture 2. Displacement transmissibility vs frequency ratio

3.2 LOGARITHMIC DECREMENT

Logarithmic decrement is a display of amplitude reduction on free damp vibration. The value of damping constantan on the system will be known if the logarithmic decrement ( ) is also known.
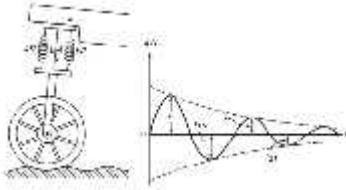
Picture 8. System 1 DOF on vehicle's shock absorber with its damper and system experiment analysis

From the picture above, t is known as time on the first and second peak, x_1 dan x_2 show the peak movement, and form the ratio:

$$\frac{x_1}{x_2} = e^{2\pi\zeta/\sqrt{1-\zeta^2}}$$

If both parts of logarithm were naturalized, it will be:

$$\delta = \ln\frac{x_1}{x_2} = \frac{2\pi\zeta}{\sqrt{1-\zeta^2}}$$

The equation above can be written as:

$$\zeta = \frac{\delta}{\sqrt{(2\pi)^2 + \delta^2}}$$

From displacement graphic, the function of time will be obtained from x_1 and x_2, and then the value will be included in decrement equation, so the equation will be:

$$\zeta = \frac{\delta}{\sqrt{4(\pi)^2 + \delta^2}}$$

Where: = damping ratio

= logarithmic decrement = $\ln\frac{x_1}{x_2}$

The value of damping ratio can be found by using this formula:

$$\zeta = \frac{C}{C_c} = \frac{C}{2\sqrt{km}}$$

Where: k = Spring content (N/m)

C = Damping constant damping

m = Load mass (kg)

3.3 The effect of vehicle's velocity toward human

The main movements that were experienced by the driver and passenger during the ride are velocity or deceleration and vibration. Endurance information about human body toward the velocity is very important as references on the endurance of vehicle's body design toward the impact.

The pleasure criteria based on velocity number according to ISO 2631 standard, will be shown in this following graphic:
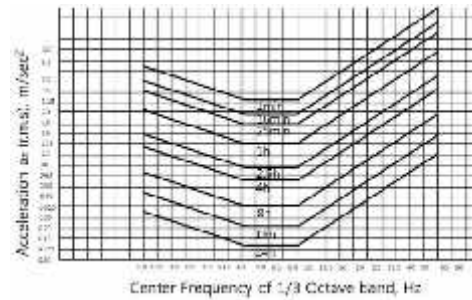
Picture 9. The pleasure criteria graphic based on ISO 2631 standard

3.4 Loretz Law

The permanent magnet array of regenerative the electromagnetic shock absorber is connected to wheel axles of the vehicle and the coil windings array is connected to the framework or body of the vehicle. When the vehicle travels on rough roads, the relative displacement between framework or body and wheel axles causes relative displacement between coil windings array and permanent magnet array. At this point coil groups will be cutting the magnetic induction lines in the air-gap, thus current occurs in the coil and in the meantime damping force occurs correspondingly. The direction of the damping force is relatively opposite to the movement of the coil group. When the conductor moves perpendicularly to the direction of magnetic induction line, the Lorentz force can be defined as:

$$F = q \cdot V \cdot B$$

Where: F = Lorentz force (N)

q = quantity df electricity (C)

V = Velocity of electric charge (m/s)

B = Magnetic flux density (T)

4. DESIGN AND PARAMETER

4.1 Coil

The coil is used as a track movement of the permanent magnet. This coil will capture GGL from the result of magnet movement in it. This is the design of coil RS:

Picture 10: Coil

4.2 Permanent Magnet

This magnet is used as a moving component which is installed in the rod shock absorber. The rod movement which was installed the permanent magnet on the coil will cause the electricity force. This is the construction of permanent magnet on the rod shock absorber.

Picture 11: Permanent magnet

4.3 Full design concept

On this part, it is shown that the mechanism of harvesting energy attachment on the up and down rod movement which pass the coil.

Picture 12: Component detail RSA

When it assembled and ready to test:
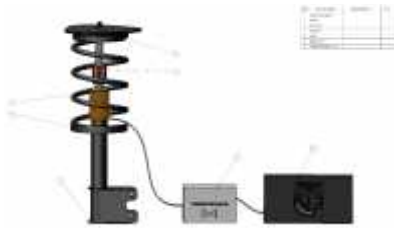
Picture 13: RSA assembly ready to test

4.3 Research Methodology
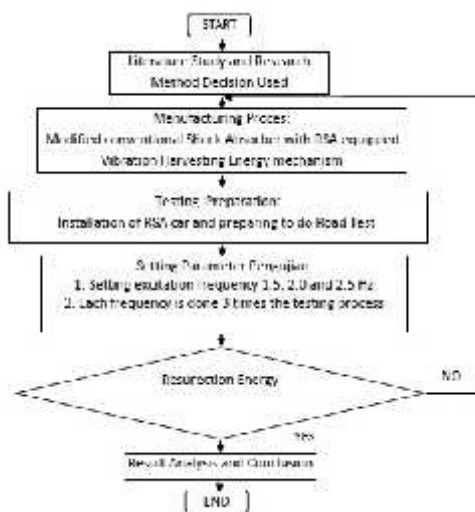
Picture 14: Research Methodology

5. RESULT

From the road test by using bump 50 mm high to replace the road surface, the resurrection energy that was obtained on RSA are:

No	Frequency	Energy Ressurection			
		Test I	Test II	Test III	Average
1	1.5 Hz	2.3	2.6	2.5	2.5 mV
2	2.0 Hz	4.30	4.37	4.1	4.24 mV
3	2.5 Hz	5.4	5.8	5.6	5.6 mV

6. CONCLUSION

The resurrection energy from RSA is relatively small. It was caused by the limitation of the step length of the "stroke" area from the permanent magnet on passing the coil area. To wider the length of its step, we need to do a redesign and choose better material in order to get bigger resurrection energy.

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THE EFFECTIVENESS OF USING POSTER AND VIDEO MEDIA IN EDUCATION ABOUT DANGERS OF SMOKING ON KNOWLEDGE AND ATTITUDES OF SENIOR HIGH SCHOOL 12 PEKANBARU STUDENTS

Hastuti Marlina[1], Reno Renaldi[2]

Faculty of Engineering State University of Padang

ABSTRACT: Based on Worl Health Organization (WHO) estimates of smokers in the world of 1.3 billion, in Indonesia teenage smokers (> 15 years) amounted to 36.5%. Therefore need prevention and fighting for smokers among teenagers is reduced. One of them by providing information through counseling to students of senior high school 12 Pekanbaru. The purpose of this research is to know the effectiveness of using poster and video media in education about danger of smoking on knowledge and attitude of senior high school 12 Pekanbaru students. Quantitative research type with quasi experimental design (one group pre test and post test). The population of all students of class X and XI are smokers. A sample of 82 people was taken with a sampling census technique. Analysis using T-test. The result of this research is got difference of mean value of knowledge of student which given counseling using video media that mean rank 14,60 bigger value compared to mean rank media of poster that is 13,98. The mean difference of the students' attitudes attituded to using video media means the mean rank 22, 90 is greater in value than mean rank of media poster 22, 58. This means that the counseling media use the video more effectively in the delivery of hazard education to increase the knowledge and attitude of the students of senior high school 12 Pekanbaru.

Keywords: Poster, Video, Knowledge, Attitude, Smoking

1. INTRODUCTION

Smoking behavior is a national and world problem. World health organizatition (WHO) considers smoking behavior has become an important issue for the whole world. One of its obvious forms is the WHO establishing May 31, 1998 as the world's no-tobacco day and so on commemorating annually on May 31[1].

Recorded approximately 1.3 billion smokers worldwide, 84% of them in developing countries, whereas in developed countries are happening just the opposite[2]. Age was first smoked at age 5-14 years of 19.2%, at age 15-19 of 43.3%. At the age of 20-29 of 18.9% and at age> 30 years of 3.9%, while the remaining non-smokers are only 14, 7%[3].

Considering the high rate of cigarette consumption in adolescence and productive age, the Ministry of Health of the Republic of Indonesia has issued a communication warning communication strategy such as through media poster and video. In early January 2014 the government issued PP no. 28 of 2013 on the regulation of health warning in the form of picture and writing has been applied to the advertisement media, the government requires that all cigarette packs in circulation include pictures of damaged organ condition through the scary picture it is expected that the number of active smokers in Indonesia can be suppressed[4].

Media Poster and video is an effective medium in adding knowledge and changing one's attitude. In the study [1] pre intervention knowledge was 0.45% with a standard deviation of 0.502%. While knowledge on post-intervention is 0.85% with a standard deviation of 0.361%. There was a difference of mean value between pre intervention knowledge and post-intervention knowledge of 0.4% with a standard deviation of 0.41%. T-test results obtained p value = 0.000 and it can be concluded there is a significant difference between pre and post-intervention knowledge. This means that the poster is effective to increase the knowledge of the head of Meranti Pandak urban village, and it can be seen p value <from 0.05.

However, the increasingly widespread government disseminates the message of picture health warning through posters media, packing of cigarette pack and video, does not mean decreasing cigarette consumption, based on preliminary survey conducted by researchers at senior high school 12 Pekanbaru students, there are still many students who smoke well in school environment as well as outside school. In fact, the picture health warning message through the media poster and video has been displayed and socialized in various places.

This makes the researcher interested to do research about the effectiveness of the use of media

poster and video on the education of danger to the knowledge and attitude of students of senior high school 12 Pekanbaru.

2. RESEARCH METHODS

This study uses Quasi Experiment (one group pre-test post-test) students are all students of class X and XI are smokers. The sample was 82 people divided into 2 groups, group A consisted of 41 people who got the danger of smoking using poster media and group B consisting of 41 people who received education about danger of smoke using video media. The analysis used is univariate and bivariate, statistic test used is T-test.

3. RESEARCH RESULT

3.1 Univariate Analysis

Level of knowledge of students before being given penyapandengan media poster, low knowledge

students as much as 21 people (51.2%). After being given extension with the poster media about smoking danger messages, knowledge of low-knowledge students decreased to 2 people (4.9%).

Whereas the knowledge of students before being given penyanjandengan video media, low knowledge students as many as 28 people (68.3%). After being given extension with video media about smoking danger messages, knowledge of low-knowledge students decreased to 17 people (41.5%).

In the attitude change of students before being given extension with media poster, students with negative attitude were 34 people (82,9%). After being given extension with the poster media about smoking danger messages, students with negative attitudes decreased slightly to 32 (78%).

While the attitude of students before given counseling with video media, students with negative attitude as much as 40 people (100%). After being given extension with video media about smoking danger messages, students with negative attitudes decreased to 16 people (39%).

Table 1 The difference in the mean score of the students' knowledge score after being given Dissemination of the dangers of smoking with media poster and video

Knowledge	Mean rank	Pvalue
Poster	14,20	0,046
Video	14,68	0,000

Table 2 The difference in the mean score score after the student attitude given the extension of the dangers of smoking with media poster and video

Attitude	Mean rank	Pvalue
Poster	22,98	0,497
Video	22,67	0,003

3.2 Bivariate Analysis

Based on T test results can be seen that the average score of knowledge after the given media poster is 14.20 with pvalue value 0.046 So also with the average score after the given value with the video media is 14.68 with p value 0.000. This means that media poster and video media are effective in delivering messages of danger of smoking to increase the knowledge of students.

While the poster media is not effective against changes in student attitudes. While the average score after the given video media is 22.67 with p value 0.003 <0.005. This means that effective video media in the delivery of smoking danger messages to changes in student attitudes

4. DISCUSSION

4.1 Effectiveness of media use of posters and video media on smoking hazard education to students' knowledge

From the research result, it is found that there is difference of mean of knowledge value of student after giving counseling either with media of poster or video media where mean rank with video media that is 14,60 bigger than mean rank with media poster that is 13,98. The results of this study prove that the video media show more effective results in increasing students' knowledge about the dangers of smoking.

As outlined by the research of experts[5], the senses that channel the most knowledge into the brain are the eyes. Approximately 75% to 87% of human knowledge is acquired and channeled through the

eye. The other 13% to 25% are channeled through the other senses.

So the use of media (video) in health promotion activities is a very appropriate media in improving students' knowledge because by using the video not only but also can be heard, and not only that the video can also present information, describe the process, explain the concepts that complicate, teach skills, shorten and slow down time and influence attitudes.

This research is in line with Fatimah's research[6] shows that the result of research analysis of influence of nutrition counseling balanced with video media and poster to the knowledge and nutritional status of elementary school students showed a significant influence with p = 000 or p <0,05 meaning influence. Where video media is more effective in improving knowledge dibangdingkan with media poster.

Then the results of this study are also in line with research conducted by Kurniawati[7] which states that the video media is better than the media leaflets to improve the knowledge of pregnant women about how to deal with complaints during pregnancy in RSUD Surakarta

4.2 Effectiveness of media use of posters and video media on smoking hazard education on student attitudes

From the research result, it is found that there is difference of mean of attitude attitude of student after giving good counseling with media of poster and video media where mean rank with video media that is 22,90 with p value 0,003 <0,05 mean rank with poster media 22,58 with p value 0.497> 0.05. The results of this study prove that the video media show more effective results in the positive attitude changes of students about the dangers of smoking.

According to Notoatmodjo[8]. attitude is a reaction or a person's response to a stimulus or object. That attitude can not be directly seen, but can be interpreted first from a closed behavior. Changing a person's attitude is a very difficult thing to do, because it requires a continuous stimulus and takes time in the process. In the provision of stimulus or stimulus, an effective and appropriate communication media needed to change a person's attitude according to what we expect.

The video media is an effective medium in changing attitudes. According to Sadiman[9]. the video has several advantages including the message delivered quickly and easily remembered, developing the imagination, clarify the abstract and provide a more realistic explanation.

The use of audio-visual media (video) in health promotion activities is a very appropriate media in improving the knowledge and attitude of students,

because the video is not only seen but also can be heard, and not only the video can also present information, describe the process, explain the concept -complicated concepts, shorten and slow down time and affect attitudes.

This study is in line with the July study in Sustainable Lestari[10]. states audiovisual media rely on hearing and sight of the target, where audiovisual use involves all the means of the sense of learning, so that the more sensory devices involved to receive and process information, the more likely the contents of the extension can be understood and retained in memory.

This research is also in line with Purniawan on the effectiveness of poster media and audio visual media (video) on smoking behavior in the home, which states that audio visual (video) is more effective in attitude change. This is indicated by the value of P value 0.003 <0.005[11].

5. CONCLUSION

1) There is difference of mean value of student knowledge after giving good counseling with media of poster and video media where mean rank with video media that is 14,60 bigger value compared to mean rank with media poster that is 13,98. The results of this study prove that the video media show more effective results in increasing students' knowledge about the dangers of smoking.

2) There is difference of mean value of attitude of student after giving counseling either with media of poster or video media where mean rank with video media that is 22,90 with p value 0,003 <0,05 mean rank with poster media 22,58 with p value 0,497 > 0.05. The results of this study prove that the video media show more effective results in changes in student attitudes are good about the dangers of smoking.

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A MODEL PREVENTIVE MAINTENANCE CONTROL OF MACHINE TURNING IN THE MACHINING WORKSHOP

Hefri Hamid [(1)], Nizwardi Jalinus [(2)], Syahril[(3)], Ambiyar[(4)], Febri Prasetya[(5)],

[(1)],[(2)],[(3)],[(4)]Jurusan Teknik Mesin, Fakultas Teknik, Universitas Negeri Padang
Kampus Air Tawar, Padang 25131, Indonesia

ABSTRACT: The use of machines in relatively long conditions result in decreased engine capability. Avoiding the occurrence of such preventive maintenance is necessary as an attempt to prevent early onset of sudden damages. this paper aims to produce preventative maintenance of Turning Machine. This descriptive research using survey method to Machine Tool Machining, which make Model of maintenance with PMC System. Data retrieval begins by creating a Machine layout plan. Record the machine is done by giving a code or symbol on the location of the machine, machine name, machine type, machine number. Data collection by generating the main Component number, writing the name of Component Part, includes maintenance actions: checking, cleaning, lubrication, locking, adjusting, replacing the consumable components, determining the time duration schedule, tools and materials used. The result of the research is a table of PMC system maintenance model used as a guidebook or guidance in doing preventive maintenance of Machine Turning in Workshop of Engineering Technique of Engineering Faculty of State University of Padang. So officers are not negligent in doing Machine Turning maintenance with the manual of care.

Keywords: Model, Preventive Maintenance Control, Machine Turning, Workshop.

1. INTRODUCTION

The Production Technology Laboratory has of Machine Tools such as Turning Machine, Frais Machine, Shaping Machine, Drilling Machine, and Grinding Machine. To maintain machining machine Turning condition found in Workshop, a controlled care model is needed. The model is a reference that can be an example to judge a particular system of things to be produced or a plan or description that describes an object or concept in the form of simplification.

To be able to perform an effective and efficient achievement in care it is necessary to model the care and anticipate when it is necessary to repair machinery or equipment and when necessary maintenance to prevent damage to machinery or tools for production [9]. Disorders on the machine can also arise due to the inability of the operator to perform the maintenance activities of the machine simply, the operator does not have sufficient technical knowledge about the machine operated, unable to control the machine at work and negative mental attitude, such as consider machine not own so operation is not really.

Treatment is an activity necessary to maintain or maintain the quality of maintenance of a facility so that the facility can still function properly in ready-to-use conditions [1]. In order to avoid damage, a well-planned lathe maintenance model is planned and it is expected that the lathe in the mechanical engineering workshop is always in good condition and suitable for use according to the standard [5].

The use of machines in relatively long conditions will result in decreased engine capability. To avoid such occurrence, preventive care is required. Preventative care is good, then the sudden damage can be reduced, and emergency work can be avoided. Preventive care is an effort undertaken to prevent premature occurrence of sudden damage with the aim of reducing the cost of repair, improving the quality and quantity of the work, and emergency care work can be avoided [7]. Damage to the engine hinders the officer to complete the tasks assigned. Preventative preventive maintenance is the maintenance of machines carried out under a program of Care made in a planned manner with a computer system. A planned maintenance system applied to mass industry such as preventive maintenance control (PMC) and total productive maintenance (TPM) [3]. TPM is a maintenance program that is done based on the amount of production or reaches the specified production target while PMC is a maintenance program that is done based on machine layout, machine type, machine type, machine name, machine name or part number and maintenance action to be performed. Each machine and component gets a maintenance turn in accordance with specified time intervals in such a way that major damage can be avoided. The importance of the PMC model can control the

engine and engine components so that the engine conditions are ready for operation or road [2].

The purpose of this research is to Produce Preventive maintenance control on Turning machine to keep machine condition optimally, prevent fatal damage, minimize maintenance cost and extend machine life or age.

2. BASIC PRINCIPLE OF TURNING MACHINE

The machine is a composite or arrangement of various parts of machine elements each of which has a certain role, which is then together to gether so that it can function as a tool or machine. While the so-called equipment is a series of components both main and auxiliary parts, whose form consists of several series of components mechanically and electrically. Equipment is lightweight, can serve as a tool, and can be carried or moved.

Machinery and equipment for laboratory and workshop practice have some basic characteristics, namely:

1) The driving force.
2) Control system or controller.
3) Sled track system.
4) Lubrication system.
5) Machine foundation system.

Viewed from the system works machine and workshop equipment can be divided into:

1) Work system uses mechanical principles.
2) Work system uses electrical principles.
3) Work system uses hydraulic and pneumatic principles.
4) Work system using optical principles.
5) Work system uses a combination of mechanical and electrical principles.
6) Work system uses a combination of mechanical and hydraulic and electrical principles.
7) Work system uses complex composite principles.

2.1 Machine Turning Construction

Machines and equipment using mechanical principles are found in many workshops. The main driving force of these machines comes from electric power. Construction of Turning Machine as follows:
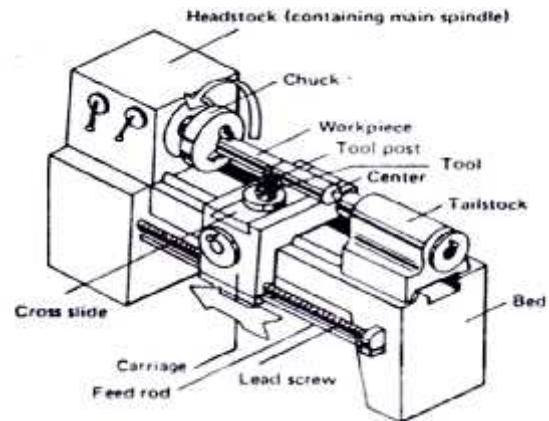
Figure 1. Main Machine Turning Components

2.2 Maintenance Objects

The main objective of machine maintenance is to take care of all machine components, in general the machine components consist of two groups:

2.2.1 Fixed component groups
That is a silent component that does not move when the machine is operated.

2.2.2 Group of moving parts
That is the machine component that moves (straight or spinning) when the engine road. This component is also called a transmission component that serves to continue the movement of a straight direction or a rotating direction movement.

2.3 Role Of Maintenance

Position or position of care as a supporter of smooth production by reducing the bottlenecks as small as possible so that the system can work efficiently. Position of the role of care as follows:

1) The maintenance function is related to the production process.
2) Position of care as supporting or supporting.
3) Production equipment can be used continuously, this is the result of treatment.
4) Maintenance activities will always be related to equipment, machinery, and other facilities.
5) Maintenance activities should always be controlled.
6) Treatment work is generally required when:
   a) The lowest facility quality limits are allowed.
   b) The duration of use of the facility or referred to as the life of the wearer.

2.4 Machine Turning Engineering Techniques

2.4.1 Corective maintenance
That is the method of maintenance of the machine by repairing the damaged component one

or several components (heavily damaged until the machine can not operation).

2.4.2 Preventive maintenance

That is the method of treatment performed to prevent the occurrence of sudden machine damage or activities to maintain and maintain equipment facilities before going crashed when operated or are in production.

1). Routine and priodic preventive maintenance
Preventive maintenance techniques can be divided into two ways, namely:
a) Routine preventive maintenance.
b) Priodic preventive maintenance.
2). Planned preventive maintenance
Maintenance of machines carried out under a carefully planned care program. The planned maintenance system applied to mass industry such as: Preventive Maintenance Control (PMC) and Total Productive Maintenance (TPM). The maintenance program is based on the location of the machine layout, machine type, machine type, name or machine number, the name or number of machine parts and maintenance actions to be performed. Precautionary treatment actions are: Lubrication, Cleaning, Setting, Checking, Replacement, Locking [6].

2.5 Preventive Models Of PMC System

Model is a plan or description that explains an object or concept in the form of simplification. PMC is a treatment performed on machine components in order to get a turn Controlled care is required Care job planning. Here is an example of assigning a machine identity:
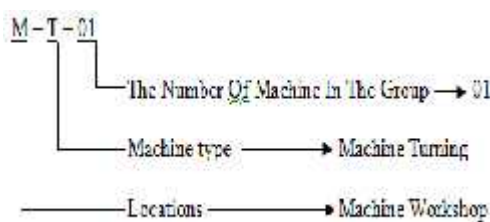
2.6 Lubrication

Efforts to reduce wear due to frictional forces, it is attempted between the two fringing surfaces to be lubricated. so that the surface does not occur direct contact. The lubricant has a function as a frictional refiner [10].

2.7 Concep Framework

Efforts to keep the engine condition optimally and maintain the work of the machine to be ready to

use and prevent the fatal damage to the production process is not hampered then made Model (PMC) Preventive Maintenance Control to the components of the lathe to be treated, by determining the Maintenance action on each component machine turning.

3. RESEARCH METHODOLOGY
.
3.1 Research Instruments

This descriptive researcher used survey method [8]. to the Turning Machine which is in need of preventive maintenance measures so that the possibility of damage can be minimized.

The planned care research with the PMC system is based on data such as the following:
1) Make layout plan layout and machine layout.
2) Record the machine by coding or symbolizing the location of the machine.
3) Record the machine by coding or symbolizing the name of the machine.
4) Record the machine by coding or symbol of the machine type.
5) Record the machine by coding or symbol of machine number.
6) Record the machine by naming the main component of the machine.
7) Record the machine by naming the machine part component.
8) Include maintenance measures: against each component part.

3. 2 Actions Maintenance

1. Examination.
2. Cleaning.
3. Lubrication.
4. Locking.
5. Setup.
6. Reimbursement.

3. 3 Research Procedures
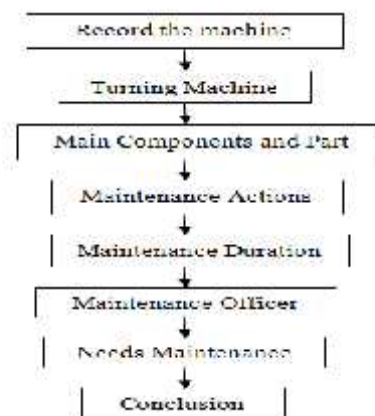
Figure 2. Flow Diagram Of Research Procedure

4. RESEARCH RESULTS AND DISCUSSION

4.1 Recording and Identification Of Turning Machine Components

Record the machine is done each component of the machine to get treatment action. Identification of machine components means to know the machine and its main components [4]. How to recognize a machine like table 1.

Table. 1 Machine Turning Identity

No	Machine Location Code			Machine Name		Machine Type		Machine Number
	Workshop	Code	Name	Code	Name	Code	Name	
	1	2	3	4	5	6		7
1	Machine Workshop	M	Turning	T	Mano	01		01
								02
								03
								04
								05
								06
								07
								08
2					Maxi mat super 11	02		01
								02
								03
								04
								05
								06
								07
								08
								09
								10

4.2 Main Components

The main components are parts of machine components that are still in the form of a series or a combination of several component parts.

Table 2. Main Component Code of Turning Machine

No	Machine Name	Main Component		Part Component
	1	Name 2	Code 3	Name 4
1	Mana Machine Turning	Electrical control	01	1. Electric circuit
		Energy shaker	02	1. Motor 2. Couple 3. Stakes (pen) 4. Pully 5. Binder bolts
		Transmission	03	1. Pully 2. V belt 3. Stakes (pen) 4. Binder bolts
		Gear box	04	1. Bake oil 2. Lubricant oil 3. Primary Spindle 4. Bering 5. Gear 6. Gear shaft 7. Stakes (pen) 8. Transmission handles 9. Binder bolts
		Lifting gears	05	1. Gear 2. Binder bolts 3. Gear shaft 4. Support arm

4.3 Part Components

Components of parts are machine components that can not be separated from the main component circuit. In the component parts are included machine code and component parts. Like table 3.

Table 3. Part Component

No	Machine Code 1	Part Component 2
1	M.T.01.01.01	1. Electric circuit
2	M.T.01.01.02	1. Motor 2. Couple 3. Stakes (pen) 4. Pully 5. Binder bolts
3	M.T.01.01.03	1. Pully 2. V belt 3. Stakes (pen) 4. Binder bolts
4	M.T.01.01.04	1. Bake oil 2. Lubricant oil 3. Primary Spindle 4. Bering 5. Gear 6. Gear shaft 7. Stakes (pen) 8. Transmission handles 9. Binder bolts
5	M.T.01.01.05	1. Gear 2. Binder bolts 3. Gear shaft 4. Support arm

4.4 Maintenance Implementation

Implementation of the treatment is the scheduling of each treatment action on the machine parts part of the tool. Machine tool maintenance action is a job done in machine maintenance to prevent damage. Measures in preventative maintenance are checking, cleaning, lubrication, locking, adjustment and replacement.

Table 4. Preventive Maintenance Action Code

No	Machine Code 1	Part Component 2	Maintenance	
			Maintenance action 3	Code 4
1	M.T.01.01.01	1. Electric circuit	Examination	01
			Cleaning	02
2	M.T.01.01.02	1. Motor	Examination	01
			Cleaning	02
		2. Couple	Examination	01
			Cleaning	02
		3. Stakes (pen)	Examination	01
			Reach	05
		4. Pully	Examination	01
			Setur	05
		5. Binder bolts	Examination	01
			Locking	04
3	M.T.01.01.03	1. Pully	Examination	01
			Setur	05
		2. V belt	Examination	01
			Reach	05
		3. Stakes (pen)	Examination	01
			Setup	05
		4. Binder bolts	Examination	01
			Locking	04
4	M.T.01.01.04	1. Oil bath	Examination	01
			Cleaning	02
		2. Lubricant oil	Examination	01

The above machine tooling machine data is made in the form of PMC system tables to control the main components and machined parts of machine tool parts. So that the engine conditions remain optimal and avoid heavy damage. Table 5 is a model table of PMC system results.

Table 5. Machine Turning Maintenance Model

PREVENTIF MAINTENANCE SYSTEM PMC	PRODUCTION MACHINE
LAYOUT CODE MACHINE	M
MACHINE NAME	TURNING
TYPE OF MACHINE	MARRO
ENGINE NUMBER NUMBER	01
DATE OF EXAMINATION	28-5-2015

No	Machine Identity	Main Component Code	Part Component Name	Maintenance Action Code	Duration of maintenance		Maintenance Officer	Tool	Material	Control		Information
					Schedule	Time				Yes	No	
	1	2	3	4	5	6	7	8	9	10	11	12
1	M.T.01.01	01	1. Electric circuit	01	Year	23 december every year	Member					
				02	Year	23 december every year	Member	Brush				
		02	1. Motor	01	Semesterly	1 feb and 1st of August	Technician					
				02	Semesterly	1 feb and 1st of August	Technician	Brush				
			2. Couple	01	Semesterly	1 feb and 1st of August	Technician					
				02	Semesterly	1 feb and 1st of August	Technician	Brush				
			3. Stakes (pen)	01			Member					
				06			Member		Stakes Pen			
			4. Pully	01	Semesterly	1 feb and 1st of August	Technician					

4.4 Discussion

The preventive maintenance model of the machine tool PMC machining system should be based on machine location data or machine location. The machine that was recorded in this research lies on the machine workshop (machining workshop). In the data collection that should be noted is the location of the machine, the name of the machine, the type of machine, the main component, the component parts, the maintenance measures, the duration of care, the maintenance officer, the tools, the materials, the control and the description.

Implementation of treatment is made based on preventive maintenance measures, such as checking the condition of the lubricant in the gearbox, checking the coolant in the container. Cleaning such as cleaning the parts of dirty or dusty engine components by using diesel and brushes include cleaning the body of the machine, cleaning the machine sleeve. Lubrication such as lubricate gears with oil, lubricate bering with gemuk. Locks such as locking bolts or longitious nuts include locking the foundation bolt, locking the bolt on the rotary handle. Setting such as setting the head off in line with the loose head cushion line, adjusts the pulley strain of the engine so that the v-belt is not lax.

Changes such as lubricating oils on the gearbox, changing pins (pen), and changing the coolant.

Preventive maintenance schedules are carried out on a regular or daily basis such as checking for bolts or nuts, cleaning the body after the engine is used, and lubricating the pads before the engine starts up. and periodic maintenance is done once every week such as giving gemuk on the rack teeth, giving gomok on the screw axis. Every six months like cleaning a dusty motor from dust, giving gums to bering, and setting the pulleys. And once a year like checking the electrical circuit, changing the lubricant oil and coolant. by scheduling maintenance, each machine will be controlled for maintenance, so the schedule should be continuous, so the maintenance time is done on one main component for one day of treatment.

Officers in the preventive maintenance of machine tool production is divided into three parts namely; The operator on duty after the machine is used then the machine immediately cleaned by using a brush to remove the bram attached to the machine. The machining technician is in charge of periodic machine maintenance such as cleaning the inner engine body and setting the pulley strain. Experts in preventative maintenance of machine tools are tasked with difficult parts such as cleaning and

checking electrical controls, replacing worn-out pens.

Equipment used in performing preventive maintenance of this machine tool is a brush that serves to clean the machine parts that are difficult to reach or irregular surfaces, such as cleaning the gear, clean the chips that is scattered on the engine body or tub container. The duster is to clean the easily accessible parts or a flat surface such as cleaning the body of the machine from dirt and dust, removing unclogged sockets so that the smooth chips is removed from the sleeve. The lubricating gun serves to lubricate the engine components with oil to keep the oil from scattering while lubricating such as lubricating steel balls on a machine turning, lubricating the sleeve. Pressure gun serves for gemuk on machine components aimed at giving gemuk neater, and not messy giving gemuk using pressure gun like giving gemuk on rack tooth, giving gemuk on the threaded shaft. The wrench and the L lock are used to lock the bolt or nut on the machine components, use the wrench such as locking the bolts on the engine foundation, locking the bolts on the machine table and the use of L locks such as locking the bolts on the handle, locking the bolts on the bottom.

Materials used in preventive maintenance include Solar that serves to clean the engine components of lubricants that are not feasible to use, it aims because the diesel easily lifts the lubricating stick like cleaning the screw shaft from gemuk, cleaning table sill table drilling machine. gemuk is a lubricant in the form of thick, excessive use of g gemuk on the component parts of the machine, gemuk not easily melt or other words the stickiness gemuk such as giving gemuk on the screw shaft because the screw shaft slow movement and heavy load. Lubricant oil is a liquid lubricant that is easy to melt, the oil used is SAE 140 (society automotive engineering with viscosity 140) which is suitable for use on gear box, and heavy working shaft.

Control is carried out to find out the information there is or not carried out the treatment on the schedule that has been made. As if (yes) is implemented then the officer gives a check mark on the control table there and if it is not implemented then the officer gives a check mark on the controlling table (no) implemented.

The description is done to find out the reason if the control is not implemented as oil lubricants because machine tools are not often operated and the oil is still good.

5. CONCLUSIONS AND SUGGESTIONS

5.1 Conclusions

After doing research about the model of preventive maintenance of PMC system at machine tool machine at machining workshop hence writer concludes:

1). Determine the location of machining machine tool done by making layout plan of the machine.
2). Record the machine is done by including machine workshop, machine name, machine type, machine number.
3). List the main components of machine tools by making: machine name, code and main component, part component name.
4). Data collection of part components is done by including machine code and component part.
5). The maintenance model is made based on the maintenance measures of inspection, cleaning, lubrication, locking, adjustment, replacement of machine parts of machine tools.

5.2 Suggestions

Suggestions that writers can provide in relation to research on preventative models of PMC system are as follows:

1) Before making the layout of the machine need to know the type of machine tools and the number of machine tools.
2) In recording machine tools starting from machine tools that have few components to which many have machine components or in sort. So in the data retrieval makes it easier to know the components.
3) After listing the component parts in the preventive maintenance model the maintenance schedule must be thoroughly controlled, so that the maintenance time does not clash or there is no equal maintenance time on different machine tools.

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7. AUTHOR'S CONTRIBUTIONS

Nizwardi jalinus, Palembang, South Sumatera, Indonesia. Agust 22, 1953. Lecturer in Mechanical Engineering Faculty of Engineering Padang State University. Educational Doctorate (S3) University of Tasmania Australia graduated in 1998.

Syahril, Maninjau, West Sumatera, Indonesia. May 6, 1964. Lecturer in Mechanical Engineering Faculty of Engineering Padang State University. Doctoral (Ph.D) in Vocational and Technical Education, Faculty of Education, UKM Malaysia, 2010.

Ambiyar, Tanah datar, West Sumatera, Indonesia. February 2, 1960. Lecturer in Mechanical Engineering Faculty of Engineering Padang State University. Doctoral (Dr) in Vocational and Technical Education, Faculty of Education, Jakarta State University, 2005.

Febri prasetya, Padang Panjang, West Sumatera, Indonesia. February 13, 1989. Lecturer in Mechanical Engineering Faculty of Engineering Padang State University. Master (M.Pd.T) in Vocational and Technical Education, Faculty of Technical, Padang State University, 2015.

INVESTIGATION OF CHEMICAL FEASIBILITY AND DISTRIBUTION OF IRON SAND RESERVE REGIONAL AREA OF AGAM DISTRICT FOR CEMENT RAW MATERIAL IN PT. SEMEN PADANG

Heri Prabowo[1], Sumarya[2]

[1,2]Department of Mining Engineering, Faculty of Engineering, Universitas Negeri Padang [#]

ABSTRACT: The purpose of this research is to know the mineral content of iron sand and its spreading both vertically and horizontally with the purpose of providing information and data for local government of Agam district for the development and arrangement of the environment along the coast.

In order to obtain information about the depth of iron sand can be used the geoelectric method because one of the physical properties of metal elements including iron is to have low resistivity. In this study used resistivity mapping method that aims to determine the variation of the arrangement of soil layers vertically and horizontally. The configuration used in this method is Schlumberger configuration. To know the chemical content of iron sand is done by taking samples of iron sand systematically and represented at some point. The sample was analyzed chemical composition by XRF method (X-Ray Fluorescence), then correlated with some surface data so that the depiction of the quality of iron sand of Tiku Regency.

From the interpretation of soil resistivity value on 2 paths, it can be concluded that iron sand in Tiku Beach area is in-depth 0 - 16 m. The chemical content of iron sand from XRF method analysis shows Fe_2O_3 percentage of 10 - 35%, with TiO_2 content of 1 - 3%. The quality of iron sand can be used as raw material for cement maker.

Keywords: Agam iron sand, Resistivity mapping, Iron sand sample, PT Semen Padang

1. INTRODUCTION

West Sumatera has abundant natural resources (SDA), but the natural wealth is much that has not been processed and utilized optimally. One of abundant wealth is iron sand in Agam Regency. One of them that utilizes iron sands as raw material for making cement is PT Semen Padang which raw material of iron sand is imported from Java. So experience some obstacles such as if the season of the big ocean waves hampered to bring in iron sand from Java and the cost of production will be greater.

The purpose of research of physical and chemical feasibility study of iron sand of Tiku Regency area of Agam Regency for cement raw material of PT Semen Padang is to know Fe content and mineral content in iron sand in order to provide information and data for local government of Agam Regency to bring PAD (Royalty) and as one of the solutions for PT Semen Padang in sufficient iron sand needs.

2. Research methods

The methodology is to take a systematic iron sand sample and be represented at some point. The sample was analyzed chemical composition.
Research procedure
1. Data Collection Stage
In this first phase, data collection will be conducted in the iron sand area in Agam, West Sumatera. From this stage will get samples of iron sand that will be in careful levels.
2. Sampling
Samples obtained from the Iron sand research site in Tiku Agam District will be used for analysis purposes and also a direct test of samples, also to find out how much iron sand is available at the site.
3. Phase Data Retrieval
This stage is done at PT Semen Padang to get data of Fe content as cement making mixer to be compared with iron sand type found in Tiku. Besides that, we will get data of iron sand composition used for cement making materials, and also with the use of iron sand how the effect of the resulting cement quality.

4. Data Analysis Stage

At this stage will be analyzed based on data that has been obtained in the field. This stage will be an economic analysis of the Iron Sand, for example by comparing the cost if iron sand imported from Agam with imported from the island of Java to PT Semen Padang, so it can be assessed economy. It will also be analyzed the feasibility of the Iron Sand, is it worth to use as raw material in the manufacture of cement needed PT. Semen Padang

5. Data Processing Stage

The data that have been analyzed is processed again with the existence of additional data from literature study and the result of sample analysis done so that it can form a better and useful output.

6. Conclusions

All data has been obtained and done data processing, so that can be drawn a conclusion about the proper assessment of the feasibility of utilization of Iron Sand as the raw material of cement manufacture in PT. Semen Padang.

RESULTS AND DISCUSSION
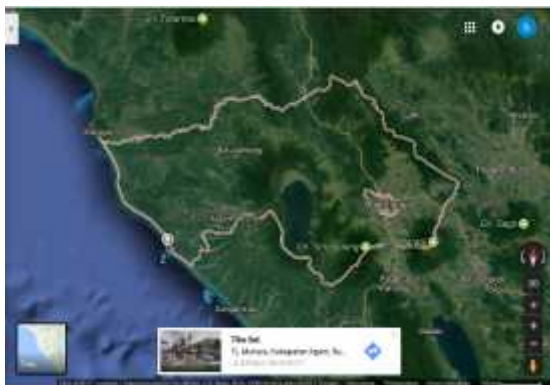
Fig.1 Sampling location

Location of iron sand sampling at Pasir Paneh Beach, Tiku District, Kab. Agam with coordinates:

1. S0 21 01.3 E099 53 25.6
2. S0 21 27.5 E099 53 51.4
3. S0 22 48.5 E099 54 52
4. S0 22 40.5 E099 54 47.6
5. S0 22 32.7 E099 54 43.4

Table 1. Laboratory test results of iron sand samples

Items		Sample				
		1	2	3	4	5
Fe ttl		40.69	38.76	39.87	47.7	43.98
Al_2O_3	%	15.72	15.88	12.13	22.45	22.11
Fe_2O_3	%	19.10	19.10	20.10	10.00	17.10
CaO	%	4.46	3.39	4.04	4.14	2.84
MgO	%	2.74	2.28	3.91	1.41	0.99
SiO_2	%	13.37	13.37	14.07	7.00	4.97
TiO_2	%	1.01	1.70	1.53	0.93	0.68
H2O	%	2.91	5.52	4.35	6.37	7.33
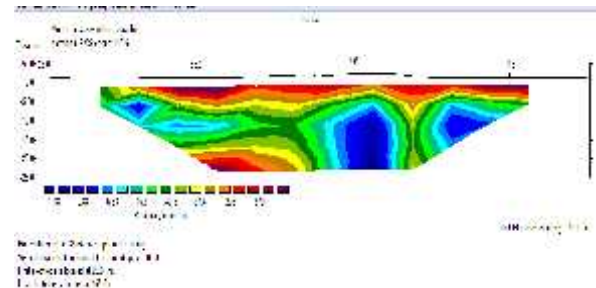
Fig 2. Top layer subsurface section on track 1
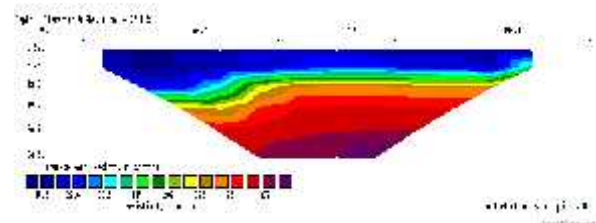
Fig 3. Top layer subsurface section on track 2

3. CONCLUSION

1. Fe_2O_3 content (iron) average iron sand from sample analysis tested in laboratory ranged from 10 - 35%, while the content of TiO_2 between 1 - 3%.

2. The result of the sample analysis shows that iron sand of Pantai Tiku is chemically satisfying PT Semen Padang spec

3. Based on data of Fe and Ti content of laboratory analysis shows the quality of iron sand Tiku area will be much in demand by investors because the quality is good.

4. The measurement result with geoelectricity shows iron sand at Tiku beach located at depth 16 - 18 m with horizontal distance land to beach 100 - 130 m.

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5. AUTHOR'S BIOGRAPHY

Heri Prabowo is a geomate member of lecturer in the mining engineering department of the Engineering Faculty State University of Padang. S2 from Mining Engineering Department ITB. Research has been done, the spread of iron sand in Pariaman field, coal quality, a method of coal upgrading, iron ore exploration, iron stone reserve in east Pasaman, potency and gold reserve in south Solok, the influence of intrusion of igneous rock to lime quality, metal exploration, coal exploration. His contact E-mail is heri.19782000@gmail.com

6. AUTHOR'S CONTRIBUTIONS

Heri Prabowo: Concepts, design, acquisition, analysis, and interpretation of data and article strengthening. Sumarya: Critical review and conclusion of the version to be filed. The content of articles and content editing also grammer articles.

7. ETHICS

This article material has never been published. All the authors involved in the preparation of this article already exist. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved.

THE DEVELOPMENT OF INTERACTIVE MULTIMEDIA-BASED LEARNING MEDIA USING ADOBE FLASH CS3 AND CAMTASIA IN PROBLEM-SOLVING LEARNING IN ELEMENTARY MATHEMATICS OF IN STUDENT PGSD STKIP ADZKIA IN PADANG

Ika Parma Dewi [1)], Lativa Mursida [2)], Yani Rizkayeni Marta [3)]

[1]Department of Electrical Engineering, Fakulty of Engineering, Universitas Negeri Padang
[2]Department of Electrical Engineering, Fakulty of Engineering, Universitas Negeri Padang
[3]Department of Electrical Engineering, Fakulty of Engineering, Universitas Negeri Padang

ABSTRACT: This research was motivated by the low class PGSD STKIP Adzkia Padang students in Problem Mathematics Problem Solving (*Problem Solving*). This is due to lack of utilization and innovation of learning resources as well as Interactive Multimedia Based Learning Media Using Adobe Flash CS3 and Camtasia. The method used in this research is the Research and Development (R & D) by using a development model ADDIE which includes five stages: (1) Analysis: needs analysis, (2) design: the design of the product, and (3) development: the development of the product. (4) implementation: implementation of the product (5) Evaluation: the effectiveness of the student.Results obtained from this research and development are as follows (1) The product resulting from this research is a product based on Interactive Multimedia Based Learning Media Using Adobe Flash CS3 and Camtasia in Problem Solving Learning Mathematics SD (2) Development of Interactive Multimedia has passed the stage of media validation experts, validation experts materials, and language validation experts. The validation results of the three experts are said to be valid. (3) Development of Interactive Multimedia Based Learning Media has been through the practical phase of the lecturer's response with the result of the percentage is 83.40%, and the practicality of the student response with the result of the percentage is 87.81% then it is practically categorized. (4) the development of Interactive Multimedia Based Learning Media has been through the effectiveness stage shows the value of 87.46% of students reach the Minimum Criteria of Completeness, it can be categorized effective.

Keywords: *Interactive Multimedia Based Learning on Adobe Flash CS3 and Camtasia, Research and Development, Validity, practicalities and effectiveness*

1. INTRODUCTION

Entering the 21st century discussed a lot about character education in Indonesia which decreases increasingly day by day. The low quality of character of this nation is the concern of all parties. Education serves to help students in their development that is the development of all potential, skills and personal characteristics to the positive both for himself and his environment.Based on interview with one of the lecturers of mathematics in the department of PGSD STKIP Adzkia Padang, mathematics is one of the subjects that has a very important role in education. The evident is more hours of math lessons than any other subject. In School learning Mathematics aims to train students to think systematically, logically, critically, and creatively in communicating the ideas or problem solving. However, until now mathematics as the main science in learning still gives "fear" for learners. As a result, in the process of learning mathematics requires extra energy from both lecturers and learners. Therefore, the process of learning mathematics should be made as attractive as possible so that students do not quickly bored in learning Mathematics.In the teaching and learning activities, to facilitate the learning of character-based

Mathematics education requires the existence of media that can direct and emphasize the realization of the values of student character. The authors are motivated to research and provide supplies for students of PGSD STKIP Adzkia Padang to create interactive learning media using Adobe Flash CS3 software and camtasia which are also character-based learning media. The rapid development of technology in the current era of globalization can not be avoided on the world of education. Researchers try to do research with the title Development of Interactive Multimedia Based Learning Media Using Adobe Flash CS3 and Camtasia in Mathematics Problem Solving Elementary on PGSD Students PGSD STKIP Adzkia Padang.

2. METHODS

2.1 Time and Place of Research

The research hold on odd Semester 2017/2018. This research was located in the PGSD department of STKIP Adzia Padang.

2.2 Procedure of Development

This research was a research development by using 4-D model consisting of four stages. According to Thiagarajan in Trianto (2011: 189) the fourth stage was the definition, design, development, and disseminate.

2.3 Trial of Product

The type of experiment research was True-Experimental Design, in which the sample used for the experiment or as a control group was taken randomly from a specific population. The tests were conducted on the control and experiment classes before and after learning, the control class was the class without the treatment and the experiment class was treated using learning media.

2.4 Subject of Test

The subject of research in the development of Interactive Multimedia-based Learning Media on mathematics problem-solving elementary as a supporting of student learning with 17087 V_a and 17087 V_b session code of PGSD STKIP Adzkia Padang.

2.5 Type of Data

The type of data in research development of supporting media of learning Based on Interactive Multimedia was primary data, meaning that data obtained directly from the research subject that was from expert/media expert, content learning expert, from student and lecturer who implement learning with Interactive Multimedia Based Learning media. The data referred the result of qualitative research given by lecturer and student through questionnaire given the result is analyzed by using statistical formula.

2.6 Technique of Data Analysis

Technique of data analysis conducted in this research is descriptive data analysis technique. Namely by describing the validity, practicality and effectiveness of using learning media.

2.6.1 Analysis of Validity

The analysis od validity using Cohen Kappa analysis technique based on the validation sheet, using the formula:

$$KK = \frac{P_0 - P_e}{1 - P_e}$$

With

$$Pe = \frac{1}{N^2} \sum (N_1)(N_2)$$

Table 1.Categpry of Validity based on Cohen Kappa Analysis

No	The Level of Achievement(%)	Category
1	81-100	Very valid
2	61-80	Valid
3	41-60	Quite valid
4	21-40	Less valid
5	0-20	Invalid

Source:Modified from (Riduwan, 2010:88)

2.6.2 Analysis od Practicality

Practicality test data was obtained from data provided by lecturers and students. From all scores of items obtained, tabulated and searched the percentage by the formula :

$$KK = \frac{P_0 - P_e}{1 - P_e}$$

With

$$Pe = \frac{1}{N^2} \sum (N_1)(N_2)$$

Table 2. Categpry of Practicality

No	The Level of Achievement()	Category
1	81-100	Very practical
2	61-80	Practical
3	41-60	Quite practical
4	21-40	Less practical
5	0-20	Inpractical

Source: Modified from (Riduwan, 2010:88)

2.7 Analysis of Effectivity

Analysis of media effectiveness was done twice before and after learning. The first analysis was conducted to determine the initial capability between the experimental and control groups. The testing using t-test. The second analysis was to find out the difference of learning outcome between control and experimental groups. The testing used t-test for two related sample.

Table 3. Pretest-Posttest Control Group Design

R_1	O_1	X	O_2

R₂	O₃	O₄

Source : Sugiyono (2013: 76)

Description :
R₁ : Experimental Class
R₂ : Control Class
X : Learning to use media supporters
O₁ : The value before the experimental class is done
O₂ : The value after the experimental class is done
O₃ : The value before the control class is done
O₄ : The value after the control class is done

3 RESULT OF PRODUCT DEVELOPMENT AND DISCUSSION

3.1 Process of Product Development

The development of supporting media learning aims to increase the motivation and independence of student learning Section 17087 V PGSD STKIP Adzkia Padang, which is in accordance with the learning materials.

Supporting media learning on Mathematics problem solving Elementary has been through the phase of validity, practicality, and effectiveness. The validity test is done by seeking expert opinion of the media developed, so that obtained a valid support media learning for use in the learning process. The practicality test is done by asking opinion to lecturer of mathematics problem solving elementary and by questionnaire to students. While the effectiveness test is done by looking at the comparison between student learning outcomes before and after used the interactive multimedia-based learning.

3.2 Define

3.2.1 Observation

Observation that made at PGSD STKIP Adzkia Padang on Mathematics problem solving Elementary School problems the lecturer is more explainning the subject matter without much involving student when the process of learning, and the presentation of materials was less interesting. Lecturers use the lecture method and the learning process was still centered on lecturers, that causing the students to be passive, and only relying on lecturers to get the learning materials. The learning process is monotonous, and finally makes students easily to get and saturated.

3.2.2 Analysis of Syllabus

Topics developed in the syllabus of Mathematics Problem Solving elementary is as follows: Meeting 3. Understanding problems and solving problems, types of math problems.

3.2.3 Analysis and Review of Materials Required

Identification of materials required by the media was done by exchanging opinions with the lecturers of mathematics problem solving elementary on some learning materials of understanding problem and problem solving, and types of math problems.

3.2.4 Design

a. Design of Opening Page

Fgure 1. Design Home Page

Figure 2. Design Loading Page

b. Design of Menu Page

Figure 3. Design of Main Page

c.   Design of Syllabus Page

Figure 4. Design of Syllabus Page

d.   Design of Materials Page

Figure 5. Design of Materials Page

e.   Design of Quiz Page

Figure 6. Design of Quiz Page

f.   Design of Creator Page

Figure 7. Design of Creator Page

3.2.5 Develop

This stage aims to obtain a valid, practical, and effective product of learning media. Development stage consist of : test the validity of learning media, according to the validator assessment, and practicality test, according to the assessment of subject lecturers and students.

a.   Validity phase of learning media
The data used to measure the validity of learning media on problem solving elementary mathematics is the data obtained through the input of the validator using a quesionnaire.

Table 4. List of the validator

No	Validator	Position	Aspect Validated
1	Dr.SitiAininLusti,M.Hum	Lecture FBSS	Language Validation
2	NurAzmi Alwi.S.S..,M.Pd	Lecture FIP	Language Validation
3	TitiSriwahyuni, S.Pd,M.Eng	Lecture FT-UNP	Media Design
4	YekaHendriyani, S.Kom., M.Kom	Lecture FT-UNP	Media Design
5	ViviPuspita, S.Pd., M.Pd	Lecture STKIP Adzkia Padang	Material
6	Yelmiati,S.Pd,M.Pd	Lecture STKIP Adzkia Padang	Material

b.   Language Validation

Validation stage of the language format, validator validate and evaluate the format of learning media. Language Validators assess the language of the questionnaire, the suitability of the indicator with the validated aspect, the truth of the sequence of statements on the questionnaire and the use of language in the learning medium was easy to understand.

c.   Media Design Validation

Media format validation stage, validator validate and evaluate the format of instructional media.Media validators assess media designs developed from aspects of navigation, convenience aspects, written and display aspects.

d.   Material Validation

Validation of Material, validator perform validation and assessment of materials. Validation of material includes accuracy of material coverage, suitability between material and syllabus.

3.3 Dessiminate

Disseminate phase was done by giving this learning media problem solving of the elementary mathematics in class 17087 V secsion code in PGSD STKIP Adzkia Padang. Based on the explanation, it can be concluded that this instructional media is one of the learning media that is valid, practical, and effective for use in the process of learning subjects of Mathematics Problem Solving elementary.

3.4 Data Description

3.4.1 Data of Validity Test

The retrieval of learning media validity data is by using questionnaire.

3.4.2 Data of Media Design Validation Test

Assessment of validator about validity of instructional media Mathematics Problem Solving Elementary can be seen in Table 5 below

Table 5. Validator Rating About Validity of Learning Media

No	Aspects of Validity	Number Grain Reserved	Max Score	Respon of Validator	
				V 1	V 2
1	Navigation	1	5	4	4
		2	5	4	4
		3	5	4	4
2	Convenience	4	5	4	4
		5	5	4	4
		6	5	4	4
		7	5	4	3
		8	5	4	4
		9	5	3	3
3	Teks	10	5	4	4
		11	5	3	3
		12	5	4	4
		13	5	5	5
		14	5	4	4
		15	5	4	4
4	Dsiplay	16	5	4	3
		17	5	4	4
		18	5	4	4
		19	5	4	4

Based on the results of data analysis obtained the index of agreement is 0.703. so that, the development of media support interactive multimedia-based learning in the category of "Valid".

3.4.3 Data of Material Validation Test

Assessment of validator about the materials validity and materials of Mathematics Problem Solving Elementary can be seen in Table 6:

Table 6. Validator Rating About Validity of Material Learning Media

No	Aspects of Content Validity	Aspects that are assess	Max. Score	Respon of Practitioner (Lecturers)	
				V1	V2
1	Materials	1	5	5	5
		2	5	4	4
		3	5	4	4
		4	5	3	3
		5	5	5	3
		6	5	4	4
		7	5	4	4
		8	5	4	4
		9	5	5	5
		10	5	4	4
		11	5	4	4

Based on the results of data analysis obtained the index of agreement is 0.828. So that, it can be concluded that the material presented on the media support interactive multimedia-based learning developed for Mathematics Problem Solving learning Elementary "Very Valid".

3.4.4 Data of Practicality Test

a. Lecturer's Response to Practical Media Mathematics Problem-Solving Learning

The results of the assessment of the practicality of learning media Mathematics Problem Solving Elementary can be seen in Table 7:

Table 7. Data of Response Lecturers About The Practicality of Learning Media Problem Solving Mathematics Elementary School.

No	Aspects of Assessment	Persentase of Assessment		Category		
		P1	P2	Average		
1	Technical	82	83	82.5	Very Practical
2	Content	84	85	84.5	Very Practical
3	Design	84	84	84	Very Practical
	Average			83.66	Very Practical

P1 = Practionaire 1, P2 = Practionaire 2

Based on table 7, there are three aspects of media practicality of Interactive Multimedia-based learning based on the response of lecturers through the questionnaire. The Average of percentage is the assessment of both practitioners, among others: (1) the technical use of acquired 82.5% with very practical categories, (2) content of time obtained 84.5% with very practical categories, (3) design is 84% in very practical category and obtained an overall average that is 83.66% with very practical category. These results indicate that the supporting media learning developed "very practical" so as to facilitate lecturers in helping student learning and help students understand the concept of the learning material.

b. Student's Response to Practical Media Mathematics Problem-Solving Learning

The results obtained are shown in Table 8 below:

Table. 8. Data of Student's Response About The Practicality of Learning Media Problem Solving Mathematics Elementary School.

No	Aspects of Assessment	Persentase of Assessment	Category
1	Simplicity	89.20	Very Practical
2	Motivation	85,80	Very Practical
3	Interesting	90,50	Very Practical
4	Usefulness	85.75	Very Practical
	Average	87.81	Very Practical

The average of test result of instructional media practicity Learning Problem Solving Problem

(Mathematics Problem of elementary Element according to student is 87.81, so it can be concluded that the media is included in the category of "Very Practical".

3.4.5 Data of Test Effectiveness

a. Test of Instruments question

Test to know the validity, reliability, difficulty level problem and distinguishing power.

1. Test of Item Validity

Testing the validity of instruments is done by testing the student test with Section Code 17087 V_b PGSD STKIP Adzkia Padang, assuming that both are done on the problem solving problem (Problem Solving) of elementary mathematics, and in students with the same generation.

After tested the validity of the items of the 30 questions given there are 25 valid questions, that are questions no 1, 2, 3, 4, 5, 6. 7, 8, 10, 12, 14, 15, 16, 17, 18, 20 , 22, 23, 24, 25, 26, 27, 28, 29, 30 While the question no 9, 11, 13, 19, 21 fall into the category of invalid questions, meaning the matter is discarded.

2. Test of Realibility

Reliability results using misrosoft Excel 2007 obtained value of 0.746. The result is compared with r table. The test is declared Reliable if r result of calculation> r table. According to r table, for N = 30 and a significant level of 5%, the value of r is 0.361. Then get r count> r table = 0.746> 0.361

From the results of analysis and based on the interpretation of the value of r then it can be seen that the test has a high test reliability is 0.746.

3. Test of The Toughness Index

The Toughness Indexis made to see if the problem has been made into difficult category, medium or easy. Of all the problems that have been tested then tried to analyze and obtained the result that 3 questions are classified as moderate criteria, 27 questions are relatively easy.

4. Test Of Different Power

From all the question that have been tested done the analysis of the problem and it was obtained that the 8 categories of good, 17 questions enough category, and 5 questions ugly category.

a. Learning Outcomes

Learning Outcome Problem solving (Problem Solving) SD Mathematics seen from posttest and pretest result of student. Data of learning result obtained from data of learning result before and after test of instructional media use test, where matter in the form of multiple choice as many as 25 problem. Here is the average table of student learning outcomes:

Table 9. Average Results of PreTest and PostTest Student Learning

Learning Outcomes	KKM	Percentage	Average
Before	12 persons	44.82%	69,13
After	26 persons	89.65%	86,75
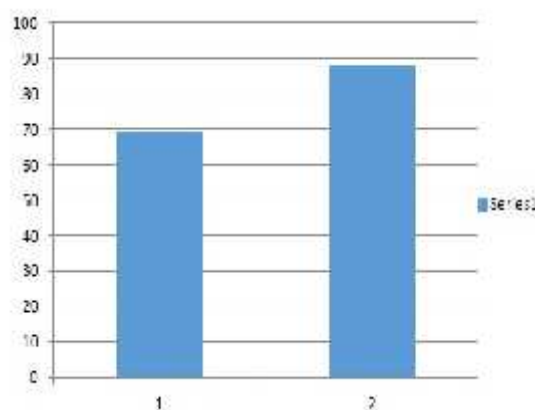
Figure 8. Histogram Improving the Value of Student Learning Outcomes Before and After Learning

4. PRODUCT REVISION

The main purpose of product revision is for the perfection of instructional learning media that has been designed so as to have validity, practicality, and effectiveness when used according to their needs. Likewise this case has some of the following revisions.

4.1 Language

The revision of the questionnaire and learning media is based on the validator input that includes the correct and correct Indonesian sentences, use the same letter for each questionnaire and be consistent with the spaces used.

4.2 Learning materials

Learning materials that exist in this learning support media there is no significant improvement based on validator assessment.

4.3 Media Design

The revision of instructional media support design is based on validator input which includes the use of letters and text that are too small, and an enhanced color combination.

With this revision, the weaknesses or deficiencies contained in the media supporting the learning can be minimized, so valid is used as a medium of learning.

5. DISCUSSION

This research produces learning support media for problem solving problem (Problem Solving) of elementary mathematics. The development of this media is based on the initial observation of learning process of problem solving problem of elementary mathematics which aims to know the problems, obstacles, and any phenomenon encountered in the field related to learning, then needs analysis, such as curriculum analysis and identification of the required materials. Learning media Problem solving Problem (Problem Solving) SD Mathematics, this has been through the test phase of validity, practicality and effectiveness. In the validity test is done by seeking expert opinion through validation sheet. The validated aspect of this instructional media is the design of instructional media and material conformity with the curriculum. From the experiments conducted got the result that the whole aspect is very valid value.

Practical testing is done by asking opinion to lecturers and students through practicum questionnaire sheets. From the test of practicality is known that the learning media Problem Solving (Math Solutions) SD is in the category very practical to be used as a medium of learning support.

Furthermore, the effectiveness test is done by looking at the average comparison seen from the pretest and posttest result of the students that is the value before the students use the media and after using the supporting media of learning.

6. CONCLUSION

Based on the results of media development research that has been done, then obtained the following conclusions:

a. This research produces a learning media for problem solving learning (Problem Solving) Mathematics SD PGSD Students STKIP Adzkia Padang.

b. Validity of instructional support media Problem solving Mathematics of elementary school is expressed in language aspect, media design, on material conformity aspect with curriculum and

syllabus is valid. Thus, the supporting media of problem solving learning (Mathematics Problem Solving) developed in the category included "valid".

c. Practicality of media in learning can be seen from the implementation of the use of learning media Problem solving Problem (Problem Solving) Mathematics SD as a whole well. This is evident from the practicality of instructional media based on practicality assessment by teachers stated "very practical" and based on students' judgment also stated "very practical".

d. Effectiveness of instructional support media Problem Solving Mathematics of SD seen from student learning outcomes before (pretest) and after learning using learning support media (postest). Learning outcomes show an increase in the average value of students, so that this learning media is said to be effective

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ART EDUCATION
THROUGH FREE EXPRESSION APPRECIES, DISCIPLINE SCIENCE, AND MULTICULTURAL AS EFFORTS TO IMPROVE STUDENT CREATIVITY

Indra Irawan

Universitas Negeri Padang

Abstract: The focus of this research is how the process of implementation of art education through the approach of free expression, discipline and multicultural as an effort to improve student creativity. The study employed qualitative approach with the researcher herself as the research instrument. Data collection techniques included focused interviews, participant observation, and study documentation. Data analysis was done by reducing, clarifying, describing, concluding, and interpreting all the information selectively. The results show the process of implementation of art education is inseparable from the teaching-learning process, which covers: curriculum, objectives, teaching materials, methods of teaching and learning activities, facilities and infrastructure, and evaluation. Free expression approach in learning the art of visual art is done by providing opportunities for students to develop idea, done through observing objects, image and Style (technique of hope). The implementation process of learning the visual art of art through discipline approach is done by giving the subject matter theoretically based on scientific viewpoint. The implementation process of learning the visual art through a multicultural approach is done by introducing, practicing, and doing reformation to the students about the diversity of cultural arts of their homeland.

PRELIMINARY

Man thinks creativity is a necessity. The ability to think creatively can be developed by various methods one of them through education. Education as a means of fertilization and creativity development, must be managed properly. So the teacher as the spearhead of education should be equipped with adequate skills about learning for their students. With sufficient ability, student creativity is expected to be stimulated and finally students have the ability to solve problems creatively. In reality, however, the learning strategy further emphasizes learning activities that prioritize intellectual development rather than the development of student credentials (Munandar 1983: 84-85). Similarly De Bono (in Sumaryanto 2001: 2-3) sees that in education, students' intellectual thinking is more important than lateral thinking skills (including creativity), and they should support each other.

Based on initial observations, art learning in general and fine arts specifically, there is no continuity and interrelationship between a branch of art and art and culture. The reason is limited competence and teacher insight, hampering the development of student creativity (Nursito 2000: 11). This situation is further exacerbated by the lack of productivity of teachers in the work of art and the lack of teacher insight into the material, objectives and nature of art education and supported the lack of existing facilities at the school.

In essence, art learning if managed properly can contribute to improving the creativity of students. Because of the importance of creativity development needs to be prepared conditions that provide the possibility for children to channel their talents and creativity optimally. Therefore, the teacher's responsibility to the manager of the instructional system must be maximized. Thus the mastery of learning materials and strategies should be in full teacher satisfaction, in addition, teachers should be able to understand the curriculum associated with the application of appropriate instructional strategies and can spur and develop the creativity of learners.

From the learning result of visual art, it can be seen that the students can only receive the material from the teacher and imitate, without any processing that shows their creativity. So it can be concluded that art education received by students is the creativity of teachers, not the result of the creativity of students themselves. This is very contrary to the purpose of art education itself, that art education is one place to train students in order to express the soul through the media. Therefore it is necessary to change the art learning strategy in Junior High School so that art can develop student creativity. One of the right strategies in art learning to nurture and develop student creativity is the free expression approach, disciplinary approaches, and targeted multicultural approaches. The free expression approach is a learning strategy that involves students in solving problems simultaneously, disciplinary approach is a learning strategy using science as a framework of thinking, multicultural approach is a learning strategy that introduces students with various art and culture from various regions. For that, it is necessary to conduct research to examine in depth how the process of implementation of art

education through the approach of free expression, discipline and multicultural as an effort to improve student creativity.

Creativity is a tendency to self-actualization, manifesting the potential, the drive to grow and mature, the tendency to express and activate all the capabilities of the organism (Roger, 1962 in Munandar 1999: 18). While Clark Moustakis (in Munandar 1999: 18) states that creativity is the experience of expressing and actualizing individual identity in an integrated form in relation to oneself, with nature and with others. According to Santrock (in Sumaryanto 2001: 4) creativity is the ability to think about something in a new and unconventional way to be able to find a unique problem solving.

Humans have the potential to be creative. When humans engage in creative action, it will further grow their self-concept that will decrease and this will lead to mental health disorders (Carin and Sund 1978: 77). This is almost the same as what Munandar (1983: 70-76) suggests that creativity can be enhanced if there is support for creative culture or termed creativogenic. Similarly Bower, Bootzin and Zajonc (1987: 232) argued that social support is something that can enhance children's creativity. Another view of the creativity is the stage of ideas and the stage of execution of ideas. Both stages contain eight levels of creation process.

Another form of lenient intelligence in the form of ideas or ideas is the result of integration of the process of imagination, from the usual level to the highest level, of the three types and sources of images we have, of all senses, in appreciation. Idea stage includes (1) preparation, (2) material collection, (3) empathy toward pre idea, (4) pre-idea incubation, (5) hatching idea. Furthermore, the implementation stage is the implementation process as it manifests out. The implementation process consists of: (6) exterior aspects of implementation, (7) integral aspects of implementation, (8) highest creation level. Levels in the creation process are not necessarily sequential implementation, can jump-jump, change the order, overlapping, integration and so on. Creativity is one element of cognitive domain that can dikembanmgankan in art learning becomes important to be managed with the maximum.

Art learning for students is ideally integrated with other science content. as has been formulated by the Ministry of National Education (2001: 7) that the learning of art covers all forms activities on physical activity and taste of beauty, expressed in the activities of expression, exploration, creation and appreciation through language, sounds, movements and roles. Art is taught interrelated because art has multilingual, multidimensional, and multicultural. Multidimensional art can essentially develop basic human capacities such as physical, perceptual, intellectual, emotional, social, creativity and (V. Lowenfeld in Kamaril 2001: 2-3). Multilingual art

can develop the human ability to communicate visually or visually, sound, motion and integrity (Golberg 1997: 8). Multicultural art means art aimed at fostering awareness and appreciation of the diversity of local and global cultures as the formation of respectful, tolerant, democratic, civilized and harmonious attitudes in a pluralistic society and culture (Kamaril 2001: 4).

The ultimate goal of art education is to help the student through the way to find the connection between his apparent expression and his entire human existence. Thus the fine arts education serves as an alternative to the development of the child's soul toward maturity. Through the emphasis of creativity children are given the widest opportunity in the process of expressing creative gagasen in the form of rupa, so that the end result of forming human with a good aesthetic understanding. In addition, children have the opportunity to gain an aesthetic experience and to know the various cultures of other regions, and able to perform social interactions in the social environment of the community. Visual art learning is generally done by imitative methods, where teachers only model model or sample and demonstrate creative production / process techniques that are then imitated by the child. With this imitative method, without the opportunity to release their own creativity. so that children can not exclude their creativity and are more likely to be passive. To address such matters, there is a teaching strategy that involves the child in the process of teaching and learning, the free expression approach.

Approach Free Expression In Art Education

Learning model with free expression approach is designed using emerging curriculum model that is learning activities that are not designed before but developed according to the wishes of children. In this way, the teacher asks the students what activities they want to do and then prepare everything to make it easier for the students to carry out their activities. There is a possibility by one thing the student suddenly change the mind, then the teacher must immediately adjust to the desires of the students. Implementation of this kind of free expression approach is suitable for non-formal dance studios, whereas for schools that have a tight curriculum and schedule, it is difficult to do. Because of the difficulty of applying the free expression approach purely in school, art educators develop a more directed free expression approach.

With this directed approach, teachers carry out learning activities in accordance with a specific strategy so that students can express themselves in accordance with what is expected. The strategy is a warming activity to stimulate and give expression motive to the students. Heating activities or commonly called motivation can be done in various

ways, among others: (1) Storytelling or dialogue with children to arouse attention and stimulate the birth of motives that can be used as a basis in the work. (2) Provide students with direct experience of natural contact, for example by inviting students to look at the surroundings. (3) Demonstrate the process of creating works of art that will be taught.

Approach to Discipline of Science in Art Education

Discipline is the underlying assumption underlying the concept of this approach. The discipline of science as expressed by Dobbs (1992: 9) is a field of study characterized by (1) having the body of knowledge, (2) the existence of a community of experts who study the science, and (3) the availability of work methods that facilitate exploration activities and research. Chapman (1978) argues that art education that provides an opportunity for children to express their emotions is important, while Eisner (1987/1988) argues that disciplinary arts education aims to offer a systematic and sustainable learning program in four fields that are involved in the art world namely the field of creation, enjoyment, understanding and assessment. These four areas must be reflected in the curriculum.

The difference between disciplinary arts education and free expression approach lies not only in terms of the range of activities offered, but also in the philosophy of the program and how to teach children. In the free expression approach, the child is treated privileged by allowing him to freely express what he wants to express. Teachers are not allowed to intervene. The role of the teacher is simply to make it easier for the child in expression. Thus was born a curriculum known as emerging curriculum, a curriculum that is not ready to use but arranged according to the will of the child on a learning activity. It is the child who decides what learning experience he will do. In discipline-based art education, the curriculum used is ready to use with systematically arranged programs. With reference to this ready-made curriculum, teachers carry out learning. Jeffers compares these two approaches by using natural growth metaphors with a metaphor of formation. The natural growth metaphor assumes a child as a flower or a plant, a teacher as a gardener and a school as a garden. Teacher as a gardener must create an atmosphere in such a way that the child as a plant grows fertile and natural. On the other hand, the metaphor of formation views the child as clay and the teacher as a sculptor. The child as clay is in a position to choose or reject the final form of himself.

The Multicultural Approach in Art Education

Multicultural art education is an educational approach that promotes cultural diversity through the creation, enjoyment and discussion of visual (visual) beauty. Multicultural art education was born as a part of multicultural education. There are several factors that together share the birth of a multicultural educator: (1) injustice in society, (2) the need for identity, (3) changing geographical circumstances, (4) the desire to eliminate prejudice, (5) the consequences of emergence art of postmodernism. Multicultural art education is basically a philosophy, a great idea or an approach. The essential characteristic of multicultural education is simply the spirit to promote cultural diversity through artistic activity. The spectrum of multicultural education is factually reflected in the arts education activities grouped into three models namely the introduction model, the model of practice, and the model of reform.

METHOD

The method used in this study with a qualitative approach, which is the main target of research is the process of improving student creativity in the education of Fine Arts through the approach of free expression, discipline, and multicultural. The population of this study at KotaPadang Junior High School is assumed in Junior High School facilities that support teaching and learning activities and the quality and quantity of teaching staff more complete, as well as in any earlier acquisition of information both academic and non academic. Data collection techniques using directional and non-directional interviews, participant observation and documentation study. Data analysis used in this study refers to Miles and Huberman analysis (1994: 10) where the process of data analysis used simultaneously from the process of collecting data, reducing, clarifying, describing, concluding and interpreting all information selectively. An examination of the validity of the data in this study, using dependability and confirmability (Lincoln and Guba in Jazuli 2001: 34).

RESULTS AND DISCUSSION

Implementation Process of Art Education in Junior High School

The implementation process of art education can not be separated from the teaching and learning process, which includes: curriculum, objectives, learning materials, teaching and learning activities, facilities and infrastructure, and evaluation.

Curriculum

The curriculum used in Junior High School is the Education Unit Level Curriculum. The curriculum structure of SMP / MTs includes the substance of the learning taken in one education over three years from Class VII to Class IX. The curriculum structure is based on competency standards of graduates and subject competency standards with the following conditions: (1) The SMP / MTs curriculum contains 10 subjects, local content, and self-development. Local content is a curricular activity to develop competencies tailored to the characteristics and potential of the region, including regional excellence, whose material can not be grouped into existing subjects. The substance of local content is determined by the unit of education, called self-development. Self-development aims to provide opportunities for learners to develop and express themselves according to the needs, talents, and interests of each learner in accordance with school conditions. Self-development activities are facilitated and / or guided by counselors, teachers, or educational personnel that can be done in the form of extracurricular activities.

In the process of Implementation of Education Unit Level Curriculum, first, need understanding and elaboration of Education Unit Level Curriculum in Arts Arts subjects. Cultural Arts Learning is included in the category of clumps of Aesthetic subjects. The aesthetic subject group is intended to enhance the sensitivity, the ability to express and the ability to appreciate beauty and harmony. The ability to appreciate and express beauty and harmony includes appreciation and expression, both in individual life so as to enjoy and be grateful for life, as well as in community life so as to create harmonious togetherness.

The content of art and culture as mandated in the Government Regulation of the Republic of Indonesia Number 19 of 2005 on National Standards of Education is not only contained in one subject because the culture itself covers all aspects of life. In the subjects of Art Culture, cultural aspects are not discussed in isolation but are integrated with art. Therefore, the subject of Cultural Art is essentially a cultural-based art education.

Arts and Culture Education is given in schools because of the uniqueness, meaningfulness, and usefulness of the developmental needs of learners, which lies in the giving of aesthetic experiences in the form of expressing / creating and appreciating activities through the approach of: "learning with art," "learning through art" and "Learning about art." This role can not be given by other subjects.

Cultural Arts Education has multilingual, multidimensional, and multicultural. Multilingual means developing the ability to express themselves creatively in various ways and media such as language, sounds, motion, roles and various blends. Multidimensional means the development of various competencies including conception (knowledge, understanding, analysis, evaluation), appreciation, and creation by harmoniously integrating aesthetic, logical, kinesthetic, and ethical elements. Multicultural nature contains the meaning of art education to grow awareness and appreciation of the cultural diversity of the archipelago and abroad

Arts and Culture Education has a role in the personal formation of harmonious learners by paying attention to the needs of children's development in achieving multiple intelligences consisting of intrapersonal, interpersonal, visual, spatial, musical, linguistic, mathematical logic, naturalist and adversity intelligence, creativity intelligence, intelligence spiritual and moral, and emotional intelligence. In the education of art and culture, art activities must accommodate these peculiarities that are contained in the provision of experience to develop conception, appreciation, and creation. A form of translation of Education Unit Level Curriculum starting from Standard Competence and Basic Competence. Junior high school teachers must really understand the Competency Standards and Basic Competencies, then elaborate in the semester's learning materials. In one semester, the teacher determines the number of weeks effective, and from the effective week is then spelled out to be an effective day. While each subject has a 45 minute meeting time on an effective day.

The planned learning objectives should be in accordance with the Competency Standards and Basic Competencies. Each learning objective will appear a subject matter subject. This subject matter must comply with the Competency Standards and Basic Competencies. Basic Competency and Competency Standards become the direction and basis for developing the subject matter, learning activities and indicators of achievement of competence for assessment. In designing learning and assessment activities, it is necessary to pay attention to the Process Standards and Assessment Standards. Furthermore, teachers determine the learning steps that are poured in the form of teaching and learning activities.

Learning Objectives of Art in the Unit of Arts and Culture Subjects

The subjects of Cultural Arts are aimed to enable learners to have the ability to understand the concepts and the importance of art and culture, display an appreciation attitude towards art and culture, showcase creativity through cultural arts, showcase their participation in cultural arts in local, regional and global level. The subjects of Cultural Art include aspects of (1) art, including knowledge,

skills, and values in producing artwork in the form of paintings, sculptures, carvings, prints, and so on; (2) music art, including the ability to master vocal exercises, play musical instruments, appreciation of musical works; (3) the art of dance, including motion skills based on exercise with and without sound stimulation, appreciation of dance movements; (4) theater arts, including bodywork, thought and vocal skills that combine elements of musical art, dance and role art.

The learning objectives of Fine Arts found in the junior high school are students are expected to have knowledge about the essence of artwork and procedures of its creation, have a sense sensitivity that enables him to perceive the beauty values that surround him and make sensitive judgments about the artistic quality of a work of art, possess the skills that allow him to express himself through the media. In essence, the learning of Art in Junior High School aims to provide guidance and guidance that is really capable of directing students to process, exploration, appreciation and creation, cultivate their ability and creativity, with continuous training and guidance from teachers.

Learning materials

Determining art learning materials for Junior High School students is not easy. It requires knowledge and accuracy of teachers in the selection of art learning materials, which are in accordance with the curriculum and Level of Education Unit, and can provide students with stimulation, motivation, guidance and creativity. The learning process has a difficulty level in accordance with the characteristics of students.

Learning methods

The application of learning applies some of the methods used by teachers in the process of art learning include the lecture method of this activity by the teacher by way of explaining the subject matter. This method is usually used to explain the material theory, concept concepts and things that are philosophical and unidirectional, Further question-answer method-used teachers in learning the art of dance with the aim to know how far the knowledge of students in absorbing the lesson. The next method of mimicry and demonstration methods- is the teaching method that teachers do by way of the teacher gives examples of expectations, related to the techniques of using tools and materials with various media used

Facilities and infrastructure

The smoothness of the learning process of fine arts in the classroom / school is supported by the presence of adequate facilities and facilities, such as the following: adequate representative building, adequate class / studio space. The role of each of the above facilities, can provide opportunities for students to move broader in a variety of creative activities and learning.

Evaluation

Evaluation used by teachers in art learning is evaluation process. Process evaluation is an evaluation done during the learning process. Preferred in the evaluation process is the production process, krasi and prodak or work that has been completed finising (feasible presentation), and not on the results alone. Students are able to apply all the techniques and can use the characteristics of materials and media used and able to pour ideas in the form of form in accordance with the concept, theme or nuasansa that make it happen

Implementation Process Art education through Approach Free Expression

Creativity is very important for student development. Creativity will form from the experiences students experience in everyday life. In art learning, creativity can be formed through a free expression approach. The free expression approach in art learning is done by giving the widest possible opportunity for students to express ideas or ideas in their mind freely. And One of the efforts to cultivate the creativity of students, is through excitement to see the phenomena that exist around the merekan, stories, films, music and otherinteraksi with the thing in front of the imagination expected students will develop in accordance with their respective personal.

Objects as a medium for the development of the imagination and creativity of students can be found around students. Objects can be human, environmental circumstances, plants and animals. In the process of learning art students can observe all that is related to the activity of the object, then imitate again in accordance with their own imagination. So the result will be different between one student and the other students although the object that he sees is the same depends on the creativity of each student. Teachers should appreciate every creative effort by giving students praise, so that students feel appreciated and for the next will never be afraid again to be creative. Implementation of art learning based on this free expression approach, in accordance with the curriculum material, which encourages students to further develop their imagination as a form of creativity in the work Implementation Process Art education through Discipline Approach Science The process of art learning

Implementation Process Art education through Discipline Approach Science

implementation through disciplinary approach is done by giving theoretical subject matter based on scientific point of view. The subject of this lesson includes the identification of the type of artwork Including styles, styles, streams and mass that developed from the domestic time and abroad and multiplying the character of art that is rooted in the cultural diversity of the nation, the local area, the exploration of art Nusantara, became the main basis of learning activities in order to develop creativity. The subject matter is given systematically covering the activities of expression/creation, theory and criticism/appreciation of fine arts. this method builds the knowledge, understanding, and skills in art disciplines that allow it to be evaluated appropriately. In the learning process of art based on this discipline, the ability of children is developed to be able to produce artwork (art production); analyzing, interpreting and assessing the quality of artwork (art criticism); know and understand the role of art in society (art history) and understand the uniqueness of artworks and how people judge and describe the reasons for the assessment (aesthetics).

Implementation Process Art education through Multicultural Approach

The process of implementing art learning through multicultural approach is done by introducing, applying, and reforming students about the diversity of art and culture of the country including Model Introduction The introduction model aims to introduce the theoretical, practical and appreciative art of the aenni religious. This introduction is intended to broaden the students' insight into understanding other people and the artwork they create that may be very different from the beliefs and traditions held by the students.

Lessons learned can be curricular or extra curricular activities. The curricular learning is delivered by the cultural art teacher in accordance with the curriculum of the Education Unit Level. Extra curricular learning is provided by art teachers who are not regular school teachers, which are held outside of school hours after school lessons are completed or in the afternoon. The subject matter also varies from the introduction of basic art covering sketches, drawing shapes, estimate techniques, dry and wet coloring with various objects garapan environment, socio-cultural life around merea or cultural geala. This lesson can be applied to monoculture or classroom schools or classes whose students have diverse ethnic, racial, religious or social backgrounds (multiethnic / multicultural). Learning methods can be used by teachers to introduce visual art with all its aspects from various community groups with learning methods of lectures equipped with hearing media, discussion, questioning, studio practice, and field study.

Model of Practice

The model of practice is specifically applied to students who are multicultural. It is called the model of practice, because it recognizes diversity and seeks to apply the idea of equality in the diversity systemically and systematically into learning activities. with students from different ethnic, racial, religious, social class, gender, views, and specific backgrounds, and gain opportunities in the learning process. If in the introductory model, the teacher can still carry out traditional learning activities because he merely introduces art from various backgrounds, so in the model of practice, the teacher not only introduces the diversity and equality of rights in diversity that multiculturalists fight for, but implements those ideals in real class. Here, the technical problem of learning is only a secondary factor, while the primary factor is the positive attitude of the teacher about equality in diversity characterized by the spirit to practice it.

In order for this model of practice to be properly implemented, the school environment must first be made conducive, with no top discriminatory treatment. To build this non-discriminatory atmosphere, teachers and staff who are facilitators in the school also reflect the diversity of students' backgrounds. Similarly, school policy, reflected in rules and curricula, is all-encompassing so students feel that their family tradition, family beliefs and social conditions are accepted and respected.

In the model of practice, the concept used in designing learning activities is an open concept. This means that teachers use the concept of visual art that is interpreted and functioned diverse. In real life, visual art does have varied meanings and functions such as: expressing feelings, beautifying things, telling experiences, documenting events, criticizing, entertaining, commemorating events, displaying cultural symbols, stimulating imagination, generating economic value, and more. Thus it becomes a challenge for art teachers to choose a theme of learning that can be interpreted freely by the students according to their experience, in studio practice (creation of artwork), One of the suggested ways is to explore the theme of the students. Thus the theme of creation is not uniform but varies according to the student's background. In addition the theme can be selected by exploring the culture and local characteristics where a school is located. The theme that has been selected is then manifested visually by using visual media in accordance with the wishes of students. No media is superior to other media, nor is there any better media-processing

technique than any other technique. The application of this model of applying theoretical (aesthetic, artistic) or appreciative (art critic) must also rest on the diversity of art with the principle that each work of art has a meaning, and its own beauty criteria. It is the teacher's duty to introduce the meaning and criteria of the beauty of each work discussed in each learning activity. This recognition effort can be done by directly informing, preparing a reading material or presenting a competent person on the issues discussed.

Model Reshuffle

In this model, the teacher identifies five steps in developing a curriculum of multicultural art education: (1) teachers analyze and improve the negative attitudes of social pluralism and ethnic diversity, (2) teachers and students analysis of the situation to be familiar with the community, (3) teachers and students choose relevant and interesting curriculum materials, (4) teachers and students collaborate in investigating issues related to selected curriculum materials, (5) teachers implementing good evaluation program formative or sumatif.

CONCLUSIONS AND SUGGESTIONS

Conclusion

The implementation process of art education can not be separated from the teaching and learning process, which includes: curriculum, objectives, learning materials, teaching and learning activities, facilities and infrastructure, and evaluation. The free expression approach in dance learning is done by providing opportunities for students as wide as possible to develop ideas in the work and skills and hone the sense of aesthetics in students. One effort to cultivate student creativity, is through the stimuli to see objects, stories and capture the reality and phenomena that exist around them. The process of art learning implementation through disciplinary approach is done by giving theoretical subject matter based on scientific point of view. The process of implementation of art learning through multicultural approach is done by introducing, applying, and reforming the students about the diversity of art and culture of the country.

Suggestion

Based on the above conclusions, suggestions that can be submitted are as follows: for schools, should provide more support for the implementation of fine art learning in the form of fulfillment of infrastructure and opportunities as wide as possible for teachers and students in the process of learning art, and for teachers Art Culture, should be more creative in preparing subject matter for students.

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THE INFLUENCE OF USING ANIMATION MEDIA AND LEARNING MOTIVATION TOWARD LEARNING RESULTS OF AUTOMOTIVE STUDENTS IN SMK N 2 PAYAKUMBUH

Indra Wahyu[1], Fahmi Rizal[2], Rijal Abdullah[3]

Faculty of Engineering,
Universitas Negeri Padang, Indonesia

Abstract: This article was written to describe: (1) The difference result of students learning on TDO Subject between by Using Animation Media and not Using Animation Media, (2) The difference result of students learning on TDO Subject between the students who have high motivation and low motivation, (3) The interaction between learning Using Animation Media and learning motivation toward the Result of TDO Subject. The type of this research quasiexperimental design with total population is 4 classes by the number of student are124 students. Selectedsampleare 2 classes were composed of experimental class and control class.The results of hypothesis testing showed that: (1) there are differences in learning result TDO students who used on-media animation with media animation, which shows that the learning result of students who use higher animated media, (2) there are differences learning result between the students who have high motivation and low motivation, it shows the students who have high motivation better than the students who have low motivation (3) There is interaction of Using Animation Media and learning motivation toward TDO Subject on The first term in learning periode 2014/2015, with probability 0.014.

Keyword: Animation Media, Learning Motivation, Learning Result

1. INTRODUCTION

Learning is an activity that deliberately done to modify the various conditions directed to achieve a learning objective. Learning is a process of changing behavior both in terms of cognitive, affective and psychomotor aspects. The learning process is influenced by internal factors and external factors. Internal factors derived from the learners themselves include interest, desire and learning skills. While the external factors such as teachers and all the strategies. In teacher learning process is the main key, hence teachers are demanded always to do learning innovation covers discovery and utilization of media, classroom management and set learning strategy well.

Motivation learning that comes from internal and external learners is the basic capital to achieve learning outcomes. While the activities undertaken learners in learning is a process to achieve learning outcomes. In the learning process, learning outcomes can be regarded as the product of the learning process. Learning outcomes will be optimal if supported by a strong motivation. The more appropriate the given motivation, it will further support the increase in the activities of learners on the desired goals. Motivation and activities undertaken by learners will determine the intensity of effort achievement of learning outcomes.

Learning outcomes are the basis for determining the level of success in understanding a subject matter. The quality of learning can be seen from two aspects, namely in terms of results and learning process. In terms of learning outcomes, learning is said to succeed if learners have mastered the competencies learned at least reach the Minimum Criteria of Completeness (KKM) on each of these competencies. In terms of the learning process, learning is said to succeed if 85% of learners are actively involved (SMK N2 Payakumbuh Curriculum, 2013).

Basic Technology of Automotive (TDO) is one of the basic subjects of vocational in Automotive Engineering Program that must be completed, given in semesters 1 and 2 in class X students. Learning materials contained TDO subjects include: material about the basics of the machine, metal formation, and energy conversion machines. Low learning outcomes in TDO subjects will affect students' learning outcomes in other vocational competencies, sourced from TDO subjects.

Based on observations and information obtained from teachers who teach TDO subjects in SMK N 2 Payakumbuh, obtained data that part scores of student learning outcomes are still low. This means that the absorption or the level of mastery of learners against the TDO subjects is still far below the minimum mastery level. This is evidenced from the pure achievement of the average grade of semester test for students of class X Automotive Engineering in TDO subjects in the first semester of the academic year 2013/2014, there are still many learners who have not achieved

the learning achievement of Minimum Exhaustiveness Criterion (KKM).

When observed in the learning activities of students class X Automotive Engineering SMK N 2 Payakumbuh, generally illustrated the lack of competence in learning, impact on the achievement of learning results are not satisfactory. This can be observed from some of the learner's lack of presence, less responding to teacher questions, gathering tasks not on time, not following the lesson seriously, disturbing friends, leaving the classroom before the learning process ends. To know the condition of learning and data of characteristic of learners on Basic Subject of Basic Automotive Technology, then conducted an interview with the subject teacher. From the results of interviews can be concluded that: teachers are still teaching conventionally, the influence of friendship environment of friends that cause them do not want to go on time, the tendency of teachers to use the same method of presentation so that the lesson material becomes unattractive, learners feel less involved in learning, and the way the teacher conveys the less understood learners

There are three purposes in this research are: (1) reveal the influence of the use of animation media in improving learning outcomes in the subjects of TDO students SMK N2 Payakumbuh, (2) reveal the influence of learning motivation on the learning outcomes TDO subjects of students SMK N2 Payakumbuh, 3) reveal the interaction between learning media and learning motivation in influencing learners' learning outcomes on TDO subjects

2. RESEARCH METHODS

This research is a type of experimental research by implementing instructional media in the form of Macromedia flash animated animation (utilization media). The experiment used in this research is quasi-experiment (Quasi-experiment). The design/design of this research uses a factorial design

This study was conducted to determine the causal relationship of a treatment, namely to see the students' learning outcomes in the TDO subjects on basic competence explains the process of energy conversion machine after using the animation media

The instrument used in this study is a test question to determine the results of learning Basic Automotive Technology and questionnaire motivation learners. The difference of learning result of Basic Technology of Automotive learners between the experimental group and the control group was tested with independent t-test to determine the effect of using animation media on learning outcomes. To know motivation learners

after learning using animation media, through the data score questionnaire provided by learners. The treatment in this research is an experiment in learning using animation media for experiment class and without using animation media for conventional class. Each treatment group made the same learning design, except on the media used. This research instrument is a tool that can collect data about TDO learning outcomes in the cognitive domain, covering aspects of knowledge, understanding, and application. The test is given in the form of writing form of multiple choice (PG) with the number of questions as many as 40 items.

The question items in this instrument were developed starting from composing the question grid that was consulted with the expert judgment for the validation of the learning result test. After validation, the next test is done. Tests conducted on 32 respondents, outside the object of research. The test result of learning is tried to know the validity of the item, the reliability of the item, the difficulty index of the problem, the different power and the function of the permit. Ambiyar (2012: 149) states that the analysis of the items on the test of learning outcomes can be done from three aspects, namely: (1) the difficulty of the problem points, (2) the differentiating points of the questions, and (3) the distractor functional aspects. Of the 40 questions, there are 35 items that are declared valid and 5 items are invalid (fall). Based on data processing experimental variable learning outcomes performed, the obtained reliability index of 0.879 this shows the reliability index test index is at a high level.

2.1 Data Analysis Technique

After getting an overview of the mean, standard deviation, highest score, lowest score and range of score. The result data were analyzed by (a) Normality test to see whether the data is normally distributed, (b) homogeneity test aims to see both samples having a homogeneous variance or not. For data of more than two groups of data then the homogeneous test can be used is Barlett test. The data in this study were analyzed to test the research hypothesis. Testing of the first and second hypothesis is done by t-test.

3. RESULTS AND DISCUSSION

The research data collected in this research comes from class X TPBO as an experimental class and class X TSM as a conventional class at SMK N 2 Payakumbuh. The questionnaire data of motivation scores and the learning result test obtained overall reveal information about the highest score, lowest score, average, standard deviation, and variance.

The result of this learning motivation questionnaire is distinguished from the experimental class that gets treated by using animation learning media and conventional class (without using animation learning media). The highest questionnaire value is 193, which shows that learners have a high learning motivation during the TDO learning process takes place. The result of questionnaire motivation learners learn good class experiment and conventional class can be described. For the highest score in the motivation, a questionnaire was found in the experimental class with the score 193 and the conventional class was at score 188. In the experimental class had a mean of 169,5 and the conventional class of 156. From the data collected for learning motivation of learners in the experimental class in the group high

motivation has to mean with score 179,7 and for low motivation with score 148. For conventional class have meant in high motivation group with a mean of 168,9 and low motivation with a mean of 143,1.

3.1 Hypothesis Testing Results

3.1.1 First Hypothesis Test

The first hypothesis states the results of learning TDO learners who are taught with animation media learning is higher than the learning outcomes of learners who are taught conventionally. To test the hypothesis was analyzed by t-test, with results as shown in table 5.

Table 5. Results of the First Hypothesis Testing Calculation

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Learning outcomes TDO	Equal variances assumed	1.934	.170	2.458	58	.017	8.300	3.377	1.541	15.059
	Equal variances not assumed			2.458	55.539	.017	8.300	3.377	1.535	15.065

Based on table 4:15, it appears that t arithmetic for learning outcomes with Equal Variances not assumed is 2.458 with a probability of 0.017. For the two-tailed test, the probability becomes 0.017 / 2 = 0.0085. Because 0.0085 <0.025 then Hypothesis zero (H0) states that the results of learning TDO among learners who are taught by using animation media together with learners who conventionally taught (without using the media animation) are rejected. Alternative hypothesis (H1) accepted that states that there are differences in learning outcomes of learners who are taught using animation media with students who are taught conventionally (without using animation media).

This indicates that there are differences in learning outcomes of TDO learners taught by using animation media (A1) with students taught conventionally (A2) thus learning using better animation media and can improve TDO learning outcomes

3.1.2 Second Hypothesis Test

The second hypothesis states the learning outcomes of TDO learners who have higher motivation higher than learners who have low motivation. To test the hypothesis was analyzed by t-test, with results as shown in table 6.

Table 6. Second Hypothesis Test Results

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Learning outcomes TDO	Equal variances assumed	4.654	.045	6.496	18	.000	23.200	3.571	15.697	30.703

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Learning outcomes TDO	Equal variances assumed	4.654	.045	6.496	18	.000	23.200	3.571	15.697	30.703
	Equal variances not assumed			6.496	13.955	.000	23.200	3.571	15.538	30.862

Independent Samples Test

Based on table 6, it appears that t arithmetic for learning outcomes with Equal Variances not assumed is 6.496 with a probability of 0.000. For a two-tailed test, the probability becomes 0,000 / 2 = 0,000. Because 0.000 <0.025 then Hypothesis zero (H0) states that the results of learning TDO among learners who have high motivation with low-motivated learning outcomes are rejected. The alternative hypothesis (H1) accepted states that the learning outcomes of learners who have high motivation higher than those with low motivation. This indicates that there are differences in learning outcomes of TDO learners who have the high motivation (B1) with students who have the low motivation (B2) thus learners who have higher motivation better and can improve the results of learning TDO

3.1.3 Third Hypothesis Test

The third hypothesis states that there is a learning interaction between learning media and learning motivation in influencing student learning outcomes on TDO subjects. To test the hypothesis was analyzed with ANOVA Two-Lane, the results as shown in table 7.

Table 7. Hypothesis Testing Results

Tests of Between-Subjects Effects

Dependent Variable: The Results Of The Study

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2403.533[a]	3	801.178	5.227	.003
Intercept	317699.267	1	317699.267	2072.789	.000
Media_Pembelajaran	1401.667	1	1401.667	9.145	.004
Motivasi_Belajar	9.600	1	9.600	.063	.803
Media_Pembelajaran * Motivasi_Belajar	992.267	1	992.267	6.474	.014
Error	8583.200	56	153.271		
Total	328686.000	60			
Corrected Total	10986.733	59			
a. R Squared = ,219 (Adjusted R Squared = ,177)					

Based on table 7, it is seen that F arithmetic is 6.474 with probability 0.014. Because of the probability of 0.014 <0.05, the null hypothesis (H0) states that there is no learning interaction between learning outcomes taught by using animation media and learning motivation of learners on TDO subjects rejected. While alternative Hypothesis (H1) accepted that states that there is a learning interaction between learning outcomes taught by using animation media and learning motivation of learners on TDO subjects. The average score graph of the learning outcomes of the two treatment groups as shown in Figure 2.
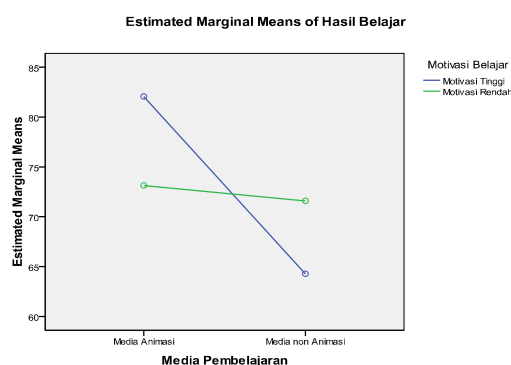
Figure 2. Graph of the average score of learning outcomes of both treatment groups In Figure 2. The graph shows the picture that the score of the result of the students' learning that is taught by the animation media is higher than the non-animated media (conventional). On the graph saw a disordinal interaction between learning using animation media with the level of learning motivation. This is explained by the intersection by the low motivation line on learning using animation media to cut the high motivation line on learning using non-animated media (conventional)

4. DISCUSSION

a. Learning outcomes of TDO learners are taught with animated learning media compared to the learning outcomes of students taught conventionally (without using animation media). The results of the first hypothesis testing, based on t-test analysis showed that overall learners who follow the learning by using the animation media showed higher TDO learning outcomes than the learning of learners without using animation media, which obtained data as shown in table 8

Table 8. Experiment Class and Conventional Classroom Data

No.	Data	Experiment Classroom Learning Results	Conventional Classroom Learning Outcomes
1.	Mean	77	69
2.	Median	75,50	56,00
3.	S^2	133,39	207,70
4.	S	11,55	14,41

From table 8 shows the value for the experimental class above the KKM school that is 75, the conventional class under the KKM is worth 69. While the standard deviation is obtained for the experimental class 11.55 and for the conventional class 14.41. This study is supported by the theory that the media animation can enhance the learner's activity. As Munir (2012: 61), with the animation media strengthen learners' understanding of learning materials so as to improve student learning outcomes.

According to Hamalik (2012: 238) learning by using media animation more communicative and interactive. Proven when the research appears the learners are more centralized and curiosity is higher to learn the material because they feel interested and motivated will be the presentation of media. Thus it can be concluded that to improve learning outcomes learners need to use animation media as a supporter of learning.

a. TDO learning outcomes of learners who have high motivation compared with the results of learners who have low motivation. The second hypothesis test result, based on t-test analysis shows that the TDO learning outcomes of high motivated learners is higher than the learning outcomes of learners who have low motivation. Learners should have high motivation to improve learning outcomes. Gellerman (1963) says that people who have high achievement motivation, would love to win a competition. He dared to bear all the risks as a consequence of his efforts to achieve the goal. Timpe (1993: 221) says that motivation is the desire of someone who encourages him to perform actions that can be seen from the sincerity and joy of the work and done with full responsibility. Things are not much different proposed by Moekijad (1990), and Nawawi (1993) who said that, motivation is a human impulse to do something to achieve goals. Based on the study of theory and the results of data analysis can be concluded that to improve learning outcomes of learners they must have high motivation

b. Interaction between learning media and learning motivation of learners on TDO subjects. Based on the results of the analysis with Anova Two Path, the test results prove there is an interaction between the learning media Animation with the level of motivation of learners in influencing the results of learning TDO. Interaction is a dependency relationship between a variable to some extent from other variables. Result of analysis of third hypothesis test, it can be concluded that there is interaction between animation media with motivation level of learners in influencing learners result of learners or hypothesis presented accepted. This means that this stage of learning results TDO learners who are taught by animation media can improve student learning outcomes. In graph 4.9 seen the interaction disordinal between learning using animation media with the level of learning motivation. This is explained by the intersection by the low motivation line on learning using animation media to cut the high motivation line on learning using non-animated media (conventional). According Kerlinger (2000: 351) states that the variety of interactions with crossed patterns called interaction disordinal. While the interaction with the inline pattern is the independent variable effective one level of other independent variables called ordinal interaction. Interaction is not always the result of a "true interaction" between experimental treatments. There are three possible causes: (1) the variant induced by the actual interaction between the two variables together affects the dependent variable, (2) the occurrence of an accidentally arising interaction, and (3) the effect or effect working on one experimental level, but not working at another level of experiment.

The presence of interaction between animation media with the level of motivation of learners in

influencing the learning result of TDO due to several things, among others: a. The animation media used in this study is an existing media group or media so (Media By Utilization) that is projected motion media, meaning that the show visualizes the workings of a tool accompanied by sound by displaying the program output containing learning materials with interesting pictures accompanied by sound. Learning by using multiple senses, ie the sense of view and hear will provide benefits for learners. The success in learning from what we hear is only 20%, what is heard and see 50%. (Yulaelawati, 2004: 121). This means believed by the media of learning animation will be more meaningfully obtained learners. b. In this animated media if the learners do not understand can play back the animation outside the lesson, meaning learning can be done repeatedly with ease and efficiency.

c.   The animation media used can display things that are not visible (abstract). For example the visualization of the combustion process in the combustion chamber. It is believed that understanding of learning messages using animation media is more meaningful, starting from the diffrensiasi phase that learners initially observe, identify and analyze. Furthermore, in the conclusion phase of learners through visualization experience is believed to be able to create a new conceptualization of what they learned before. Evidently, the use of animation media can: 1) overcome the limitations of space, time and sense power, 2) appropriately and varied can overcome the students' facial attitude, so the media can cause excitement in learning (Sadiman, 2008: 17).

Thus it can be concluded that the animation media implemented in this study is the right media in improving the results of learning TDO students class X TPBO in SMK N 2 Payakumbuh

5.   CONCLUSIONS AND RECOMMENDATIONS

Based on the results of data analysis and discussion, it can be concluded that: (1) Learning outcomes using animation learning media better than conventional or without animation media learning. (2) Results TDO learners who have high motivation higher than the results of learning learners who have low motivation.(3) There is a significant interaction between the use of animation learning media with the learning motivation of learners in influencing student learning outcomes on TDO subjects. It is suggested to the Headmaster to encourage teachers to choose the animation media in delivering the lesson material effectively and pay attention to the availability of supporting facilities and infrastructure, including the availability of computers and in-focus in schools. For further researchers it is expected to use more complete instruments and design an integrated animation learning media on the learning objectives in the curriculum. In addition, for teachers who teach TDO subjects should diligently integrate several learning methods. In the activities of mentoring, development, and management of teacher learning activities certainly can facilitate learners so motivated in achieving learning objectives. It is expected that the appropriate and varied media use can overcome the passive attitude of learners

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INFORMATION SYSTEM AND REPORT VALUE PROCESSING BASED MICROSOFT VISUAL BASIC 6.0 ON SENIOR HIGH SCHOOL (CASE STUDY AT SMAN 12 PADANG)

Indra Wijaya [1], Isra Mouludi [2], Fandy Neta [3], Yaslinda Lizar [4], Satria Ami Marta [5],

[1] Faculty of Teacher Training and Education, Universitas Putra Indonesia YPTK Padang
[2] Department of Agro-Industry Management, Polytechnic ATI Padang
[3] Informatic Engineering Department, Politeknik Negeri Batam
[4] Faculty Sharia, UIN Imam Bonjol Padang
[5] Student Education of Information Engineering, State University of Padang

ABSTRACT: Computers have become a major tool in every human activity. Not only for business applications but also in everyday activities. This shows how computers have become part of human evolution. This happens because the computer is able to make human work easier and more effective. Computers can perform data calculation process and also data processing. This makes it easy to gauge and process an information system report. One of the most important parts of a school is the student's and student's grades. In a school, there are hundreds of students and each has different values. Not infrequently the storage value of students recorded and stored conventionally. So it takes a very long time in the process. Research conducted at SMAN 12 Padang, which is oriented at filling the report card and computerized information presentation. In the sense not only to use but also able to solve problems that may arise and fill in manual data that has been done. The result of this research is a design of application program that can be applied directly in SMAN 12 Padang. The use of computers that are applied to Visual Basic 6.0 programming language will help in data processing, both in terms of time, accuracy and good results.

Keywords: Information System, Report, Visual Basic.

1. INTRODUCTION

The development of technology and the current globalization at this time is needed for the development of Human Resources from various aspects that exist, both in terms of science, the development of values and attitudes, and skills and so forth. Every human being throughout his life seeks to obtain a decent life in accordance with his nature, therefore the human being is entitled to get the highest education in an effort to prepare him to achieve the level and quality of life that is expected in achieving happiness. To improve the quality of human life is the very necessary role of education, both individually and social groups. In the world of education, the role of an educator is very decisive direction and success of his students.

The purpose of high school education explains that learners need to develop the potential that exists in him. In this regard, the government has ensured that children with special intelligence are entitled to special attention in order to develop capabilities appropriate to their personal growth rate. This is affirmed in Article 5 paragraph 4 of the National Education System Act of 2003 that citizens with potential intelligence and special talents are entitled to special attention.

SMA is one form of a formal education unit that provides education at secondary education level as a continuation of SMP / MTs or other similar or equivalent form of learning results that are recognized equal/equivalent to SMP / MTs. In high school, students are required to choose an existing department, ie Science, Social, or Language.

One of the most important parts of a school is the student's and student's grades. In one school there are hundreds of students and each has different values. Not infrequently the storage value of students recorded and stored conventionally. So it takes a very long time in the process.

While the results of data processing student value can only be seen, both by students and parents only on book report cards. The data processing system of the students of SMA Negeri 12 Padang is not yet fully computerized. The procedure is to receive the students' assessment file from each subject teacher after it is recorded in the book of value/leger and copy it back in a book called the report card. After copying the report cards are stored and distributed to each student at the time of delivery report cards take place. In the time period specified by the party, the school, the student is required to return the report card to the Master Guardian of each class. As long as the report cards are in the students, not all students can keep the report cards well. There are still students who do not care and careless, this is what is feared can cause report missing, wet water, tear and neglect other students that result in damage to report cards. Not

among the students alone, Master Guardian sometimes mistakenly or forgot to place the deposit of student report cards. This is because the filing cabinets are not neatly arranged and the number of student report cards in a closet.

SMA Negeri 12 Padang for now still use the old process in bookkeeping the value of report cards. Processing and making the value of report cards begins with the stages of each field of teachers submit value to the homeroom, then the guardian class makes a recap of the value of each subject by way of inputting manually / handwriting that takes a long time and prone to error , if an error occurs then the homeroom must remove again so as to make the recap of the value becomes less clean and tidy. The homeroom should also look for the average grade of each student and rank it (rank) which will then become the value of report cards. The recap of the report will be sent by the homeroom to the General Affairs Department (TU) after the file is accepted, TU will enter the value in the student's book as the archive, where the value has not been inputted into digital data. The next stage is TU staff re-process with computerization. In this case, processing report cards still use Microsoft Excel, after which TU staff print the value of report cards and submitted to the homeroom, to be distributed to the guardian.

Efforts in data processing and information will work with a better change on existing systems (Microsoft Excel). So that when errors and delays occur when the calculation of processing value that takes a lot of time and requires a lot of energy can be minimized.

For that, the authors compiled an application program used to support information systems data processing report-based multiuser. Data collection methods by the authors include field studies. Field studies include observation or direct observation methods and direct interview methods with the parties related to the problems studied so as to obtain data and information that can be trusted truth. The use of computers and programs Microsoft Visual Basic 6.0 as a tool and teacher/guardian class as operators can generate reports quickly, efficiently, reports generated in the program Computerized System Processing Value Report multiuser at SMA Negeri 12 Padang, among others: Subject Data Report, Competency Value Data Report, Extracurricular Value Data Report, Report Value Data Report.

Based on these problems, the authors are encouraged to carry out further research on the filling system report cards are set forth in the form of a thesis entitled "Processing Information System Report KTSP Based Microsoft Visual Basic 6.0 At SMA Negeri 12 Padang.
In an effort to obtain a clear picture and misinterpretation of the research problem, this study is limited to:

a. How to design Microsoft Visual Basic 6.0 as a student value data processing application?
b. How to design a suitable layout and easy to use?
c. How to create an application program based on the design?
d. How to use Microsoft Visual Basic 6.0 apikasi program as a means of processing student data values?

2.1. Research focus

Based on the identification of problems that have been stated above, in order to obtain maximum research then this research is focused on "Information System Value Report KTSP Based Microsoft Visual Basic 6.0 At SMA Negeri 12 Padang".

2.2. Research purposes

Based on the formulation of the problem, the purpose of this research and development is to:
a. Design Microsoft Visual Basic 6.0 as an appropriate value extraction.
b. Designing the appropriate layout and easy to use.
c. Create an application program based on the design.
d. Application of Microsoft Visual Basic 6.0 based application program as a means of processing student value data.

2.3. The benefits of writing

The benefits that can be given are as follows:
a. For Researchers.
   To increase knowledge and various means to apply knowledge gained in college to the development of Microsoft Visual Basic 6.0.
b. For School.
   The results of this study are expected to provide input on the school, which can be used as a material consideration in spur teachers/homeroom class in improving data processing student value.
c. For Development of Scientific.
   Can be used as a material to develop knowledge and comparison materials for readers who will conduct research.

3. THEORETICAL

3.1. Overview of Information Systems

3.1.1. Understanding System

There is two (2) approach groups in define system that is:

1) The approach that performs on the procedure "The system is a network of interconnected procedures, gathered together to perform an activity or to accomplish a particular goal" (Jogianto H. M, Information Systems Analysis, and Design).

2) The approach that emphasizes the component or element of "System is a collection of elements that interact to achieve a certain goal" (Jogianto H. M, Analysis and Design of Information Systems). Thus, it can be said that the system is like a linked link to one another, which, if disconnected or lost, one of them will not work.

3.1.2. Classification System

The system can be classified from several points of view, including the following:

1) The system is classified as an abstract system (abstract system) and a physical system (physical system). The abstract system is a system of thoughts or ideas that do not appear physically. The physical system is a system that exists physically.

2) The system is classified as a natural system and a man-made system. The natural system is a system that occurs through natural processes, not made by humans. Man-made systems are systems designed by humans.

3) The system is classified as a particular system (deterministic system) and a probabilistic system, where a particular system operates with predictable behavior whereas the indeterminate system is a system whose future conditions are unpredictable because they contain elements of probability.

3.1.3. Understanding Information

Information can be interpreted as a result of processing data in a form that is more useful, easier to understand and more meaningful to the recipient that describes real events (events) used for decision making.

The source of information is data. Data is a fact that can be recorded and implicitly meaning. Events are things that happen at a given moment.

There are two (2) types of data that are the source of information:

1) an Empirical data
   is data obtained from data- gathering data or *survey* (direct observation).

2) Data from the experts
   is data from opinions or views *subjectiv*e of experts or people who are more aware of the uncertain event.

Good information is information that has quality. The quality of the information depends on:

a) Accurate

Accurate means information that is free from mistakes, not misleading, inaccurate also means that information must be clear and reflect the intent.

b) Timely
   timely information is information that is not too late to come to the wearer. The outdated information will not affect the value anymore, because information is a cornerstone in making a decision. If the decision too late, it will be fatal for an organization.

c) Relevant
   Means that information has benefits for the wearer. The relevance of the causes of damage to a computer or the system will be more relevant when directed at a computer expert and a systems analyst to be able to repair the damage or mistakes occur.

3.1.4. Understanding Information Systems

Information setback of an organization. Presentation of good information will make it easier for the manager or in making decisions. Systems that lack of information will look fragile. Data sources of information to be processed in order to be useful to those who receive.

The information system also called design *Processing System.* A system which is a link in an organization that meets the needs of daily transaction processing, contains the operation, managerial and strategic activities of an organization (Jogianto H. M, 1989: 11).

3.1.5. Systems Development Life Cycle

Development of computer-based information systems can be a complex task that requires a lot of resources and can take months or even years to complete. The system development process through several stages starting from the system it is planned until the system is implemented.

When the operating system that has been developed still comes back issues that are critical and can not be overcome in the maintenance phase of the system is necessary to develop a system to overcome back and returned with the first process is the planning system. This cycle is called the system development life cycle *(Systems Development Life* Cycle).

According to Jogiyanto H. M (1989: 52), information systems development life cycle can be seen in Figure 1.
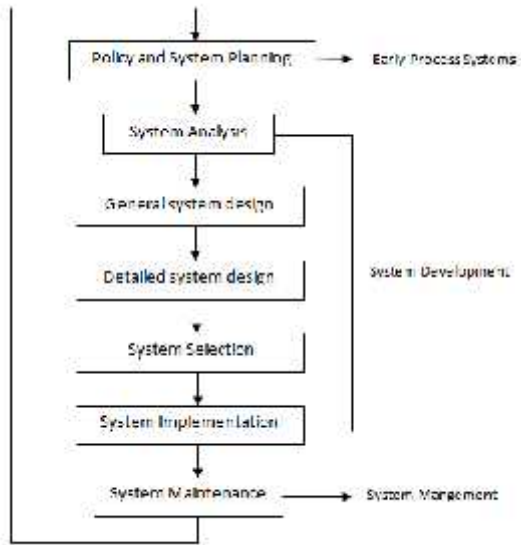
Fig.1 Systems Development Life Cycle

3.2. Database Basic Concepts

According to Stephens and Plew (2000) *Database* is a mechanism used to store information or data (Janner Simarmata and Faith Paryudi, Database).

Technology *Database* needs arising as a result of information that can be provided by a computer, this information is not only the daily needs but also the needs of the process of planning and control at the top level of management *(top level* management).

3.3. The basic concept of the Visual Basic programming language

Visual Basic is a computer programming language. Programming languages are the commands understood by the computer to perform certain tasks.

Programming *Visual Basic* language, developed by *Microsoft* since 1991, is a development of its predecessor the programming language BASIC *(Beginner's All-purpose Symbolic Instruction* Code) developed in the 1950s. *Visual Basic* is one of the *Development Tool* are tools to create a wide variety of computer programs, especially those that use the operating *Windows* system.And *Visual Basic* is a computer programming language that supports object*(Object Oriented Programming* = OOP)

4. ANALYSIS AND RESULTS

4.1. Systems Analysis

4.1.1. Information Systems Flow(ASI) Old

Analyzing the current system was conducted to determine the real issues faced by SMA 12 Padang.

This analysis is used to provide alternative forms required.

For more details, then the Flow of Information Systems (ASI) Lama can be seen in Figure 2 below:
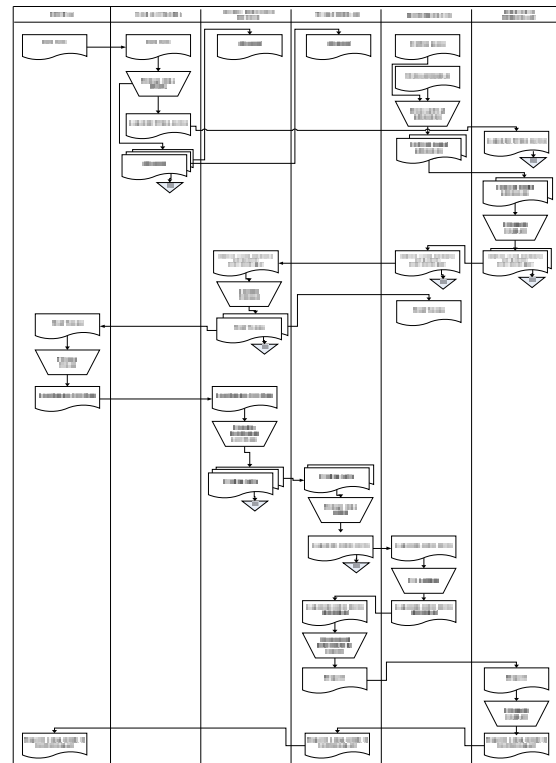
Fig.2. Flow of Information Systems (ASI) Duration

4.2. System Design

4.2.1. Flow Information Systems (ASI) New

In a new information system does not do a thorough change. , Changes occur only on computerized data processing method using *Exel* into a computerized method that uses the programming *Visual Basic* language. For more details can be seen in Figure 3 below:
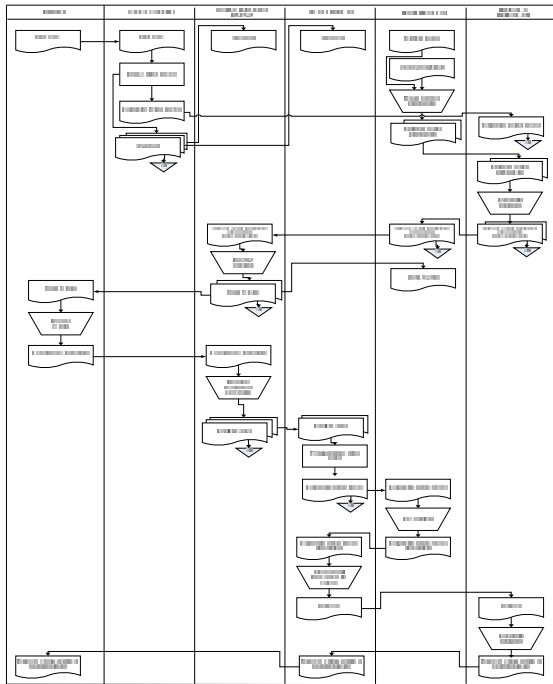
Fig.3 Flow of Information Systems (ASI) New

4.2.2   Context Diagram

The following pictures *context diagram* of academic information system SMA 12 Padang, which consists of a symbol system that interacts with six *entities* are students, administration, subject teachers, homeroom, curriculum and leadership. For more details can be seen in Figure 4.
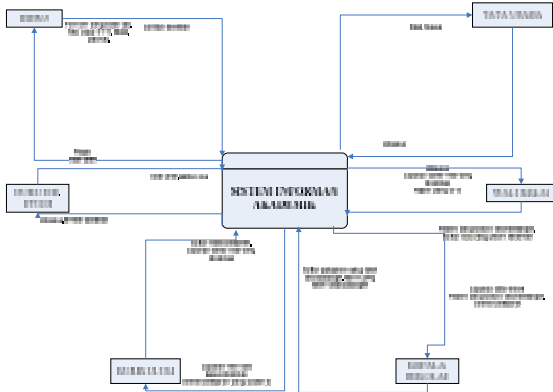
Fig 4. Context Diagram

4.2. Data Flow Diagram

Data flow diagram merupakan alat untuk menggambarkan sistem informasi tanpa harus memperhatikan sampai ke hal – hal yang lebih rinci. *Data Flow diagram* mempunyai empat simbol yang dapat digunakan untuk mempresentasikan sistem informasi fisik dan logik.
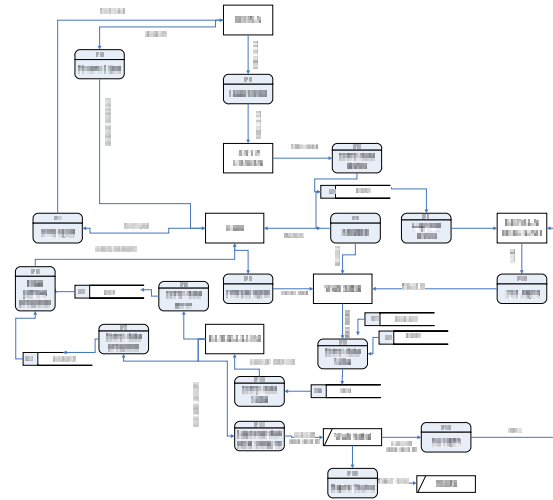
Fig 5. Data Flow Diagram

4.3. Data Flow Diagram

Data flow diagrams are tools to describe the information system without having to pay attention to things - things in more detail. *Data Flow diagram* has four symbols that can be used to present physical and logical information systems.
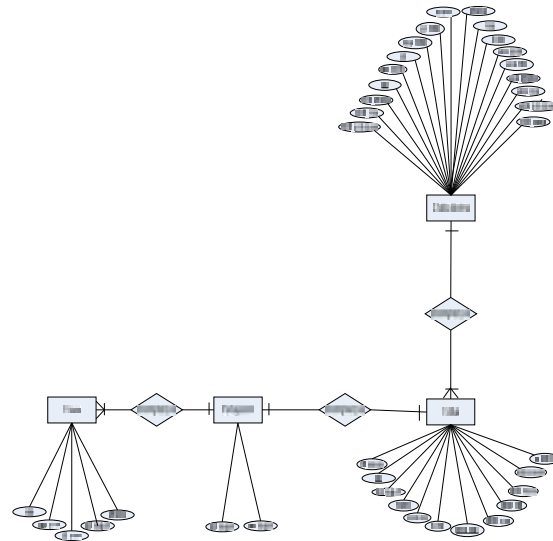
Fig.6. Entity Relationship Diagram (ERD)

4.4. Structural Program

Design is a program structure design description of the relationship between a program module with other program modules. The design of the structure of the proposed program can be seen in Figure 6 below:
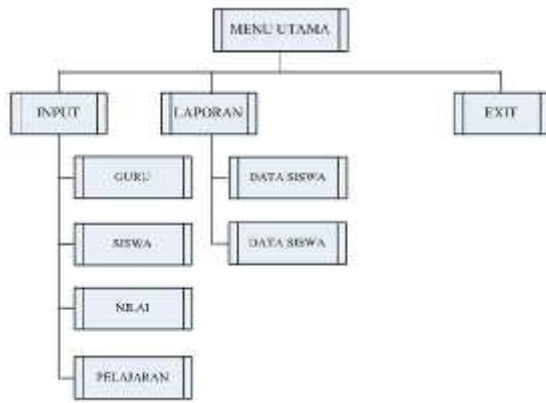
Fig.7 Program Structure

5. SYSTEM IMPLEMENTATION

5.1. Implementation In the System Created

5.1.1. Menu Login

Menu login function so that users can log in and access the data after the validation is usually a username and password.

Fig 8. Menu Login

5.1.2. Main Menu

Main Menu displays a menu that consists of themenu, *file*report menu,menu, *exit*each of the menu has a sub-menu of its own.

Fig. 9 Main Menu

5.1.3. Student Data Entry

Student Data Entry function to mengentrikan data regarding the students that will be filled raportnya value. These data will be used as the data in the report cards charging-based *Microsoft Visual Basic 6.0*

Fig 10. Entry Display Student Value

5.1.1. Lesson Data Entry

Data Entry Lesson serves to enter data about the subject to be filled in value.

Fig .11. Entry Data Lesson

5.1.4. Entry Students value
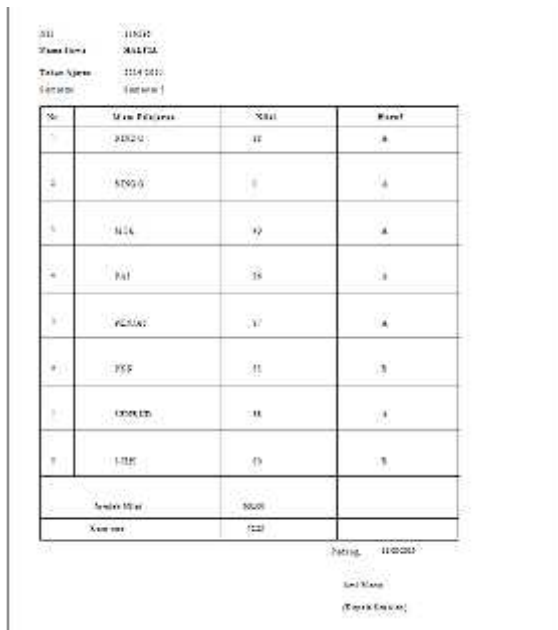
Student Value Entry serves to enter data about the values obtained by the students according to their respective abilities

Fig.12. Entries Display Student Value

5.1.5. Data Raport

Data Report serves to issue a report on the overall student value that exists in SMA Negeri 12 Padang.

Fig.13. Student report cards Display

5.2. System Advantages and Disadvantages are Talah Created

5.2.1. Advantages

1) How to use the simple application and easy to understand.
2) Being able to save time filling report cards.
3) Facilitate teacher / homeroom in entering student grades.

5.2.2. Disadvantages

1) The administration fee is higher
2) Installation requires considerable time

6. CONCLUSIONS

After discussing the report cards based on *Visual Basic 6.0* on SMA 12 Padang and do the designing and designing new information systems using database management systems and uses *Visual Basic* 6.0,then the chapter this can be deduced from the whole process of analysis that has been done before. It can also be given advice to the parties who use this system design to optimize the system performance.

1. With the use of computers and applications, it will enhance the optimal work in the process of filling system the value of report cards based on *Microsoft Visual Basic 6.0* in SMA 12 Padang

2. By utilizing the new system, it is expected to obtain a charging value of report cards are fast, accurate, and optimal terms usage.

3. By utilizing an integrated system application program, then kesaalahan-expected error no longer occurs.

4. The use of computers is applied with the programming language *Visual Basic 6.0* will assist in data processing, both in terms of time, accuracy and good results.

5. Designed system will facilitate in making the report charging value of report cards, and the system is designed to present the required information whenever needed.

6. Results from the manufacture or design of this new system, hopefully to overcome the constraints that exist and beneficial to the SMA 12 Padang.

7. SUGGESTIONS

From the above conclusions, and after seeing the results of research done, it can put forward the implementation of the new system gradually. With the adjustment and maintenance of the new systems, so the success of the implementation of the new system can be fully guaranteed. To support the use of this new system, it is provided suggestions so that mistakes in the use and presentation of information.
As for suggestions that are considered necessary are:

1. In the implementation of this new system it must first be carried out adjustments to the existing system or the system is running so that the new system will feel the advantages and benefits compared to systems that are running at the moment.

2. Replacement of the system from the old system to the new system takes time to adjust. For the replacement of these systems, it can be done gradually, in addition to the old system and the new system can be used simultaneously. This will not interfere with the activity until the new system can be received by users of the system.

3. To be the implementation of the new system, we encourage communication between the leadership (Principal) and data processing personnel should be further improved. Leaders must be able to provide explanations and motivations of the personnel about how the importance of computers in helping to solve the problems with the optimum of what has been implemented so far, to further the personnel should be provided with sufficient knowledge of data processing by using a computer to enable companies to run and grow in accordance with the progress of science and technology.

4. Required training and introduction to the homeroom / teachers and employees associated with the system to be implemented, the

minimum homeroom / teachers and the employees know and understand about the application program that is applied.

5. With the new system, a computer user can stimulate other parts to be able to make changes to their work systems through the application of a computerized system, so it can be further developed towards a more perfect.

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DESIGN OF SIMULATOR FOR REPLACEMENT OF TOOLS PRACTICE DIGITAL ENGINEERING IN THE VOCATIONAL SCHOOL

Irwan Yusti, Ganefri and Ridwan

Postgraduate Technical and Vocational Education and Training
Fakultas Teknik Universitas Negeri Padang, Padang Indonesia

ABSTRACT: Vocational School, is a school that is expected to produce graduates who have the expertise, skills and competence in their field, to be Able to Compete in the world of industry and business world. This can only be Achieved if vocational schools have adequate facilities and infrastructure, from some research results, it is found that most vocational schools do not yet have adequate facilities and infrastructure. Limitations of funds are the cause of the inability of vocational schools to provide practical means. Simulators can be used instead of existing practice equipment, using simulators, vocational schools with limited funds can improve competency Reviews their graduates.

Keywords, Vocational School, Competency, Simulator

I. INTRODUCTION

Indonesian National Qualifications Framework (KKNI) [1] requires that vocational graduates should have the competence, capable of performing a specific task and have basic operational knowledge of the specific areas of work.

To achieve the required competencies in KKNI, SMK graduates should not only have the theoretical capability but also must have the ability in the field of practice. Prosser [2] stated "Vocational education will be efficient if the environment in which students are trained is a replica of the environment in which she will work". In other words, SMK should have facilities adequate practice in order to have the competencies expected by the world of work.

Of the few studies that have been conducted on the feasibility of facilities and infrastructure practice [6] [7] [8], it was found that many SMK does not have the facilities and infrastructure adequate practice, this is caused by the lack of funding for the provision of facilities and infrastructure such practices, Prosser [2] states that "vocational education requires a certain cost and if it is not met then the vocational education should not be forced to operate". So that SMK has limited funds may have facilities adequate practice necessary to develop facilities and infrastructure practice at an affordable price, which has the same specs as a practical tool available today. One effort that can be done is to replace the existing practice facilities currently using the software in the form of a simulation program.

The simulation program has been developed by software developers such as Matlab, Proteus, Labview. The simulation program can be used to simulate the existing practice in vocational, just can not be made as a replica of a practical tool in SMK today. Therefore, this study aims to develop a simulator which is a replica of a practical tool in SMK today. With the simulator, SMK has limited funds can be used as a substitute for practice. With the tools of practice, vocational school graduates can increase their competence.

II. BASIC THEORY

1. Simulation

According to Thiagarajan[3] "Simulations create situations that are analogous to Certain aspects of reality".

Simulations by Heinich[4] is "An abstraction or simplification of some real-life situations or processes. In the simulation, participants usually play the role of involving them in interactions with others or with elements of a simulated environment ".

Of the two theories can be concluded that a simulation is an event or condition that made such actual events or conditions, by simulation, the simulation participants will gain the knowledge and skills to deal with events that real.

According to Joyce & Weil [5] simulations in education can be done in several forms, namely:
a. role-playing
b. Sociodramas
c. Game
d. Peer Teaching

2. Simulation Program

Simulation is a software program that is designed to be able to simulate an event like the

actual incident. The simulation program is an application program that can be made using commonly used programming languages such as Visual Basic, C ++, Delphi or Java. In this research, the programming language used is C ++ language. In order for the programming language can be made into a simulation program needs to add some algorithm. The algorithm is a provision - the provision used as a reference in the simulation to be made, an example of an algorithm for the simulation of the AND gate as table 1.

Table 1. Algorithm AND gate

IN 1	IN2	OUT
0	0	0
1	0	0
0	1	0
1	1	1

3. Digital Technique

course in digital engineering is a core lesson for vocational electronics group, the purpose of this lesson is to give knowledge to the students about the components - digital components and the principle of digital circuits.

In subject digital techniques, the main material is taught to students is about:

a. Gate basic
b. Flip-flop
c. Register
d. Decoder

III. METHOD

the method used in this research is the R & D, in which the author develops equipment practice is used for this (in the form of hardware) into equipment practice shaped software and a study of the literature for these practice equipment to meet the feasibility standards (effectiveness. Practicality and validity).

IV. DESIGN

The simulator that will be made in this study is a simulator that can simulate all the lesson material in digital techniques. Therefore, the simulator is divided into several modules, where each module can simulate the subject matter.

1. Basic Gateway Module

The basic gate module is a module that can simulate the characteristics of basic digital gate techniques. Basic gate module design as shown below.
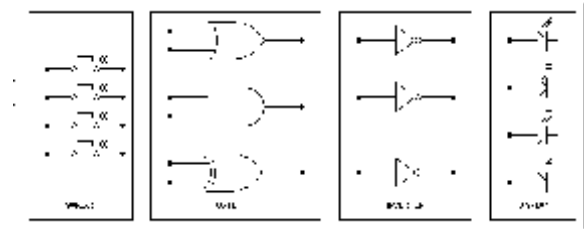
Fig 1. Basic Gate Module

2. Module Flip – Flop

Module flip-flop is a module that can simulate the characteristics of a flip-flop. The design of the module flip-flop as shown below.
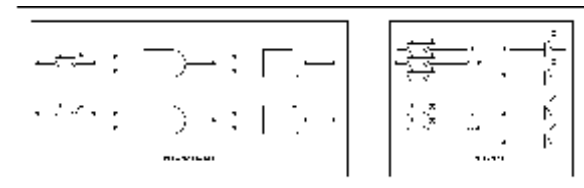
Fig 2. Module Flip – Flop

3. Register Module

In the module register, students can see the characteristics of the register. Image module registers as below.
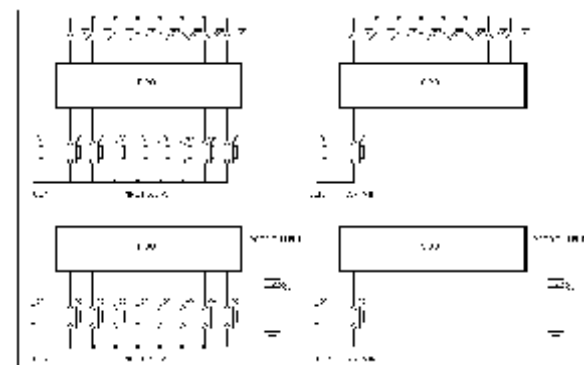
Fig 3. Module Registers

4. Module Decoder

In decoder module, students can see the characteristics of the decoder. Image decoder module as below.
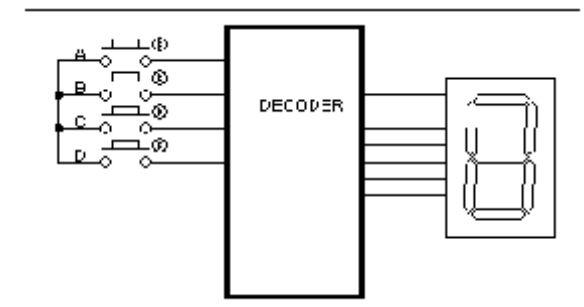
Figure 4. Module Decoder

V. CONCLUSION

graduate vocational competence can only be enhanced by providing skills to students. Students in vocational skills acquired from practice in schools and practice in the world industry / world of work.

Limited funds can not make much vocational facilities and infrastructure providing adequate practice, so it is difficult to increase the vocational competencies graduates, with the simulator is expected to help SMK who have limited funds, improve the competence of their graduates.

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CELL ROTATION TO RESOLVE THE WEAKEST CELL DAMAGE IN THE BATTERY PACK IN DISCHARGING PROCESS

Irwanto Zarma Putra[1], Citra Dewi[2]

[1,2] Department of Electrical Engineering Faculty of Engineering
Universitas Negeri Padang Jl. Prof Hamka, Air Tawar, Padang, Indonesia

ABSTRACT: This paper discusses the use of batteries in battery packs that will explore the tendency of weakness in some battery cells. In the battery pack, there will be a battery cell that becomes the biggest damage target caused by undervoltage in the discharging process. Undervoltage occurs because of the difference in voltage values on each cell in the battery pack.The circuit becomes one of the factors causing a difference in cell voltage value in the battery pack. Therefore the cell rotation method is offered. This method will attempt to repair the difference in voltage values in the battery pack. The repair is focused on battery cells that will be under voltage in every discharging cycle that is conducted to keep the battery condition to be maintained. The displacement of the cell with the lowest value to the cell with the highest value successfully eliminated the weakest cell which constantly experiences greater stress than other cells in the circuit in the discharging process.

Keyword: Battery, Battery pack, Cells Rotation, Discharging.

1. INTRODUCTION

The battery is one of the main components in the use of portable devices and electric vehicles which is developing better. The use of battery in portable devices and electric vehicles uses more than one cell batteries to supply the energy needs. The existence of batteries in electric vehicles has a high economic value compared with other devices [1] so a research about maintaining the condition of battery cells to be in good condition and work optimally is needed to be conducted. This paper is proposed a new method to maintain the cell battery on the battery pack to be optimal.

2. BATTERY

The battery is a device used to save energy through an electrochemical process. Electrical chemical occurs when charging of electric energy is converted to chemical and when discharging of chemical energy is converted to electric energy [2].

A battery consists of several cells that are connected in series or parallel to obtain the required voltage value of electronic devices. Battery capacity is affected by several factors [3] such as a number of active materials, material type, temperature, battery life, operational usage, and maintenance.

The battery used in this study is Lithium-ion battery. The lithium-ion battery is commonly found in electronic devices. The lithium-ion battery was first discovered by Whittingham in 1960. This battery is one of the most popular rechargeable battery types today. Some of the advantages of a lithium-ion battery are having high energy specifications [4], no memory effect, long charging and discharging cycles [5], and easy maintenance [6]. In addition, to use in electronic devices, lithium-ion battery is also widely used by industry, military equipment, electric vehicles [7].

3. BATTERY CELL ROTATION AND THE MECHANISM OF CELL DISPLACEMENT

The new method applied in this study is cell rotation. The method is based on the explanation stated [1]that there is a cell that will be the weakest cell or in other words, the cell will be damaged firstly compared to other cells caused by the imbalance of the cell.

The circuit becomes one of the factors causing the different value of cell voltage in the battery pack, therefore the cell rotation method is proposed. This method will attempt to repair the difference value in the battery pack. The repair is focused on battery cells that will undergo under voltage in charging and discharging cycle that is conducted to keep the battery condition maintained.

The application of the cell rotation method is also limited to batteries that have not experienced many charging and discharging cycles. The limitations are made on the basis of internal custody

owned by each cell that has not undergone many changes.

The process of charging and discharging performed as much as 9 early cycles to determine the pattern of voltage value changes for 6 lithium-ion battery cells that are arranged series. 9 cycles of charging and discharging which selected based on changes in internal resistivity and battery capacity that will occur in every cycle are not too significant [8]. The charging and discharging process is done to detect which cell becomes the weakest cells and the strongest cell in the battery pack. From 9 cycles of charging and discharging, the result showed that cell 3 is the weakest cell in the battery pack and cell 4 is the strongest cell in the battery pack. The weakest and strongest battery cell position changes were performed that is from cell 3 to cell 4 and vice versa then the experiment for 9 charging and discharging cycle was done again to determine the changes and improvements that occur in the battery pack.

4.   RESULT AND DISCUSSION

The method was applied in the charging and discharging process, but the significant effect only occurred on the change of voltage value in the discharging process. The experiment was conducted in 9 cycles of discharging with the battery voltage value of 24 V and each cell voltage of 4V. The discharging process was conducted with a load value of 50 W with constant load discharging technique. The experiment occurred averagely on 85 minutes with a limit of loading stopped when one cell reached its minimum voltage of 2,7 V.
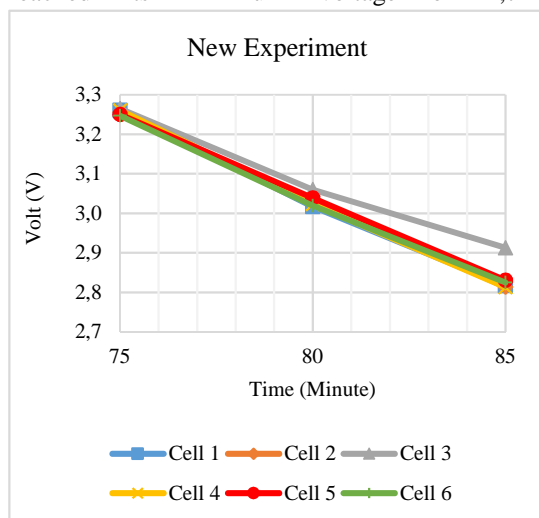
Figure 1 : Detail of Initial Discharging Experiment Data

In the preliminary experiment, the battery was given a load of 50 W with an average time of experiment of 85 minutes. The experiment was stopped when cell 3 of the battery pack reached a voltage of 2.7 V. From the beginning of the experiment until the 70th minute, the changes of voltage value on each cell was relatively balanced,there is no noticeable difference in voltage values, the decline in voltage value that is very sharp and voltage differences on each cell was begun from minute to 75 until the end of the experiment. Cell 4 became the cell with the highest voltage value from the other cell at the end of the experiment. The experimental data showed that cell 3 became the weakest cell and cell 4 became the strongest cell in battery pack. Based on these data and previously described mechanism, the change of battery composition on the battery pack was done, where the weakest cell is placed in the strongest cell position and otherwise and repeat new experiment to determine the result of the change of voltage value in the battery pack.
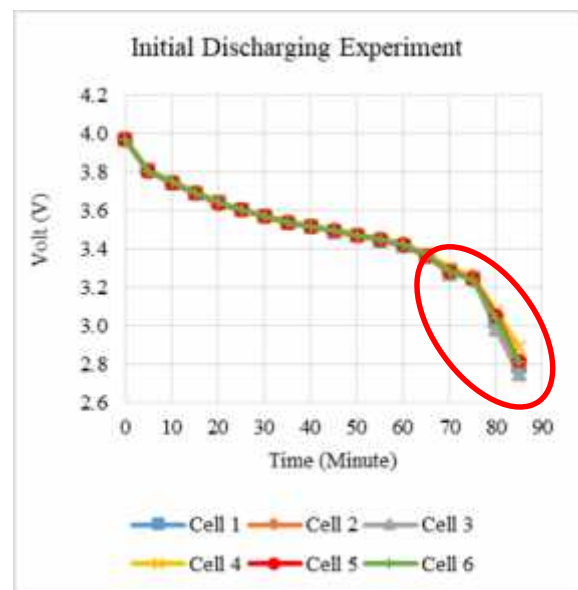
Figure 2 : Initial Discharging Experiment Data
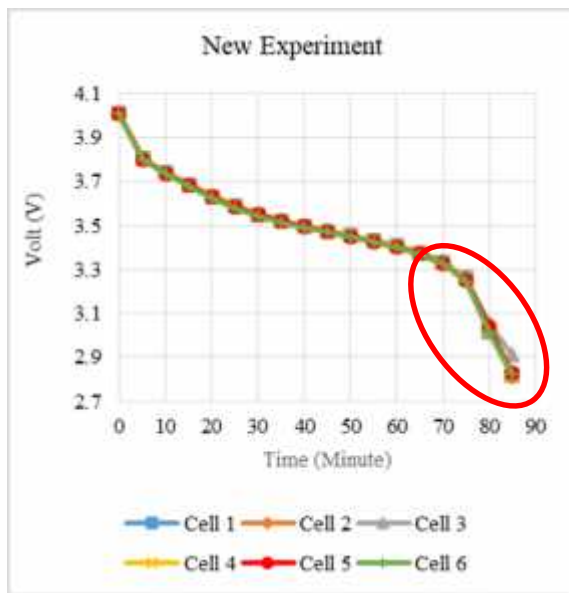
Figure 4 : New Discharging Experiment
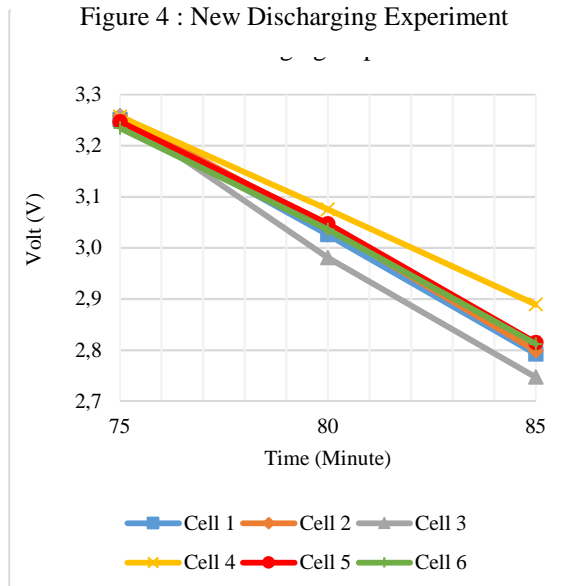
Figure 5 : Detail of New Discharging Experiment

The new experiments performed after the changes in the battery sequence, data showed that the decreasing in volatage value is fairly drastic occurs only at the beginning and at the end of usage. No more cells are found to have lower values than other cells but still get the cells with higher voltage values than other cells. Cell 3 became a cell with a higher value than the other cells at the end of the experiment.

The variety in the standard value of deviation was occurred in thepreliminary experiment, cell 3 had higher deviation than other cells that was 0,289

andcell 4 had lower deviation than other cells that

	N	Minimum	Maximum	Mean	Std. Deviation
Initial Experiment					
Cell 3	18	2.747	3.971	3.47628	.289234
Cell 4	18	2.889	3.971	3.49267	.258304
New Experiment					
Cell 03	18	2.913	4.010	3.48767	.257305
Cell 04	18	2.813	4.011	3.47850	.274842

was0,258. In new experiment, only 1 variety of

TABLE 1 : Descriptive Statistic

standard deviation value that was on the cell 3 which was smaller than other cells that was 0,257. The higher the deviation value of data means the higher the variety of the data. With the average value of each cell which was almost same, so the preliminary experiment could be stated to have a larger variety of change values than new experiments.

The method proposed in this study is only applicable for the change on batteries that have not yet experienced the cycle. This method successfully resolved a difference in battery cell voltage which will adversely effect on the cell in discharging process. The repair resulted was eliminating the lowest cell by placing the cell in the highest voltage cell position. At the end of this study, It can be concluded that the cell rotation method proposed has a more effective role in the discharging process.

5. CONCLUSION

The displacement of the cell from the lowest to the highest successfully eliminated the weakest cell which constantly experiences greater stress than other cells in the circuit in the discharging process. The repair is only applied to the battery which has not much charging and discharging cycle because of other undefined factors due to the effect of this study.

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IMPROVEMENT OF CONCRETE QUALITY WITH ADDITION OF SUNUA PASIR PADANG PARIAMAN WEST SUMATRA

Iskandar G.Rani[1], Widya Salmita[2]

D3 Civil Engineering FT State University of Padang

ABSTRACT: West Sumatra as a common area shaken earthquake, the construction of buildings both as shelters, shophouses, and other social buildings need to be built with earthquake safe concrete construction. Concrete construction is the best choice, because the material constituent relatively large, and the price is relatively cheap in West Sumatra. This study aims to increase the compressive strength of concrete with low cost. The experimental approach was chosen by experiment method that is the addition of Sunua sand material to the concrete mixture ranging from 5%, 10%, 15%, 20%, 25% and 0% for the control concrete. From the result of concrete compressive test after 28 days old with addition of Sunua sand at 5% percent = 44,20 MPa, for 10% = 48,29 MPa, for 15% = 49,62 MPa, for 20% = 44.00, for 25 % = 401,37 MPa, and the control concrete is 417,46 MPa. So the highest concrete strength is obtained at 15% percentage with power 49.62MPa.

Keywords: Increased, concrete strength, Sunua sand

A. Preliminary

Development of science and technology at the end of this century so rapidly, even become the main characteristic of human life. Only qualified human beings, capable of developing, science and technology properly, continuous human resource development will be able to deliver people to cultivate and utilize existing natural resources, to meet the needs of decent and comfortable living.

The necessity of a life of one of the buildings and infrastructures which is considered vital by a country, such as housing, office building or education. Therefore needed a creativity in creating construction creations by doing construction engineering that is simple and fundamental. However, in the engineering of this construction, it should be noted also how the safety and feasibility of such engineering in the construction engineering of a building, such as concrete used for mixing the columns, sloof, beams and floors, should be carried out without leaving any security factor.

Concrete is the main material used in construction work. In order to design the strength of the concrete well, it must meet the criteria of economic aspects that is low in cost and meet the technical aspects of meeting the strength of the structure. Aggregate is a concrete-forming material having the greatest composition in a concrete mixture. The arrangement of aggregate items is one of the most important aspects of improving the quality of concrete. For fine aggregates (sand) on concrete mixtures are generally less fine grains due to drift with water, while in order to obtain a higher compressive strength required fine particle size in order to increase the density of the concrete mixture.

Sunua Sand is a sand located in Sunua Beach, Pariaman, West Sumatra. This sand has fine grains, high specific gravity and has iron content. Therefore, researchers want to raise research with the title: "Increase the compressive strength of concrete with the addition of sunua sand"

B. Research Methodology

This research is done through experimental method approach, where there are six types of composition developed, the first type is made of concrete without added materials or called control concrete, while the other type of composition successively use added materials of sunua sand each 5%, 10 %, 15%, 20% and 25%. Through this experimental method found the most appropriate trend of addition to the highest strength of the baton. The place of research is done in Civil Engineering Building Materials Laboratory of the State University of Padang.

C. Results and Discussion

Prior to the manufacture of specimens, it is necessary to test aggregate characteristics, it is intended that the aggregates used in accordance with SNI standards or requirements governing the feasibility of aggregates are used since the aggregate characteristics affect the strength and properties of the test specimen itself. In this

research the aggregates tested were split, sand, and Sunua sand. Sunua sand is taken from Sunua Padang Pariaman beach sand while other aggregates come from Lubuk Alung Padang. The following test results of aggregate characteristics:

Figure 1. Organic Sand Duku

Figure 2. Organic Sand Sunua

Table 1. Recapitulation of Duku Sand Test Result

No	PARAMETER	HASIL	SATUAN	SPESIFIKASI MAX/MIN	METODE
1	Analisa Saringan Susunan Saringan 11/2 @ 38.1 mm ¾ @19.0 mm 3/8@ 9.5 mm No:4 @ 4.8 mm 8@ 2.4 mm 16@ 1.2 mm 30 @ 0.6 mm 50 @ 0.3 mm 100 @ 0.15 mm 200 @ 0.075 mm	- - 99,82 97,27 87,72 41,77 16,65 2,46	%	-	SNI-1968-990-F
2	Zone				
3	Modulus Kehalusan	2,54		1,5 - 3,8	SII.0052
4	Kandungan Zat Organik	No.2		Warna Standar Max. No.3	SNI-03-2816-1992
5	Berat Isi Gembur	1,15	kg/l	Min. 1,2 kg/l	PB-0204-76
	Berat Isi Padat	1,55	kg/l		
6	Berat Jenis	2,98	-	Min. 2,3	SNI-1970-1990-F
7	Kadar lumpur	1,99	%	Max. 5%	SII.0052
8	Penyerapan Air Nyata	5,06	%	Max 5%	SNI-1970-1990-F
	Penyerapan air SSD	3,43			

Table 2. Recapitulation of Sunua Sand Test Result

No	PARAMETER	HASIL	SATUAN	SPESIFIKASI MAX/MIN	METODE
1	Analisa Saringan Susunan Saringan 11/2 @ 38.1 mm ¾ @19.0 mm 3/8@ 9.5 mm No:4 @ 4.8 mm 8@ 2.4 mm 16@ 1.2 mm 30 @ 0.6 mm 50 @ 0.3 mm 100 @ 0.15 mm 200 @ 0.075 mm	- - - - - 99,46 81,83 12,78	%	-	SNI-1968-990-F
2	Zone				
3	Modulus Kehalusan	1,06		1,5 - 3,8	SII.0052
4	Kandungan Zat Organik	No.1		Warna Standar Max. No.3	SNI-03-2816-1992
5	Berat Isi Gembur	1,99	kg/l	Min. 1,2 kg/l	PB-0204-76
	Berat Isi Padat	2,05	kg/l		
6	Berat Jenis	3,84	-	Min. 2,3	SNI-1970-1990-F
7	Kadar lumpur	0,43	%	Max. 5%	SII.0052
8	Penyerapan Air Nyata	1,06	%	Max 5%	SNI-1970-1990-F
	Penyerapan Air SSD	0,99			

Table 3. Recapitulation of Duku Gravel Test Result

No	PARAMETER	HASIL	SATUAN	SPESIFIKASI MAX/MIN	METODE
1	Analisa Saringan Susunan Saringan 11/2 @ 38.1 mm ¾ @19.0 mm 3/8@ 9.5 mm No:4 @ 4.8 mm 8@ 2.4 mm 16@ 1.2 mm 30 @ 0.6 mm 50 @ 0.3 mm 100 @ 0.15 mm 200 @ 0.075 mm	- - - 100 95 79 40 8 3 -	%	-	SNI-1968-990-F
2	Modulus Kehalusan	6,99			SII.0052
	Berat Isi Gembur	1,39	kg/l		PB-0204-

3	Berat Isi Padat	1,53	kg/l	Min. 1,2 kg/l	76
4	Berat Jenis	2,303	-	Min. 2,3	SNI-1970-1990-F
5	Kadar lumpur	0,9	%	Max. 5%	SII.0052
6	Keausan	22	%	Max. 27% [1] 27-30% [2] 40-50% [3]	PUBI 1982
7	Penyerapan Air Nyata	4,83	%	Max 5%	SNI-1970-1990-F
	Penyerapan Air SSD	1,27			

Catatan : 1) Untuk nilai K >225
2) Untuk nilai K 175 s/d 225
3) Untuk nilai K <125

C. Concrete Test Result

Table.4 Average Weight Concrete Cube

No	Mixed Compositions	Berat rata-rata
1	Concrete control	8237,50
2	5% Sunua Sand	8406,67
3	10% Sunua Sand	8483,54
4	15 % Sunua Sand	8502,68
5	20 % Sunua Sand	8537,75
6	25 % Sunua Sand	8594,82

Table 5. Strong Concrete Press

Sunua Sand Percentage	0%	5%	10%	15%	20%	25%
Strong Press (Kg/cm^2)	417,46	442,06	482,89	496,17	440,06	401,37

CONCRETE WITH SUNUA SAND ADDITIONAL MATERIALS
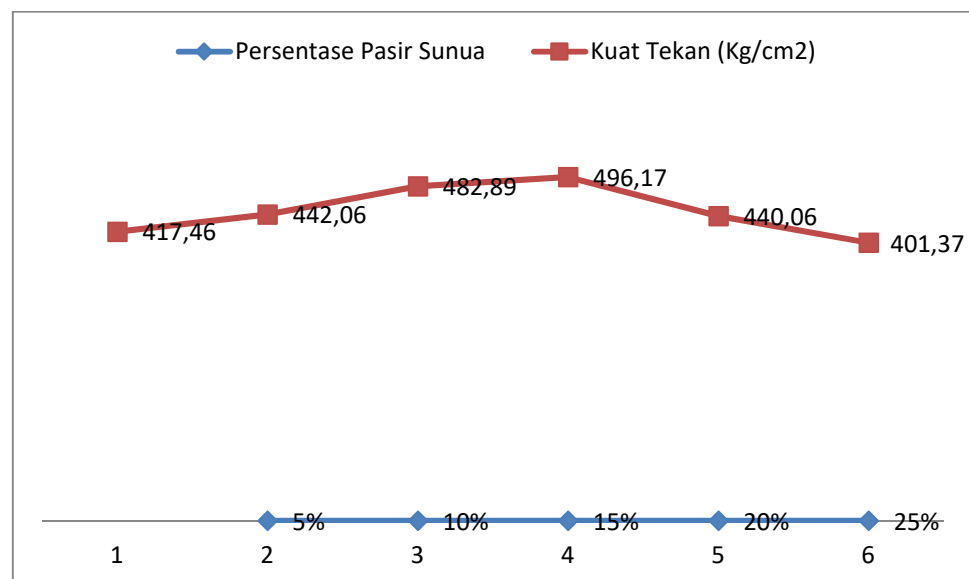
D. Discussion

Based on the results of concrete compressive strength testing with the addition of Sunua sand at age 28 days obtained variation of the results of 5 variations of different test objects, obtained a good compressive strength. The material used in this test is split, sand, and Sunua sand. Inspection of this material is done to ensure the material meets the standards in the manufacture of concrete.

From the results of examination of the material that has been done, for the level of sand slurry, Sunua sand, and gravel shows the value of 1.99%, 0.43%, and 0.9%. These results show good results because the maximum standard requirement is 5%. For the weight of loose contents, Sunua sand, and gravel obtained values of 1.15kg / l, 1.99kg / l and 1.39kg / l, while for the solid content weight of 1.55 kg / l, 2.05kg / l and 1 , 53kg / l. These results still include a minimum standard of 1.2kg / l despite the weight value of loose contents sand is only 1.15 kg / l, but the value is not too far from the standard requirements.

The results of testing the specific gravity of sand, Sunua sand and gravel are 2.98

3,84 and 2,303. These results qualify at least 2.3. For the test of real dry absorption value of 5.06%, 1.06%, 4.83%, while the absorption of SSD result is 3.43%, 0.99%, and 1.27%. The maximum standard requirement for absorption is 5%. Aggregate wear with Los Angeles's engines showed 22% yield. The results are excellent because the aggregate wear standard is <40%. Then it can be concluded that the material that has been tested can be used as a mixed material of porous concrete making as it meets the requirements of the standard specified in SNI.

After examination of the material then made the manufacture of test specimens. The compressive strength of concrete is done after 28 days of concrete. Based on concrete compressive strength concrete with Sunua sand content of 15% has the highest average compressive strength that is 496,17 Kg / cm2. If the concrete control is compared with the concrete with Sunua sand content of 15%, it can be seen that there is an increase of compressive strength from 417.46 Kg / cm2

496.17 Kg / cm2. But the compressive strength of all test specimens is capable of exceeding quality the plan is 25 M.Pa. Thus the addition of Sunua sand.

E. Conclusion

After doing research of concrete with the addition of Sunua sand, hence the influence of addition of Sunua sand as material added to the concrete mix with percentage 5%, 10%, 15%, 20% and 25% obtained best concrete quality found in concrete with Sunua sand content 15% of 496.17 Kg / cm2. Based on these data it can be concluded that the addition of Sunua sand to the concrete mixture can improve the quality of concrete from the concrete control.

F. Suggestions

Based on the tests that have been done, the testers suggest that better concrete manufacture plus finely graded sand like Sunua sand. Smooth grains on Sunua sand can reduce pores in the concrete. Because the number of pores on the concrete can cause the low quality of concrete and also can cause concrete porous. Therefore with the addition of finely graded sand can produce a compressive strength better.

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SIMPLE WATER PURIFIER USING MULTILEVEL SYSTEM

Jasman[1], Nelvi Erizon[2], Syahrul[3],Junil Adri[4*], Bulkia Rahim[5]

Fakultas Teknik, Universitas Negeri Padang, Padang, Indonesia
*Corresponding author juniladri@gmail.com

Abstract: The study aim to describe the water filtration with multilevel system. The method in this water filtering system is a continuous flow from firts box to the next one. Each box has a different filter instrument. Water is flowed from wells using a water pump machine. This type of well water is brackish water. Brackish water is distributed in the original box containing bricks and gravel, flowed to the second city containing the sand and palm fiber, and then flowed to the third box containing the filter made of charcoal and foam. Based on physical analysis of the water coming out of this filter is colorless and odorless, and based on the results of laboratory testing the pH, acid and DOC levels, concluded feasible for use as water for daily non-consumption purposes. Clean water can be used by the community around the sub-district office for daily purposes.

Key word: water purifier, appropriate technology, brackish water

1. INTRODUCTION

One of the essential daily needs of living beings in this inseparable world is Water. Not only important for humans Water is an important part of both animal and tuban life. Without water there is probably no life in the core world because all living things desperately need water to survive.

Until now, the provision of clean water for the community in Indonesia is still faced with several problems that are quite complex and to date have not been fully addressed. One of the problems still faced to date is the low level of clean water service for the community. Subdistrict koto XI Tarusan Pesisir Selatan Regency is an area that has not been reached by water supply.

Pesisir Selatan, especially Koto XI Tarusan subdistrict is a region with the majority geographically located on the edge of the coast. For people living on the coast, water sources have the characteristics of swamp water. The definition of juridical swamp is contained in Government Regulation no. 27 Year 1991 on Swamp. According [1] Swamp is a natural waterlogging land that occurs continuously or seasonally due to inhibited natural drainage and has special characteristics physically, chemically and biologically.

The situation in the swamp area generally does not meet the water requirements for consumption. The character of the swamp water is generally the color of the water tend to be turbid and sometimes red, the water is acidic because there is always flooding, the water is not good to irrigate agriculture, the water plants cover most of the swamp, the swamp base is usually peat soil, high acidity of water, water color brown to blackish, and consists of most organic materials and does not meet health requirements when consumed.

Tarusan area as a region is very difficult to find clean water, the average people who have wells do not get clear water, the color of water that comes out barbau and yellowish. Water containers in this community are also contaminated with water is yellow. The swamp water in the Tarusan area is a brackish water swamp. The Brackish Water Swamp is a swamp that mixes water between freshwater and saltwater. There is a lot of river mouth, because of fresh water and salt water tide, when fresh water tidal water will feel fresh, but if fresh water receded, it will be filled with salt water, but fresh and salty water can also be mixed. It is not acidic, because there is a change of water

Freshwater contamination with sea water will change the nature of the water. Sea water intrusion refers to the process by which seawater enters the coastal ground water system [2]. The reason is because the pressure of ground water is smaller than the pressure of sea water at the same depth causing the boundary between ground water and sea water rise to the mainland. This has an impact on the seepage of salt water containing elements such as chloride (Cl) into the groundwater causing groundwater contamination [3]. This event certainly degrades ground water quality.

If the intrusion of sea water continues to occur will certainly have an impact on health, mainly due to groundwater quality that decreases to become brackish. According to Lecturer Department of Biology Faculty of Mathematics and Natural Sciences University of Indonesia (FMIPA UI), Dra. Erlin Nurtiyani Msi, using brackish water for consumption and other activities such as bathing, can disrupt health. Because brackish water contains high NaCl (Sodium Chloride) and can disrupt the metabolism that occurs in the human body. The use of brackish water for consumption can cause a person with stomach disease such as diarrhea. Meanwhile, when used for bathing, can trigger the emergency of skin diseases, such as itching. For the long term, it is not impossible that people who

consume brackish water will suffer serious diseases due to metabolism disturbed and sensitivity of the body to receive brackish water containing the salt. The content dissolved in brackish water according to Nusa Idaman Said. 1999 are:

Table 1. Characteristics of Brackish Water

Parameter	Unit	Consentation	Standart of Clean Water Standar
Kekeruhan	NTU	6,75	5
TDS	mg/l	`0,6	500
pH	mg/l	5,5	6,5 - 8,5
Kesadahan	mg/l	3,2	500
Angka KMnO4	mg/l	13	10
Besi (Fe)	mg/l	4,85	`0,3
Mangan (Mn)	mg/l	`0,7	`0,4
Zat Organik	mg/l	22,28	10

Sumber: PP Payau No. 27/1991

From the data contained in table 1, the elements contained in brackish water have a much different content than clean water. To overcome this problem, a water filtration system is designed to minimize the brackish water content into clean water according to the standard. The design of filter tools is designed with a multi-level system with six filtering elements.

Filtration of multi-store water systems using various types of materials, such as fibers, fine sand, coconut shell charcoal, gravel and stone. The system is considered to be quite effective because the inorganic materials used on average have the ability to decrease the acid content in brackish water, either through the process of filtration as well as the absorption process. To analyze the effectiveness of the use of this multilevel filter, a swamp water filter research is required using a multilevel water filtration technique. This research was conducted in Koto XI Tarusan sub district, because the existing groundwater condition in Koto XI Tarusan sub-district which is murky and smelly as the impact of swamp area makes this water unfit for consumption.

Quality requirements describe the quality of clean water. In accordance with the provisions of the world body (WHO) as well as local bodies (Ministry of Health) and other applicable provisions or regulations such as APHA (American Public Health Association), the feasibility of water for human life is determined on the basis of physical quality requirements, chemically and biologically [4].
Physically clean water must be clear, odorless and tasteless. In addition, the water temperature should be equal to the air temperature or approximately 25oC, and if there is a difference then the allowable limit is 25oC ± 30oC. The maximum water turbidity limit is 25 NTU and 50 TCU water color.

a. Turbidity

Turbidity is an optical effect that occurs when light forms a suspended material in water. Water turbidity can be generated by the presence of organic and inorganic materials such as mud and waste, from certain surfaces that cause the river water to become turbid. Turbidity, although only slightly can cause a color that is older than the actual color.
Water that contains high turbidity will have difficulty when processed for the source of clean water. The difficulties include in the screening process. Another thing that is not less important is that water with high turbidity will be difficult to disable, the process of kill of unexpected microbial content. The turbidity level is affected by the pH of the water, the turbidity in drinking water has generally been sought in such a way that the water becomes clear.

b. Smell

Odor in water can be caused by foreign objects that enter into water such as animal carcasses, waste matter, or caused by the decomposition of organic compounds by bacteria. In the event of decomposition of organic compounds carried out by these bacteria are produced odorous gases and even some are toxic. In the event of decomposition of organic substances resulted in increasing the use of dissolved oxygen in the water (Biological Oxygen Demand) by bacteria and reducing the quantity of dissolved oxygen (Disvolved Oxygen) in water.

The smell in drinking water can be detected by using the nose. The purpose of odor detection in drinking water is to know the smell or absence of odor coming from drinking water caused by pollutants. If drinking water has a smell then it can be categorized as drinking water that is not eligible and less feasible to be used as drinking water.

c. Flavors

The flavors present in raw water can be produced by the presence of organisms such as microalgae and bacteria, the presence of solid waste and liquid waste such as household waste and the possible remnants of materials used for disinfection such as chlorine. The emergence of flavor in drinking water is usually closely related to the odor of the water. In drinking water, the taste is strived to be neutral and acceptable to water users. Flavors in drinking water can be detected using the absorbent senses. Where the purpose of flavor detection in drinking water is to know the water taste abnormalities of the normal standard possessed by water that is neutral.
The chemical requirements clean water should not contain chemicals in excessive quantities.

Some of the chemical requirements include: permissible pH ranges from 6.5 to 9.0, total solid, organic matter, aggressive CO2, hardness, calcium (Ca), iron (Fe), manganese (Mn), copper (Cu) , Zinc (Zn), chloride (Cl), nitrite, fluoride (F), and heavy metals.

2. METHOD

2.1 Time and place

Community service is done in August to October 2017 in sub-district Koto XI Tarusan. The sampling of swamp water samples was obtained from one community well in Koto XI Tarusan sub-district. Measurements of domestic wastewater quality parameters for odor, taste, turbidity, color, temperature, Substance Dissolved (TDS), Iron (Fe) and pH parameters were performed in the laboratory.

2.2 Tools and materials

The tool used is bucket and bucket for marsh water collector, water pump machine, filter media. The tools, the swamp water container, the sample bottles for the laboratory test.

2.3 Ways of working

The method used in sampling is field survey. Site selection is done purposively (purposive sampling) (Nazir, 2003), that is location of taking of swamp water is in Sub Koto XI Tarusan. The swamp water is put into a collecting bucket, then homogenized, inserted sample bottles, for analysis in the laboratory.
Screening of swamp water is carried out with the same discharge of 5 liters / minute. The result of the swamp water filtering is put into the sample bottle. Swampwater samples were analyzed in the laboratory.

2.4 Filtering Mechanism

Swamp water flowed into container without chemical substance. Furthermore, the water flowed into the screening filtration so that the dirt on the water will be retained on the media contained in the filtering basin, then obtained the filtered water that flowed into the reservoir of clean water.
Schematic filtration system of water systems can be seen in the following scheme.
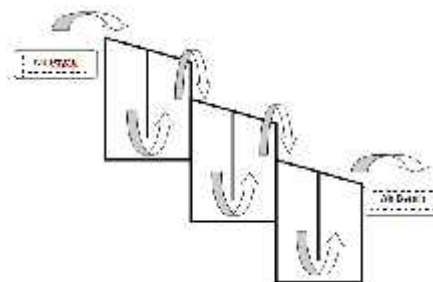
Figure 1. Schematic of Fine Water Filter

This multilevel water filtration system is designed using three boxes as a filter container. In one box there are two different kinds of filter instruments. Incoming water comes from community wells that are flowed by water pumps. Water goes straight into the box one with the first red brick filter media.

3. RESULTS AND DISCUSSION

The results of the swampwater quality analysis prior to screening are presented in Table 2.

Table 2. Results before test

No	Parameter	Unit	Water Samples	*Quality standards
1	Smell	-	No Smell	TB
2	Flavors	-	Not Feeling	TB
3	Turbidity	Skala NTU	0,00	25
4	Color	Skala TCU	21,7	50
5	Temperature	ºC	27	± 3ºC
6	Substance Dissolved	mg/L	105,7	1000
7	Iron (Fe)	mg/L	0,284	1
8	pH	-	6,05	6,5-8,5

The results of the analysis of swamp water quality after being screened are presented in Table 3.

Table 3. Results before test

No	Parameter	Unit	Water Samples	*Quality standards
1	Smell	-	No Smell	TB
2	Flavors	-	Not Feeling	TB
3	Turbidity	Skala NTU	0,36	25
4	Color	Skala TCU	32,1	50
5	Temperature	ºC	27	± 3ºC
6	Substance Dissolved	mg/L	86,8	1000
7	Iron (Fe)	mg/L	0,409	1
8	pH	-	6,62	6,5-8,5

Smell

The water odor of the sample before being filtered and after the filtration process with a stratified filter is odorless. Then the water sample is clean and good water. Good water has a characteristic odorless when kissed from afar or close.

Flavors

The flavor of the sample water before it is filtered and after the filtration process with a stratified filter is not tasteless. Physically, water can be felt by the tongue. Water that tastes sour, sweet, bitter or salty shows the water is not good. Salty taste is due to the presence of certain salts that dissolve in water, while the taste of acid is due to the presence of organic acids and inorganic acids

Turbidity

The turbidity of the swamp water prior to filtering by 0,00 NTU scale after the filtration process with the stratified filter was 0.36 NTU scale. There was a scale increase of 0.36.

Color

The color of swamp water before it was filtered was 21.7 TCU scales after the screening process with the multistaged filter was 32.1 TCU scale. There was a scale increase of 10.4.

Temperature

The temperature of the swamp water before it is filtered is as large and after the filtration process with the multistaged filter is 270C. The temperature of this water is cool or not hot water, especially in order to avoid the dissolution of chemicals in the channel / pipe, which can endanger health and inhibit the growth of micro organisms.

Substance Dissolved Substances (TDS)

TDS of swamp water before it was filtered was 105.7 mg / L after the filtration process with a stratified filter was 86.8 mg / L. TDS decline of 18.9.

Iron (Fe)

The iron content of swamp water before it was filtered was 0.284 mg / L after the filtration process with a stratified filter was 0.409 mg / L. An increase in iron content (Fe) of 0.125 mg / L.

pH

The pH value of swamp water before it was filtered was 6.05 after the filtration process with the stratified filter was 6.62. There was a pH increment of 0.57. This is in accordance with the opinion of Nurhayati (2009) which states that the filter with silica sand media, and zeolite can increase the pH Increased pH value occurs due to neutralization of negative carbon charges by nitrogen ions that cause carbon surface better to adsorb pollutants [5].

4. CONCLUSIONS

1. The quality of swamp water in Koto XI Tarusan sub-district, for its parameters meet the Environmental Quality Standard.
2. Water filtration of multilevel system is composed of 70 cm silica sand, 15 cm gravel, 30 cm charcoal and 40 cm zeolite

5. SUGGESTION

Water filtration system with 70 cm composition silica sand, 15 cm gravel, 30 cm charcoal and 40 cm zeolite can be socialized to the community to overcome the problem of swamp water treatment.

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DESIGN OF LIBRARY INFORMATION SYSTEM USING BARCODE ON SMAN 1 SOLOK CITY

Jeprimansyah
Vocational Education Technology, State University of Padang

ABSTRACT: *The rapid development of information technology at this time is very helpful in academic service One of them is the school, in this case especially the school library that can be a source of reference and learning facilities for students and teachers. Activities that run every day in the library that collects, stores, maintains and manages the collection of library materials using the system. Information systems have been Widely used in a place with a variety of technologies. The purpose of this research is to design the existing library information system at SMA N 1 Solok In order to be computerized and Facilitate the library staff member in processing book of data, member data, the book lending and book returns To be quick and accurate by using barcode*

Keywords: Schools, Library, Information Systems, Barcode

1.1. Introduction

The development and rapid advances in technology led to demands on the technology of each user, where those who feel less in speed in doing each task is run, so it is required to exercise the each task with a quick, brief, precise and easy to use at any time, the computer is one of the tools of technology that is experiencing significant changes began to form size as well as its ability to access and manipulate data we want every progress of computer technology that happens has an impact both by any of its users, especially in the field of information systems. The Barcode is the instrument that works based on the principle of work. digital. On the concept of digital, there are only 2 signal data is known and is a boolean, that is 0 or 1. There is an electric current or no (with certain voltage magnitudes, for example 5 volts and 0 Volts). Barcode apply rods line consisting of black and white. Black color represents the number 0 and the white color represents the number 1. Why is this so? Because black will absorb the light emitted by the tool bar code reader, while the white color will reflect the light back. With technology that can process data quickly then make public the more decent pace in improving the quality of each work. Books in the library lending system at the time of this now in the whole CITY of SOLOK SMAN 1 data about data processing library Administration does not yet have a good management information system. Everything from loaning logging or return the book to the Library Administration report creation is still done manually. This often results in a less precise and results take a long time and to overcome the difficulties and errors on defacement transaction data is by using *the barcode.* Installation of the barcode on the object will facilitate transaction defacement and minimize errors that occur in the defacement, because of the transaction conducted with defacement doing scanning on each object that has been given a barcode.

1. A Review Of The Literature
1.1 Basic Concepts of Information Systems

There are two groups in the approach to define the system, namely the emphasis on the procedure and the emphasis on component or element. The systems approach which is a network of more procedures emphasize the sequence of operations in the system. Procedure (procedure) defined by Richard F.Neuschel is a sequence of clerical operations (writing), usually involves several people in one or more departments, which are applied to ensure uniform handling of business transactions that occur.

2.2 Definition of System

The system is derived from the Greek meaning System entity or collection. There are two groups of approaches in defining the system, namely the emphasis on the procedure and the emphasis on component or element. Here is the definition of the system according to Jogiyanto (2001: p1), of two approaches:
1. Which leads to the procedure.
    The system is a network and procedures that are interconnected, gathered together to perform an activity or effort to accomplish a specific goal,
2. Which leads to the components and elements.
    The system is a collection of elements that interact to achieve a certain goal.

2.3 Characteristics of System

A system has the characteristics or properties of certain of having good system components (components), system boundary (the boundary), the environment outside the system (environments), interface (interface), processing (process) and the target system (objectives) and destination (goal).

1. System components (components)

   A system composed of multiple interacting components form a single unity. System components can be either subsystems or parts of the system. Each subsystem has the properties of the system to perform a specific function and affect the process of the system as a whole. A system can have a larger system called supra system.

2. System boundary (boundary)

   System boundary (boundary) is an area that limits between a system with other systems or with the outside environment. Limit a system indicate the scope (scope) of the system.

3. Outside the system environment (environment)

   External environment of a system is any system outside the boundaries that affect the operation of the system. The system environment can be profitable and also are detrimental to the system. The outside environment system that is favorable to the energy of the system and thus must remain guarded and maintained. While the adverse external environment should be controlled, if not then it will interfere with the viability of the system.

4. Connector system (interface)

   Liaison is a media liaison between one subsystem with other subsystems. Through this interface allows resources flow from one subsystem to other subsystems.

5. Input system (input)

   Feedback is the energy put into the system. Feedback can be input treatment (maintenance input) and the input signal (input signal). For example in computer systems, maintenance input program is used to operate a computer and the data is input signal to be processed into information.

6. Output system (output).

   The output is a result of the energy processed and classified into useful output and residual disposal. Outputs could be inputs for other subsystems or to the supra system.

7. Processing system (process).

   Processing is a processing system that will process the inputs into outputs. The production system will process the inputs (raw materials) into outputs in the form of finished goods.

8. Target system (objective)

   The goal of a system is the target to be achieved by a system in a short period of time in order to accelerate the achievement of the system.

9. The purpose of the system (*goal*)

   The purpose of a system is a departure from the system for what it is made. And the purpose is meant here is the ultimate goal of the system.

   To more clearly seen in Figure 2.1.
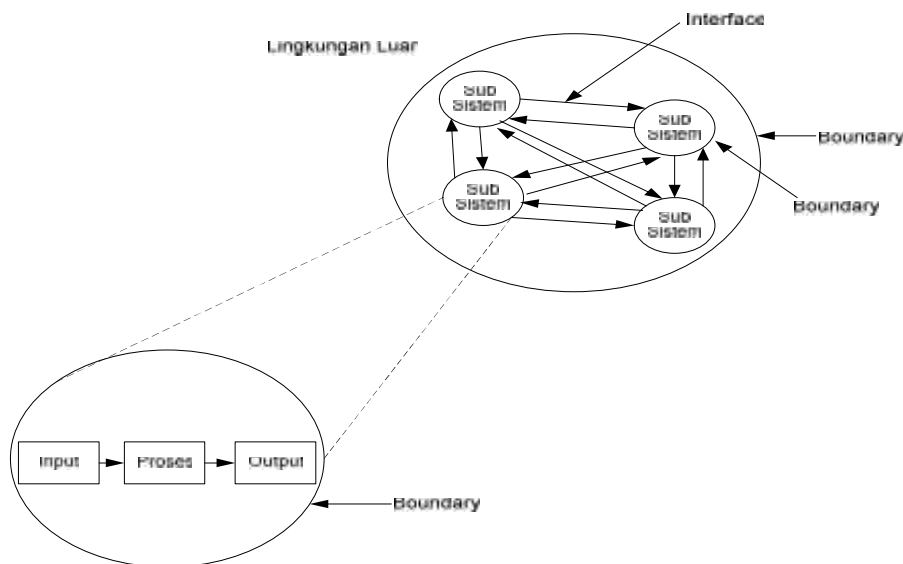
Figure 2.1 System Characteristics

2.4 understanding Information

Before understanding the meaning of information should we know things related to the information that data. According Jogiyanto (2001), is a collection of character data, facts, events or amounts which is the input (input) for the information system, usually this data can not be used as a basis in the process of decision making by management.

While the information is processed data form the plural of the form more useful and more meaningful for those who receive it.

Good information is that has quality. The quality of a system depends on:

1. accurate

   Accurate means the information is free of errors, can not be misleading, inaccurate also means that information must clearly reflect the intent.

2. On time

   Timely information is information that came to the wearer should not be too late. The outdated information will not affect the value anymore, because information is a cornerstone in making a decision. When the decision was too late, it will be fatal for an organization.

3. Relevant

   Relevant means that information has benefits for the wearer. The relevance of the causes of cheating students to borrow books in your library will be more relevant when shown to the library technical experts.

   As it is known that the information is one thing that is very important in making a decision. Information that has included three of the above resulted in a decision to be taken would be good. Because information is the processing of the data, it is necessary also to distinguish between data with information.

2.5 Understanding Information Systems

Understanding the information system according to the experts, namely:

1. According to Alter (1992)

   The information system is a combination of work procedures, information, organization and information technology in organizing to achieve goals within an organization.

2. According to Bodnar and Hopwood (1993)

   The information system is a collection of hardware and software designed to transform data into useful information.

3. According to Gelinas, Oram and Wiggins (1990)

   The information system is a man-made system which generally consists of a set of computer-based and manual components are made to collect, store, and manage data and provide output information to the user.

2.6 Database

The term database can be defined from a number of perspectives:

1. The set of groups of related data that is organized in such a way that can be recovered quickly and easily.

2. A collection of interrelated data stored simultaneously without any repetition (redundancy) to meet various needs.

3. Interconnected collection of files stored together in the electronic storage media. In the data base may be more than one file and the data stored in these files.

So from the definition above can be concluded that the database is: "set of files that are related to each other, arranged so that it can be used by several application programs database." (The Book of computer text Database "Fathansyah, Ir" 2007).

2.7 Database functions

database was established to address the problem on a compilation of data, namely:

1. *Data redundancy*

   Data redundancy is the storage of information or data on more than one file in the same data. As a result of redundancy will lead to:

   a. Wastage of memory, because the fields are not required.

   b. To perform the update will take a long time.

   c. Is likely to be the emergence of greater data inconsistencies.

2. *inconsistency Data*

   Data inconsistency is no consistency in the data on the same field in a few files that have the same key.

3. Isolation Data To Standards

   If spread in several files in formats that are not the same, so difficult in the application program to retrieve and store data.

4. *multi User* (Many Users)

   The database was built in order to speed up all power to the system and get a quick response time, and the data can then be used by people in different times, accessed by the program are the same but different time and people.

5. *Security* (Security)

   In principle, the database file can only be used by certain users (who have the authority to access). So security is intended to provide protection to the data in a database system from damage.

6. *Integrity* (Unity)

   Associated with manual systems work, in order to perform the control or control in all areas of the system, so the system is always in full control.

7. Data Independent (Freedom Data).

   In an application with the programming language Java Netbeans 3.6 for example. When the program was created to solve the problem of reading data for employee file with fields nip, nokjp, nmpeg, tgllhr, parts, then after the program is finished and there is a change in the employee file structure of the program should be changed.

Of weaknesses that can be addressed, the database can be concluded have an important criteria as follows:

1. The data can be used by several application programs without changing the database.
2. Can grow easily both the volume and structure.
3. Minimizing and can easily meet the new system.
4. Data redundancy.

2.8 Definition of Barcode

There are many definitions of barcodes, but all these definitions refer to the same thing. For more details can be seen below.

1. Barcode literally means the code line-shaped.
2. As a collection of code in the form of lines, where each different thickness of each line after the contents of the code.
3. Information machine-readable (machine readable) in a visual format is printed. General barcode shaped thin vertical lines thick separated by some distance.
4. Similar code that represents the specific information or data, usually the type and price of goods, such as food and books. Code bar-shaped black and white beam contains a set of combination stems are of different sizes arranged in such a way. This code is

2.10 Barcode Image Types

printed on a sticker or on the packaging of goods

2.9 Types of Barcode

1. (UPC) Uniform Product Code: for checkout sales, inventory, and so on retail stores
2. Code 39 (Code 3 of 9): identification, inventory, and shipment tracking
3. POSTNET: encoding zip code in the US mail
4. (EAN) European Article Number: a superset of UPC that allows an extra digit to the identification of the State
5. (JAN) Japanese Article Number: Similar to EAN, used in Japan
6. Book land: based on ISBN numbers and used on the cover of the book
7. ISSN barcode: based on ISSN numbers, used in magazines outside of the US
8. Code 128: used in preference to Code 39 for a more compact
9. Interleaved 2of 5: used in the shipping industry and warehouses
10. Coda bar: used by Federal Express, in libraries and blood banks
11. (MICR) Magnetic Ink Character Recognition: a special font that is used for a number at the bottom of bank checks
12. OCR-A: optical character recognition format that is used on the cover of the book, for ISBN numbers to be read by humans.

Figure 2.2 -Type type barcode

3. Goals and Benefits Research

3.1 Goals

1. To design an information system of data processing in a library book lending SMA N 1 city solok by using barcodes.
2. To minimize the time the data processing member, books, borrow and return books at SMAN 1 CITY SOLOK
3. With the data processing system of borrowing books in your library using the programming language, the

information produced or can be faster, more accurate and relevant.

3.2 Benefits

Assisting Officer Library and school books in the data processing faster, precise and objective.

4. Methods

The method used in this research is qualitative descriptive with

Program use and barcodes

5. The results achieved

Implementation of the system is a phase that gives an idea whether the stage - the stage we did have

succeeded or not. This section will explain how to display the input and output of information system design library SMAN 1 Solok so that we can know whether the new system according to the needs and meet the criteria.

1. **Form Main Menu**

Figure 5.1 Main Menu Display

2. **Form Publisher**
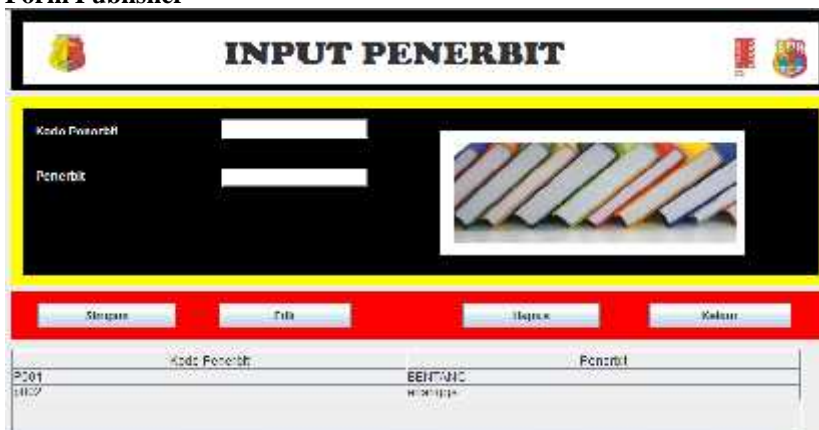
Figure 5.2 Display Form Publisher

3. **Member Input Form**

4. **Input Form's Book**

Figure 5.4 Display Form User Input

5. **Loan Form**

Figure 5.5 Display Form Input Loan Book
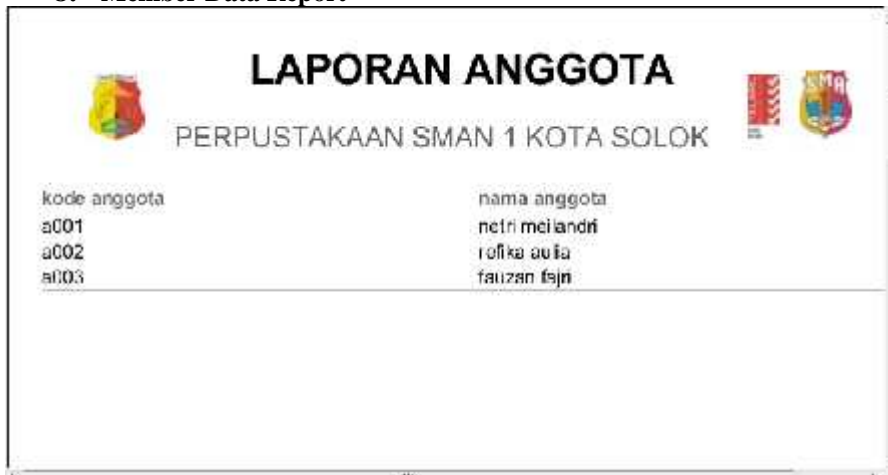
6. **Returns Form**

Figure 5.6 Display Form Input Returns Books

7. **Extension Form**

Figure 5.7 Display Form Input Extension

8. Member Data Report

Figure 5.8 Member Reports

Conclusions and recommendations

6.1 Conclusion

With a system of computer-based library information canSimplify and accelerate the process of borrowing books at the library.

6.2 Suggestions

1. To run this new system, it is necessary workforce to understand and familiar with the use of a barcode system.
2. In order for the presentation of information in accordance with the expected, then use the appropriate computer equipment in operating both systems and equipment

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THE DESIGN OF THE SIGNAL MEASUREMENT DEVICE OF BODY'S BIOELECTRICAL IMPEDANCE By USING THREE ELECTRODES

Juli Sardi[1], Hastuti[2], Ali Basrah Pulungan[3]

[1]Department of Electrical Engineering, Faculty of Engineering, Universitas Negeri Padang
[2]Department of Electrical Engineering, Faculty of Engineering, Universitas Negeri Padang
[3]Department of Electrical Engineering, Faculty of Engineering, Universitas Negeri Padang
[*]Corresponding author, e-mail: juli_sardi@yahoo.com

ABSTRACT: This article aims to design the signal measurement device of body's bioelectrical impedance (bio-impedance). Previous measurement methods are less effective because they used four electrodes. While this device is using three electrodes. The device consists of three integrated circuits, i.e. stimulate's circuit, instrumentation's circuit, and minimum system. The design used three electrodes method which one electrode is mounted on the left shoulder, one electrode on the right shoulder, and another is functionalized as the ground which is mounted between the left and the right shoulder. The measured voltage is represented bio-impedance's value. Based on the experiment, the device is able to measure bio-impedance's signal of human's body. The obtained signal could be used as a control signal.

Keywords: bio-impedance, three electrodes, a control signal, measurement

1. INTRODUCTION

The bioelectrical impedance (bio-impedance) is a passive electrical part found in body tissues. The magnitude of bio-impedance varies because it's influenced by muscle contraction that occurs in body tissue. The bio-impedance's measurements can be performed on almost any part of the body as long as the muscles in that part are still functioning or contracting. To measure the magnitude of bio-impedance, the body must be passed a small electrical current through an electrode, then measure the potential difference between two points on the current flowing part. The measured bio-impedance [1] can be known by using Ohm's law.

$$Z = \frac{V}{I}$$

Where V is the voltage and I is the current and Z is the body impedance.

The biopotential electrode is an interface between the body and the electronic measuring instrument. This connector is very important because the current flowing body is the currents in the form of ions. While the current that moves on electronic devices in the form of electrons. Therefore, the electrode is a transducer capable of converting ion currents into electric currents. This current conversion is based on the oxidation-reduction reaction. The electrical currents within the metal move electrons to move from the metal surface and caused oxidation reactions that produce cations. This cation undergoes a discharge (reduction reaction) in the electrolyte. The

reactions that arise in the anions are similar; anion toward the electrodes surface and oxidized to neutral and gives some electrons to the electrodes [1].

The electronics model of the electrodes can be understood as in Figure 1 [1]. E_{cell} is half-cell potential, C_d and R_d are the impedance of the electrodes, and Rs is the cable resistance. When this is analyzed, it can be realized that the resistivity of the electrodes will decrease due to the frequency effect, the half-cell potential will also decrease as a result of frequency.
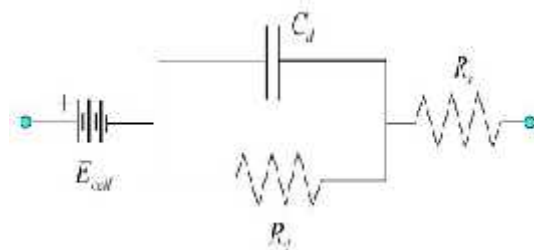
Fig. 1 Mathematical Model of Electrodes

There are two methods of measuring bio-impedance previously, namely bipolar and the tetrapolar electrode. The bipolar method uses two electrodes to flow the current and measure the potential difference, while the second method uses two pairs of electrodes to flow the current and measure the large potential difference. Although bipolar methods are easier, researchers generally [1] [2] [3] [4] [5] [6] [7] used tetrapolar methods in

bio-impedance measurement because the measured results were better than the bipolar method. The method of measuring the tetrapolar as seen in Figure 2 [8].
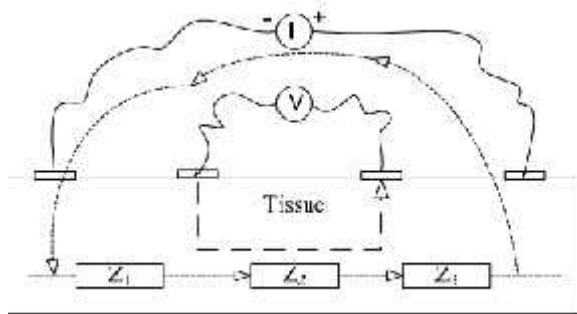
Fig. 2 Four Electrodes Method

The measurement's method of four electrodes is considered to be less efficient and effective since it used too many electrodes for 1 measurement channel. To that end, this article tried to offer another alternative in measuring body bio-impedance. The measurement's method used only 3 electrodes that can measure on 2 channel at the same time.

2. METHODS

In general, the bio-impedance's measurement system consists of a stimulation's circuit and instrumentation's circuit. The stimulation's circuit is a circuit which alternates current source with a frequency of 50 KHz and a maximum amplitude of 0.5 mArms. Then, the current will be injected into the body through an electrode. The other part is a series of instrumentation. This circuit is used to measure potential differences in the simulated body. The measured voltage represents the value of bio-impedance [9].

The voltage is amplified by using instrumentation's circuit amplifiers that have a high common mode rejection ratio (CMRR) capability. Once amplified, the voltage is passed to the band pass filter circuit to take the desired frequency, ie ± 50KHz. Thus, the voltage data will be spared from electromyography (EMG) signal interference ranging from 20Hz to 500 Hz, artificial movement disturbance, and radio wave interference. The output voltage of the filter circuit then goes into the circuit of the voltage rectifier in order to facilitate the microcontroller in retrieving and processing the data. In this articles used 2 series of stimulation and 2 pieces of instrumentation to perform measurements on two channels simultaneously. The system requires three electrodes. The diagram block of the system is showed in Figure 3.
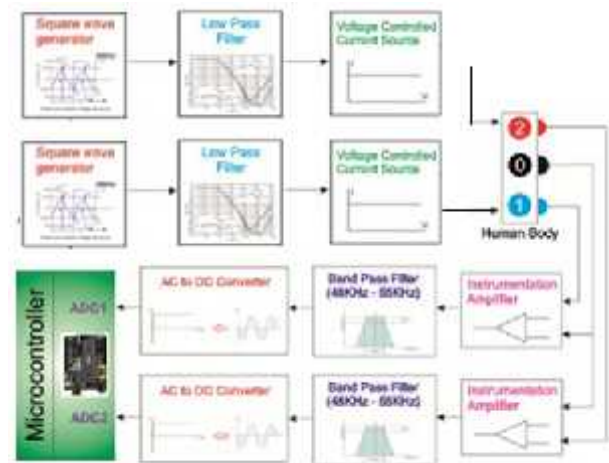
Fig. 3 Diagram Block of Bio-impedance Measurement System

2.1 Stimulation's Circuit

This circuit aims to generate an alternating current source with a frequency of 50 kHz and a maximum amplitude of 0.5 mA. The stimulation's circuit consists of sine wave generator and voltage controlled current source (vccs).

2.1.1 Sine Wave Generator

The sinusoidal signal generating circuit consists of square wave generator circuit, low pass filters, and non-inverting amplifiers. The square wave generator circuit aims to produce a square signal as free running with the addition of setting the frequency of signal output. The desired output frequency of this circuit is 50 KHz. The low pass filter circuit is used to obtain the output of a sinusoidal signal from the square signal input of the square wave generator circuit. The Cut off frequency of this LPF circuit is set to equal the frequency of the signal generated by the square wave generator circuit which is 50Khz. The non-inverting amplifier circuit is used as the voltage amplitude regulator of the sinusoidal signal generated by the low pass filter circuit.

2.1.2 Voltage Controlled Current Source (VCCS)

The function of VCCS's circuit is to convert a sinusoidal voltage signal into a sinusoidal current signal which will be injected into the patient's body through the electrode. This circuit is composed of two op-amps that have a bandwidth gain of 3 MHz, low current bias current (50 pA), and high slew rate (10 V/μs).

2.2 Bio-impedance Instrumentation's Circuit

This circuit is used to measure potential differences in the simulated body. The measured voltage represents the amount of bio-impedance. The instrumentation circuit consists of amplifier instrumentation's circuit, bandpass filter, AC to DC converter, and differential amplifier's circuit. The function of amplifier instrumentation's circuit is to strengthen the measured bio-impedance's voltages. Bandpass filter served to remove noise and to pass the frequency with a range of 45 kHz to 55 kHz. AC to DC converter aims to convert Ac voltage into DC voltage. The differential amplifier function as a final amplifier before it's processed by a microcontroller.

The installation and placement of electrodes for measuring bio-impedance are performed on the back/shoulders as it has the most optimal bio-impedance [7]. In addition, the section also provides many alternatives to provide the control signal. Figure 4 shows the positioning of the electrode.

Fig. 4 The positioning of three electrodes

3. RESULT AND DISCUSSION

3.1 The Test of Simulation's Circuit

3.1.1 The Test of Square Wave Generator Circuit

This circuit serves to generate a square wave with an adjustable frequency. The conducted experiments result that this circuit can generate frequency's range between 23 KHz and 238 KHz. Since this study required a frequency of 50 KHz. The output signal of this circuit is shown in Figure 5.
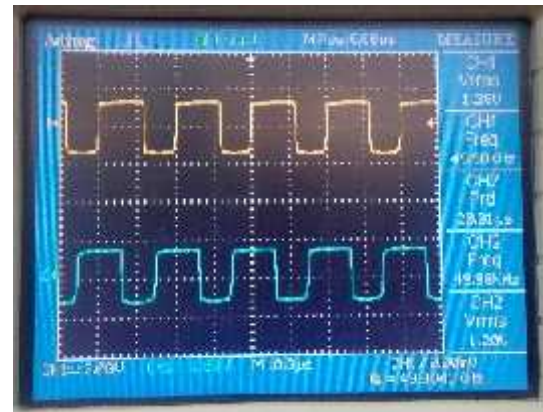
Fig. 5 The output signal of *square wave generator* circuit

3.1.2 The Test of Low Pass Filter

The test of low pass filter circuit is done by providing sinusoidal voltage input with constant amplitude. The frequency of voltage varied from 1 KHz to 500 KHz and measured output voltage using a voltmeter. Figure 6 is graphic of the frequency response of the LPF circuit and the output signal.

Table 1 Result of the test of LPF's circuit

V_{in} (Volt)	F_{in} (Hz)	V_{out} (Volt)	Gain (V_{out}/V_{in})
500	1000	740	1.1923
500	5000	740	1.1923
500	10000	720	1.1730
500	15000	690	1.1442
500	20000	700	1.1538
500	25000	680	1.1346
500	30000	690	1.1442
500	35000	670	1.125
500	40000	610	1.0673
500	45000	510	0.9711
500	50000	359	0.8259
500	60000	348	0.5269
500	70000	327	0.3144
500	80000	200	0.1923
500	90000	131	0.1259
500	100000	88.7	0.0852
500	200000	6.38	0.0061
500	300000	1.74	0.0016
500	400000	0.814	0.0007
500	500000	0	0
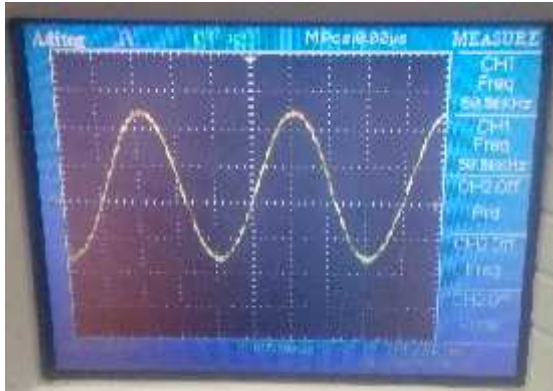
Fig.6 Output signal of Low Pass Filter circuit

3.1.3 The Test of Inverting Amplifier Circuit

The function of this circuit is to regulate the amplification of the sinusoidal signal generated by the LPF so that it can easily adjust the signal amplitude desired. In this system, the designed sinusoidal signal generated has a value of 2 Vrms. Figure 7 is the output signal of the inverting amplifier circuit.
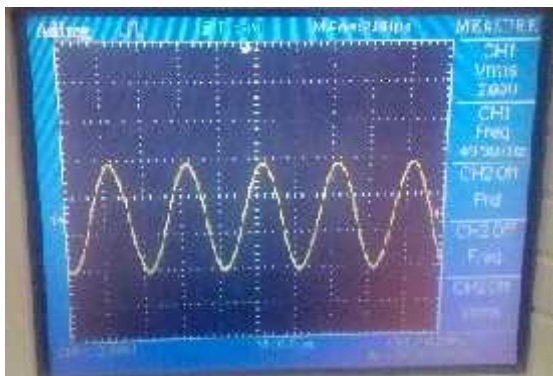
Fig.7 Output signal of Inverting Amplifier Circuit

3.1.4 The test of VCCS's circuit

The output of this circuit is set to produce a sinusoidal current with a frequency of 50 KHz, as well as a constant amplitude of 0.5mA. With 2V input signal amplitude, the multi-tune is set to have a resistance of 1 KΩ. The test of this circuit is done by using multi-tune of the 5K variable resistor. Table 2 is the result of the test of VCCS's circuit.

Table 2 Result's Data of VCCS's circuit test

Resistance (Ω)	No Load Current (mA$_{rms}$)	Measured Current (mA$_{rms}$)	Error (%)
100	0.5	0.499	0.2
200	0.5	0.498	0.4
300	0.5	0.497	0.6
400	0.5	0.496	0.8
500	0.5	0.495	1
600	0.5	0.494	1.2
700	0.5	0.492	1.6
800	0.5	0.49	2
900	0.5	0.49	2
1000	0.5	0.488	2.4

When the variable resistor is not installed, the VCCS's circuit is only connected to the amperemeter. In the initial conditions, I_{out} is set to a value of 0.5mA. From the test results, if the resistor value is high, then the error is also high. This indicated that the voltage controlled current source circuit is still not stable enough to produce a constant current with varying loads. this is not a problem in the application of bio-impedance measurement in the back area, because the impedance's range is not too big which is about 250 Ω - 270 Ω [8].

3.2 The Test of Instrumentation's Circuit

3.2.1 The Test of Instrumentation Amplifier

This test is performed by measuring the level of linearity from amplification of this instrumentation by using the input of the sinusoidal signal generator function. In the process of the multitude's test is set to have a gain of 10 times, so Rgain = 2x22kΩ / (10 - 1) = 4.89kΩ. The test's result for some input signals is shown in Table 3.

Table 3 The test's result of instrumentation amplifier circuit

V_{in} (mV$_{rms}$)	V_{out} (mV$_{rms}$)	Gain (V_{out}/V_{in})
100	1003	10.03
150	1536	10.024
200	2063	10.315
250	2572	10.288
300	3059	10.196
350	3583	10.237
400	4104	10.26
450	4560	10.13
500	5070	10.14

From the above experimental results can be concluded the amplification of the r amplifier instrumentation data is quite linear.

3.2.2 The Test of Band Pass Filter (BPF)

The test on this circuit is performed to see the frequency response of the Band Pass Filter circuit.

The cut-off frequency is between 48KHz anf 55KHz, or center frequency is at 50kHz. The input signal used is a sine wave derived from the function generator with an input voltage of 1 V_{rms}. The frequency varied from 1 KHz to 500 KHz, and the output voltage is measured using an Avometer. The test results from this BPF's circuit are shown in Table 4 below.

Table 4 The test's result of BPF's circuit

V_{in} (V_{rms})	fin (KHz)	V_{out} (V_{rms})	Gain (V_{out}/V_{in})
5	1	0	0
5	10	0.09566	0.019132
5	20	0.94722	0.189444
5	30	3.93141	0.786282
5	40	4.42912	0.885824
5	50	5.02492	1.004984
5	60	4.54289	0.908578
5	70	4.13719	0.827438
5	80	3.87723	0.775446
5	90	2.02039	0.404078
5	100	1.37764	0.275528
5	200	0.708546	0.141709
5	300	0	0
5	400	0	0
5	500	0	0

The result of the BPF's test above showed that the center frequency lied at 50 KHz. This is proven at that frequency the voltage gain is the greatest gain.

3.2.3 The Test of AC to DC Converter

This test is done by providing input to the circuit of 50Khz sinusoidal signal which generated from function generator with some variation of voltage amplitude. The output voltage is a DC voltage is shown by a voltmeter which is then compared with the RMS voltage of its input signal to determine the error of this circuit. The test results are shown in Table 5.

Table 5 The result's test of AC to DC converter circuit

V_{in} AC (Vrms)	V_{out} DC (Volt)	error (Volt)
0.5	0.41	0.09
1	0.93	0.07
1.5	1.34	0.26
2	0.95	0.05
2.5	2.48	0.02
3	3.04	0.04
3.53	3.23	0.27
4	3.65	0.35
4.5	4.13	0.37
5	4.57	0.43

3.2.4 The Test of Differential Amplifier Circuit

This circuit is used to adjust the DC voltage output from the AC to DC converter so that the value will vary from 0-5 Volts. Thus, the output of this circuit is a DC voltage with a maximum voltage of 5 Volts and it's ready to be inserted into the ADC microcontroller.

3.3 The Body Bio-impedance Measurement

This measurement is intended to determine the magnitude of impedance changes on the back/shoulders. The measurement was made by moving the right and left shoulders from the normal position up to the maximum and recorded the changes in voltage that occur. The test was conducted on five samples. The impedance is obtained by dividing that voltage by a large flow of stimulation. Table 6 shown the measurements on the right and left shoulders.

Table 6 Result of measurements on the right shoulders

No.	Name	Measured Impedance ( )		Impedance Change ( )
		Normal	Contraction	
1	Yudi	137.0832	152.4007	15.3175
2	Dharma	196.0295	203.6045	7.575
3	Andi	164.7954	175.9647	11.1693
4	Ahmad	178.5674	188.4387	9.8713
5	Robi	184.6490	189.6852	5.0362

Table 7 Result of measurements left shoulders

No.	Name	Measured Impedance ( )		Impedance Change ( )
		Normal	Contraction	
1	Yudi	154.8362	162.8298	7.9936
2	Dharma	174.8294	178.7382	3.9088
3	Andi	139.2847	145.8345	6.5498
4	Ahmad	156.2193	163.7301	7.5108
5	Robi	129.8453	139.3493	9.504

From table 6 and 7, it's known that the bio-impedance measurement system is designed to measure the body's bio-impedance value for all samples tested. Table 6 is the measurement result on the right shoulder and Table 7 is the measurement result for the left shoulder. There is a change in the value of bio-impedance in normal circumstances compared to muscles when contract. The test results also show that the value of bio-

impedance when the muscle contracts larger compared to normal condition. On the right shoulder, the changes in bio-impedance values occurred between 5.0362 Ohm and 15.3175 Ohm. While on the left shoulder the change in bio-impedance values that occurred between 3.9088 Ohm and 9,504 Ohm. The changes in bio-impedance values also caused the changes in measured bio-impedance voltages which will be used as a control signal in a system.

4. CONCLUSION

The design of body bio-impedance measurement system with three electrodes methods successfully done. This device is able to measure the body's bio-impedance signal on two channels simultaneously. There is a change in the bio-impedance value of the body when muscle tissue contracts compared to normal circumstances. On the right shoulder, an average change in body bio-impedance value of 9.7938 Ohm, and on the left shoulder of 7.0934 Ohm. The changes in body bio-impedance values are proportional to the result of the changes of bio-impedance voltage. The voltage changes that occur can be used as a control signal in the system.

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PATIENT INFORMATION SYSTEM DESIGN ON MATERNITY HOSPITAL RESTU IBU PADANG

Jusmita Weriza

EKASAKTI UNIVERSITY

ABSTRACT: In understanding the needs of patients, the good service is needed. The role of information that is needed can be obtained from technological developments. Analysis of the running system is required action in system management. The on-going result of analysis from the patient service information system is an illustration to be able to create a system information to be proposed by designing the computerized information system, on the registration process of new patients, old patient registration, record of payment invoice, and examination result is no longer needed to be recorded manually, rather by simply entering it on the computer to be stored in the database. When the old patients come for the treatment again, the officer of medical record can simply enter the registration number to the computer and the computer will look for the data automatically. the process of making the report is performed by the computer and the medical record officer can input no_MR that will be made into the report, the computer automatically displays the patient data in the computer database. The overview of a system in general and its relation to components in the system outside the environment is described logically in the form of context diagram. The graphical technique that describes the flow of information and changes as the movement of data from input to output as the structure is described in Data Flow Diagram (DFD) Entity Relationship Diagram (ERD) that has a function to organize the data in relation to other data.

Keyword: *Database, Information System, Technology*

A. Introduction

Technological developments can have an impact on changing demands in the digital age of Maternity Hospital Restu Ibu Padang that is an institution that provide service in the field of public health services, particularly those related to pregnancy, childbirth, immunization, and maternal and child health. Currently still many maternity homes that have not utilized the advance of information technology in the process of patient registration, patient data processing and making report. The demand in the era of digitalization at this maternity house contributes greatly in improving the performance of all system components in Maternity Hospital Restu Ibu Padang that provides services of pregnancy examination, family planning (KB), and normal childbirth delivery. For data processing of patient medical record, pregnancy examination service, family planning (KB)birth service, and pharmacy service requires system application in order to simplify the process of data processing and information, and maximize the patient service.

B. General Analysis

The analysis step needs to be done to identify the capability of an application whether the making of that application from the technological system has met the criteria, then whether this application involves the diagnosis of control or another potential that must be considered its compatibility to use technology.

C. System Design Analysis

To perform the existing system drawing requires the addition of a system to be built. The analysis of the running system is the required action in a system management. From this analysis, it will be obtained in the form of information on whether the running system can be used or should be updated and repaired. From this analysis, a form of information system development is obtained that we create a new system or can add and also reduce the running system.

D. Evaluation of Current System

From the results of analysis of the patient service information system, there are some shortcomings and weaknesses. Disadvantages and improvements to the system to be proposed:

1. Procedures that are running, many still done manually, starting from the registration process of new patient registration, registration of old patients, examination results, a record of invoice

payment, and medical recording that are less efficient because it takes a long time.

The solution is to design a computerized information system, on the new patient registration process, the old patient registration, the record of payment invoice, and the result of the examination do not need to be recorded manually, but simply by entering it on the computer to be stored in the database.

2. The patient's data search is done by matching the existing registration number on the patient's control card with the data contained on the patient's medical record card stored on the shelf, this form is not effective, making the patient wait long.

The solution is to design a new computerized system that when the old patients come to the treatment again, medical record officer can simply enter the registration number to the computer and the computer will search the data automatically.

3. The process of making a report is not effective, the data is inputted manually from patient documents and patient data books and store them in patient medical record notebook, this makes data redundancy, the old search process, and more storage media.

The solution is to create a computerized system, the process of making the report is performed by the computer and the medical record officer can simply input no_MR to be made into the report, the computer automatically displays the patient data in the computer database.

E. Context Diagram

A context diagram is the overview of the system in general and its relationship with the components in the system outside the environment that is described logically in the form of diagrams. The following is context diagram from Maternity Hospital Restu Ibu Padang:
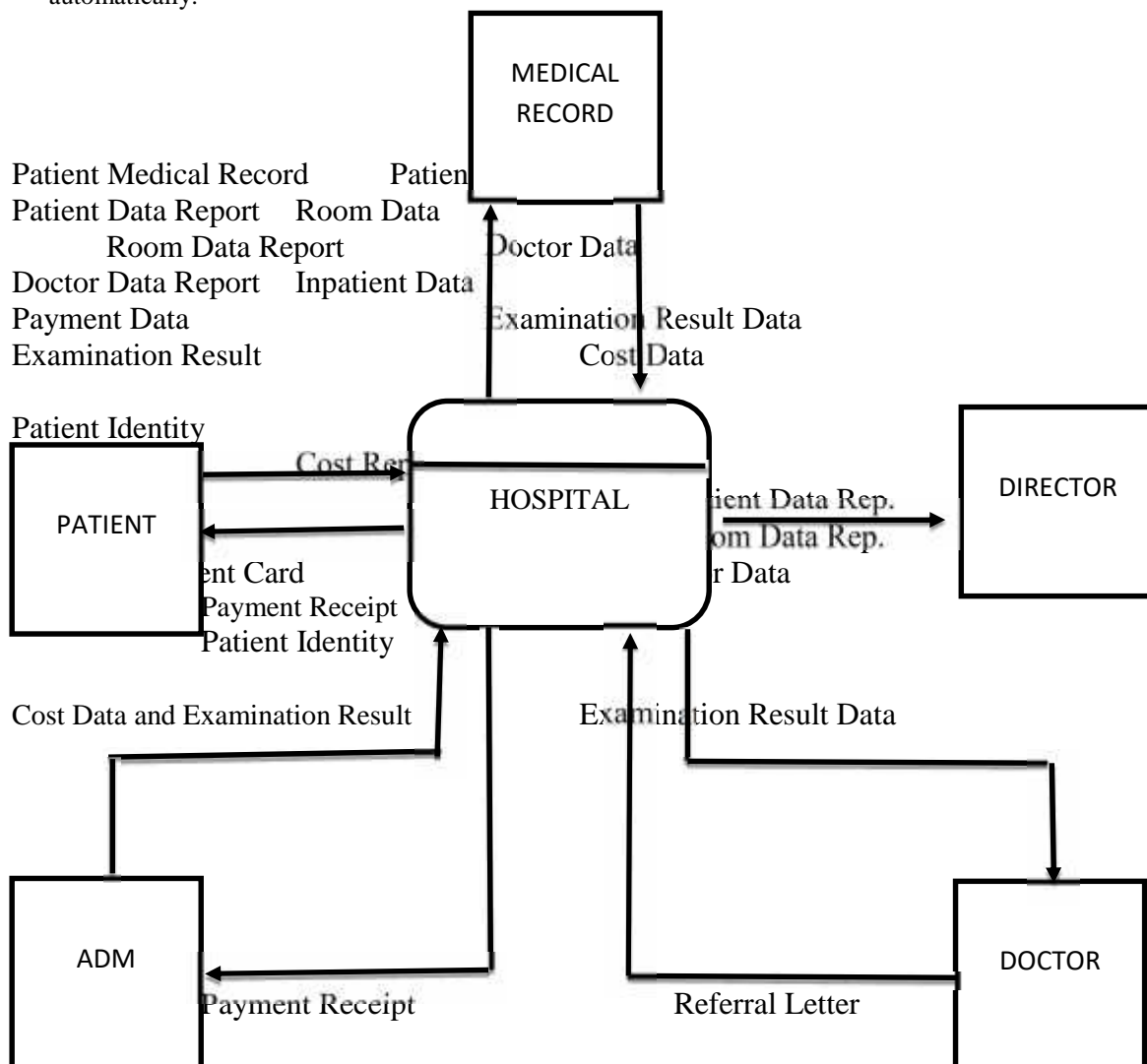
Cost Report

Picture of Context Diagram on Information System

F. Data Flow Diagram (DFD)

Data Flow Diagram is the graphical technique that describes the flow of information and changes as the movement of data from input to output in a structured manner. The following is the analysis of Data Flow Diagram on inpatient information system at Maternity Hospital Restu Ibu Padang
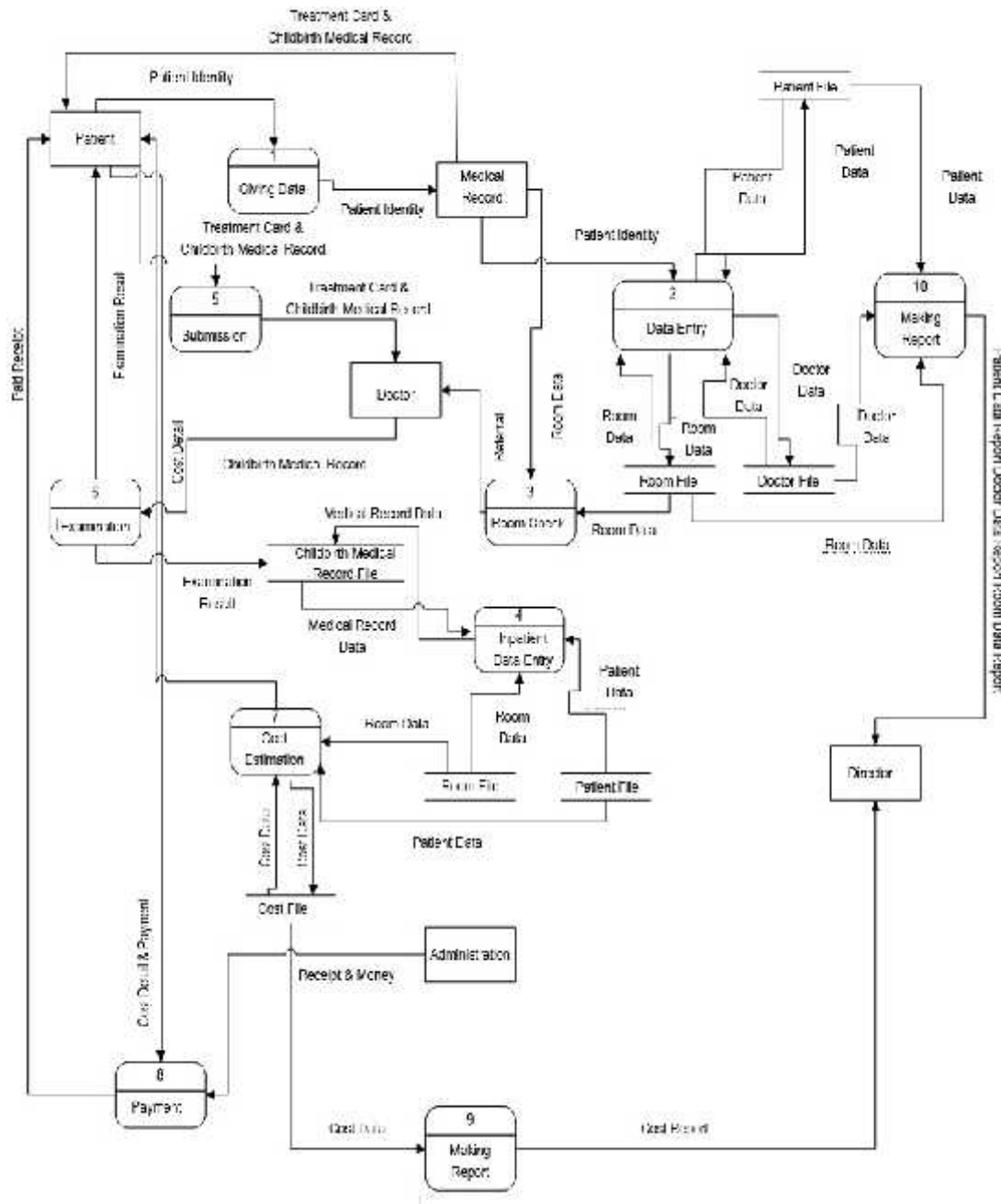
Image Data Flow Diagram

G. Entity Relationship Diagram

Entity Relationship Diagram (ERD) has a function to organize the data in relation to other data and contains the components of the entity set and the set of relations that each is equipped with attributes that represent all the facts.
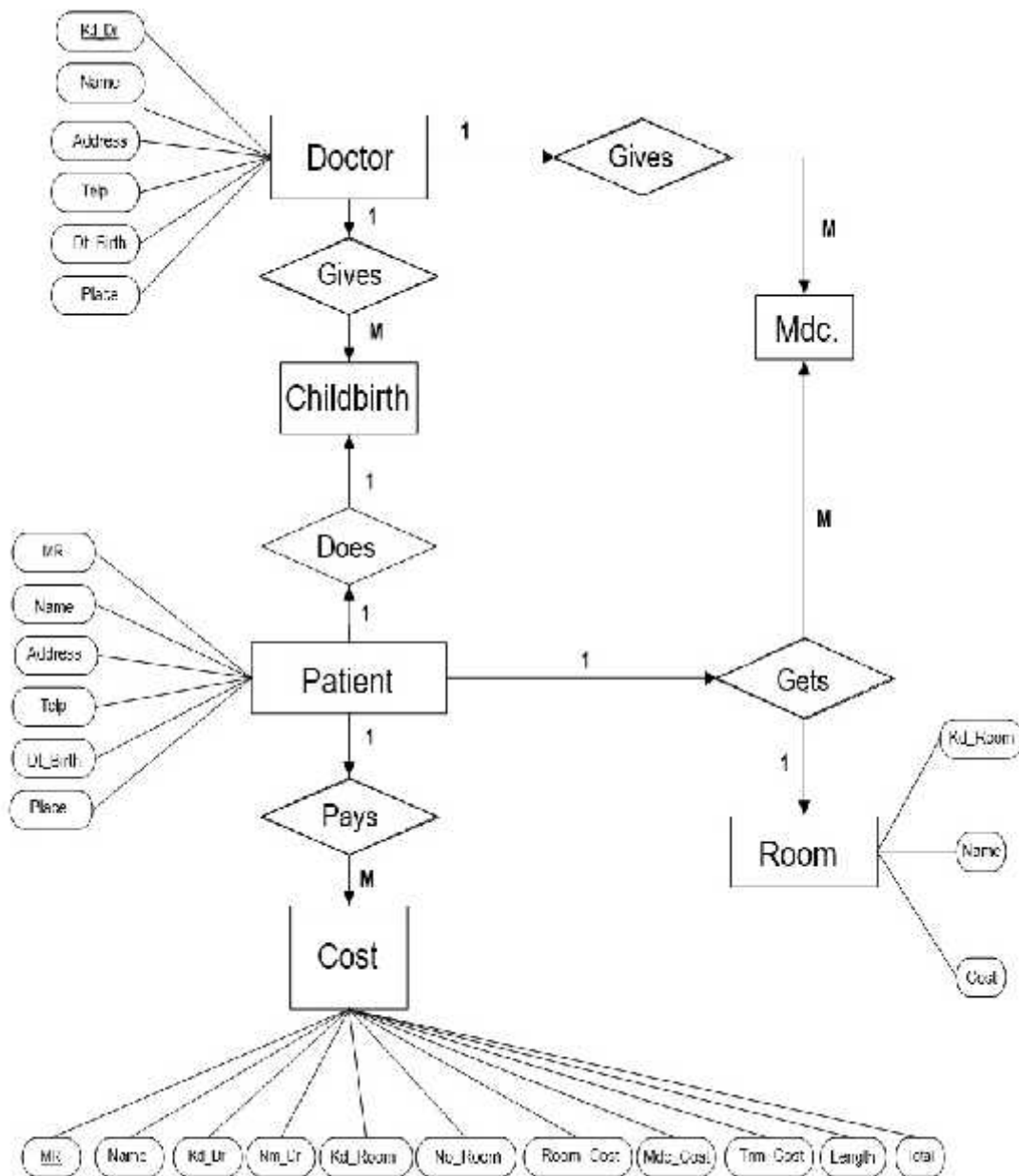
Image Entity Relationship Diagram

H. Table Design

The design of table aims to facilitate the work of computer systems in the activities of setting and searching data on the process of making reports. The following is the design of information system table of Maternity Hospital RestuIbu Padang:

1. Patient Table

No	Field Name	Type	Size	Information
1	MR	Varchar	5	Primary key
2	Name	Varchar	20	
3	Address	Varchar	30	
4	Telp	Varchar	13	
5	Date of Birth	Date		
6	Place of Birth	Varchar	20	

2. Doctor Table

No	Field name	Type	Size	Information
1	doctor_code	Varchar	5	Primary key
2	Doctor_name	Varchar	20	
3	Address	Varchar	30	
4	Telp	Varchar	13	
5	Date of Birth	Date		
6	Place of Birth	Varchar	20	

3. Room Table

No	Field name	Type	Size	Information
1	room_code	Varchar	5	Primary key
2	Name	Varchar	20	
3	Cost	Varchar	12	

4. Cost Table

No	Field name	Type	Size	Information
1	MR	Varchar	5	Primary key
2	Patient_Name	Varchar	20	
3	Doctor_Code	Varchar	5	
4	Doctor_Name	Varchar	20	
5	Room_code	Varchar	5	
6	Room_name	Varchar	20	
7	Room_Cost	Varchar	20	

8	Medicine_Cost	Varchar	20	
9	Treatment_Cost	Varchar	20	
10	Treatment_Length	Varchar	12	
11	Total_Cost	Dobble		

I. Main Menu Design

The design of the main menu has a function to explain the menu and sub-menu contained in the Information System of Maternity Hospital RestuIbu Padang
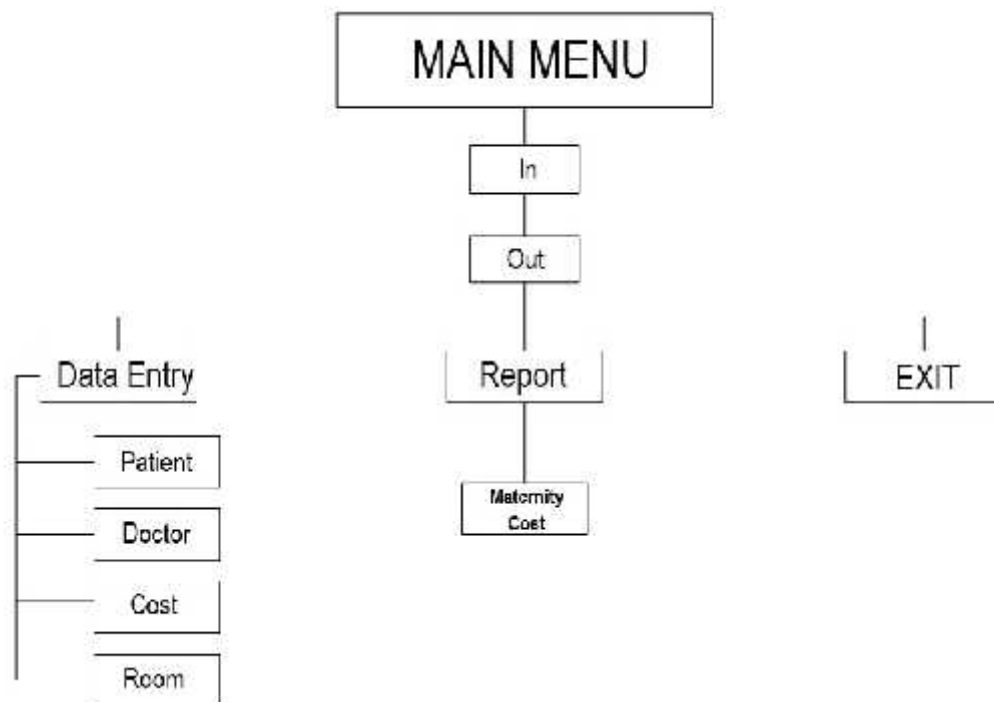
Pictures Main Menu Maternity Home Restu Ibu Padang

J. Conclusions

Based on the problems that arise from the analysis result and design of information systems on Maternity Hospital Restu Ibu Padang, the conclusions that can be put forward are:

1. The previous information system has weaknesses such a registration process, a record of examination results, payment and report are still going manually, this makes the employee performance is less effective and less efficient.
2. The proposed patient service information system will help to reduce the weaknesses of the old system so that it can improve employee performance, simplify and facilitate the process of patient service in the process of patient registration, patient data processing, and the report of patient data, doctor data report, and the report of maternity cost that has been set.

3. The proposed information system is based on the client-server, using the database as the data storage medium, thus minimizing the risk of data loss, data redundancy, avoiding the archive over-stacking, not require large storage media, and make the medical record data search process more quickly and accurately.

K. Suggestions

The proposed information system has limitations and is still far from perfection. The suggestions from a writer so that the patient service information system at Maternity Hospital Restu Ibu Padang can work as expected are as follows:

1. In the maternity patient service that is based on the client-server is expected for the Maternity Hospital to train to its employees about the system.

2. It is better for the process of socializing on the transition from the old system to the new system is done gradually because the process requires adaptation, the cost is greater than the cost of manual systems, and skilled personnel.
3. It is expected that the new client server-based patient service system can be implemented and more perfected in the future.

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IDENTIFICATION THE IMPORTANCE OF LEARNING TOOLS DEVELOPMENT ON ENERGY-EFFICIENT BUILDING INNOVATIONS USING ROOT CAUSE ANALYSIS

Kemala Jeumpa

Student of Technology and Vocational Education, Faculty of Engineering,
Universitas Negeri Padang

ABSTRACT: This paper was purposed to identify the importance of learning tools development on energy-efficient building innovation based on global warming phenomenon that we faced nowadays. To fulfill thermal comforts on the building will need engineering intervention, knowledge, skill, and innovation that can minimalize the adverse effect of nature to the building and to minimalized the adverse effect of the building to nature. Until now, lectures on civil and architecture engineering regarding eco-friendly building only based on existing concept of theory without any improvement on innovation to answer the natural challenge so student knowledge and skill was not improved to innovate an eco-friendly and energy-efficient building.

Based on this reason, problem identification of main reason the importance of learning tools development regarding energy efficient building by innovation was done. Identification will be done by using root cause analysis, by checking every layer of cause to get the main cause why the importance of learning tools development on the energy-efficient building should be done.

Identification result found some main cause of the importance needs to develop the learning tools for energy-efficient innovation: 1). Knowledge and skills of the student were not improved regarding the energy-efficient building; 2). The lesson the received by the student regarding the eco-friendly building only based on old theory and concept; 3). The lesson of energy efficient building currently was not motivated the student to innovate and answer the natural challenge; 4). Student as main actor and agent of change in the society was not quite motivated to innovate save the environment from the damage.

Keywords: identification, learning development, student, skilled, innovation, energy-efficient building

1.   INTRODUCTION

Based on the phenomenon of global warming, one way that can be done is to increase efficiency in the world of construction that is to apply the concept of Green Building as a form of awareness and real efforts in overcoming global warming. Green Building is not only a concept for sustainable living but also builds hope for the future, but now it is still a small part of Indonesian people who begin to realize the importance of choosing building materials that accommodate environmental issues. Therefore, the awareness and concern of Indonesian society must continue to be built to realize the importance of implementing the building with the concept of environmentally friendly.

Global warming, which causes the warming of the earth temperature causes the use of air conditioners indoors is also increasing because of the need for comfortable room conditions are also higher, it also enlarges the use of earth energy and increases the contribution of rising earth temperatures and the greenhouse effect. From the research of Bourdeau, 1999 (in Hari Agung Yuniarto, 2016) also revealed the fact that 50% of the energy absorbed in a building is consumed by refrigerators only, therefore 30% of the total energy required by a country is usually used in housing. This figure is from the conditions in developed countries that are more manageable, for in developing countries this figure is believed to grow larger. This fact if not handled strategically, will be the terrible impact on sustainable nation building. Based on these factors, need to be balanced with the existence of building innovations that can save energy and environmentally friendly, as has been developed in several countries.

2.   PROBLEMS

a. How to identify the main causes of the importance of developing learning tools on energy-efficient building innovations?
b. What is the main cause of the importance of developing learning tools for energy-efficient building innovation?

3.   OBJECTIVES

a. Knowing how to identify the main causes of the importance of developing learning tools on energy-efficient building innovations
b. Getting the main cause of the importance of the development of learning devices on energy-efficient building innovation

4. DISCUSSION
4.1 Learning Process

In the field of Civil Engineering and Architecture, it is very important to be given learning to students about environmentally friendly buildings. For the fulfillment of energy-efficient buildings requires engineering, requiring knowledge and skills and innovation. From the experience of learning during this course of delivery of environmentally friendly building materials only based on the concepts of existing theories without any development to innovation practices so that students' skills do not develop to make an innovation. Students at a young generation are expected to develop their skills towards innovation because as a young generation students are key actors to be able to save the environment from damage.

In this era of globalization, a nation that is unable to cope with progress in various fields will be a nation left behind. The global information age allows one to get information quickly and easily from various sources. A person also has the ability to cultivate, manage and follow up the information gained to be utilized in life to make it a solution to various life issues. Education is the process of forming and developing the power of reason, skill, and morality of life to the potential possessed by every human being. An education is said to be of quality if the learning process is done effectively so that learners gain a meaningful experience for themselves. The products of education are individuals who are superior and beneficial to society and nation-building.

Government Regulation No. 65 of 2013 about Process Standards mentions that every educator in the educational unit is obliged to develop a complete and systematic Learning Plan for learning to be interactive, inspirational, fun, challenging, motivating learners to participate actively and providing sufficient space for the initiative, creativity, and independence according to the talents, interests and physical and psychological development of learners. Education requires the ability to implement what is expected, certain ideas in life to answer problems in life. Learning activities to be supportive in solving life problems require skills, reasoning to relate facts and opinions relating to the issues at hand. This is in line with the knowledge and skills that must be obtained by students as agents of change that will plunge in the community to be able to make efforts in realizing energy-efficient buildings through innovation.

4.2 Root Cause Analysis

Root Cause Analysis is a systematic process of analysis to examine the performance of problems from the root cause to be able to ascertain the underlying cause. The purpose of Root Cause Analysis is to identify causal factors that contribute to causing problems in a performance.

4.2.1 Overview of Root Cause Analysis Process

a. Identify the difference in performance (or need) from information that has been collected so far in assessment needs. Often RCA completes the need for the highest priority so as to save resources.
b. Sometimes RCA will be driven by needs that are directly related to a particular situation or event. In such cases, it is important to start by determining what happens to prevent the occurrence of the incident.
c. However, the needs will not be generated by any single event. In such situations, it is more challenging to determine which causes the gap in performance.
d. Create a plan to analyze identified needs.
e. Analysis can take anywhere from a few hours to a week or more, depending on performance issues.
f. Understand that the analogy of peeling onions is often associated with RCA due to many frequent causative factors of the inner layer.
g. Ask the "Why?" At least five times so it can peel off the layers of the underlying factors.
h. Review the information collected at each RCA layer to identify and prioritize causal relationships.
i. For each identified priority factor priority, find at least two interventions or activities that address potential causes, and ensure that they do not negatively affect performance.

4.2.2 Root Cause Analysis Application

a. Separate the problem from the symptoms
b. Identify the factors that are causing the problem
c. Determine why not achieve the desired result.
d. Complete the question of how the problem arises

4.3 Causes Identify by Using Root Cause Analysis

The problem, in this case, is that the knowledge and skills of the students do not develop in understanding the environmentally friendly and energy-saving building related to the innovation that can be done.

a. Why do students' knowledge and skills not develop in understanding environmentally friendly and energy-efficient buildings related to building innovation?

Because so far the delivery of lecture materials does not motivate the knowledge and skills of students to innovate

b. Why is the delivery of lecture material so far does not motivate students' knowledge and skills to create innovation?

Because so far the delivery of lectures related to eco-friendly building only based on the concept of the theories that already exist without practice

c. Why so far the delivery of lectures related to the eco-friendly building is only based on the concept of existing theories?

Because learning is not directed to improving the skills to innovate on energy-efficient buildings

d. Why so far has not been learned to improve skills to innovate on energy-efficient buildings?

Because the development of learning has not been done in the direction of innovation to create energy-efficient buildings to minimize the effects of global warming

e. Why is it necessary to develop learning in the direction of innovation to create energy-

efficient buildings in minimizing the effects of global warming?

Because students must be trained the ability of thinking and work so that they will be able to generate innovation to answer a challenge that exists in the environment.

f. Why students should be trained ability of thinking and work in order to produce innovation to answer a challenge that exists in the environment.

Due to improving the knowledge and skills of students in innovating related building energy saving

g. Why it is necessary to improve the knowledge and skills of students in innovation related to energy-efficient buildings

Because students as agents of change in society and are key actors to be able to save the environment from damage.

Table 1. Factors Causing The Importance Of Learning Development

No	Causes factor 1	Path through the root cause map	Recommendation
1	Student knowledge and skills are not developing related to energy-efficient buildings	The student's way of thinking is fixed on concepts and theories	Change the way students think to be able to see the challenges in life

No	Causes factor 2	Path through the root cause map	Recommendation
1	Lessons related to environmentally friendly building received only in the form of previous concepts and theories	Students do not develop their thinking patterns to create innovation in responding to challenges in their environment	Changing the mindset of students to be able to bring innovation to answer the challenges in life

No	Causes factor 3	Path through the root cause map	Recommendation
1	The lessons learned about environmentally friendly buildings received so far do not motivate students to be skilled at innovating answering environmental challenges	Learning is not developed to motivate students' skills in innovating in order to respond to environmental challenges related to global warming	Developing learning tools towards energy-efficient building innovations

No	Causes factor 4	Path through the root cause map	Recommendation
1	Students as agents of change in society are still unskilled to innovate as key actors that will save the environment from damage	Lessons are not directed to improving students' innovation skills as part of society that will save environmental damage	Undertake the learning to improve students' skills in innovating as part of a society that saving the environment

5. CONCLUSION

a. Root Cause Analysis process is done by examining the performance of the problem from the root cause layer by layer to be able to ensure the main cause of the importance of the

development of learning devices on energy-saving building innovation is necessary.

b. Based on the Root Cause Analysis that has been done then identified that the main cause of the importance of the learning tools development, namely: Because so far lesson is not directed to motivate students' skills in order

to innovate energy-efficient buildings. Therefore, the students as part of the community that will become the environmental savior actor need to get the learning development.

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DECISION SUPPORT SYSTEM FOR RECOMENDATION CERTIFICATION TEACHER ON VOCATIONAL HIGH SCHOOL

Khairul[1], Rahmad Budi Utomo[2]

[1]Faculty of Engineering, Padang State University, Indonesia; Faculty of Computer Science, University of Pembangunan Panca Budi, Indonesia[2]

ABSTRACT: Teachers are the most important factor in education. The ability of a teacher in teaching determines the success of students in understanding and applying science. To improve the quality of education the government gives an appreciation of teacher certification allowance for teachers who are considered competent and contributes greatly in the field of education and teaching. However, facts that occur in the field, most teachers who have been certified incompetent if assessed its performance in the learning process at school. Especially in vocational high schools teachers are expected to focus not only on the content of the theory but should apply more practice in the learning process. So that student who graduate from vocational high school ready to plunge into the world of work, have the competitiveness and competent in their field. One way to solve the problem is to implement a decision support system. This method is not limited to the assessment of the criteria and the results of the calculation for the teacher's recommendation to be granted a certification allowance. The development of decision support system is expected to make teachers experts in developing the competence of their students. So that a student has the competencies needed by the world of work. And the teacher certification allowance given can give birth to a competent and professional teacher in their field.

Keywords: Teacher, Certification, Vocational High School, Decision Support System.

1. INTRODUCTION

Vocational education is an educational system that directs students to be able and ready to go into the world of work. So in the application of learning is more focused on the development of theoretical and practical capabilities that are designed as being in a job or industrial process of today. The role of teachers, in this case, plays a vital role in determining the success of the learning process in preparing students to have high competitiveness in meeting the demands of the job and industry world.

To appreciate the performance of competent and professional teachers, in this case, the government gives awards in the form of teacher certification allowance. But in the process the government through Dinas Pendidikan conduct selection to select teachers who will get teacher certification allowance. Each vocational high school within Dinas Pendidikan will send a recommendation of their teachers who will be selected to obtain teacher certification allowance.

This study was focused to rate the teacher performance rate by calculating several competencies that affect teacher performance. The assessment problem can be solved by using profile matching method. It calculates several competencies determined previously and finds the gap between the target and the raw data. The result is expected to conduct an assessment of the teacher at vocational high school. If the teacher has a low value, a teacher can make improvements.

2. THEORIES

2.1 Teacher Certification

In Article 1 Paragraph (1) of Regulation of the Minister of National Education of Republic of Indonesia Number 18 Year 2007 regarding Certification for Teachers In Position stated that certification for teachers in the office is the process of giving educator certificate for teachers in the position. Teacher certification in the position is essentially the application of educator standards and education staff[1].

Teacher certification aims to determine teacher's eligibility in performing tasks as a learning agent and realize national educational goals, improve teacher professionalism, including teacher welfare, improve process and quality of educational outcomes, and improve the dignity of teachers.

2.2 Profile Matching

Profile matching is a very important process in human resource management which is determined beforehand competencies required for the job. Competence is a requirement that candidates for office holders must have [3]. In a profile matching process outlines a process of comparing the individual competencies into job competency that can be known differences in competence (gap) [4][5]. The smaller the gap is generated then the weight value, the greater meaning it has a greater

opportunity for employees to take that position.To analyze the employees by specific occupations carried out by the method of profile matching, which in the process is first to determine the competence require. Profile matching process is the process of comparing the individual's competence in job competency so that can know the difference competence.

Profile Matching process is divided into several stages [2]:

- Aspect and Sub Aspect
- Scoring
- Gap
- Core Factor & Secondary Factor
- Total Weight
- Result

Gap is the difference between the value of the aspect and the target value. It can be obtained by this formula.

$$Gap = Aspect\ Value - Target\ Value$$

Core and Secondary Factor are calculated by these formulas.

$$NCF = \frac{\sum_i^n NC}{\sum_{t=1}^n IC}$$

$$NSF = \frac{\sum_{l=1}^n NS}{\sum_{i=1}^n IS}$$

3. METHODOLOGY

Some Stages of the Profile Matching algorithm for teacher selection that will be recommended to obtain a certification allowance are:

a. Prepare the data on teacher performance appraisal criteria.
b. Define the ideal sub criteria target.
c. Determine the gap between each sub-criteria.
d. Give weight to each gap, criteria, the percentage of Core Factor and Secondary Factor.
e. Group sub criteria result of performance appraisal of a contract employee to Core Factor and Secondary Factor. Then calculate the value of Core Factor and Secondary Factor.
f. Calculate all the final values by the sum of the percentage of criteria that has been calculated the total value of CF and SF on sub-criteria.

g. After the final value has been obtained, then next to the ranking sequencing of the final value of each teacher.
h. Analyze the results of the Profile Matching method to provide recommendations for teachers who deserve certification allowance.

In first of the research instruments, the writer preparing some data needs analysis. such as teacher data to be selected, weighted ratings and gap rules before apply the Profile Matching Method to provide recommendations for teachers eligible for certification allowance

Table 1 Teacher Assesment Criteria

Criteria	Weight	Sub Criteria	Core Factor	Secondary Factor
Individual	20%	Discipline	60%	
		Presence		40%
Competencies	30%	Pedagogic	80 %	
		Personality		
		Social		20%
		Professional		
Portopolio	50 %	Academic Qualification	70%	
		Education And Training		
		Teaching Experience		
		Planning and Implementation of Learning		
		Assessment of Superiors and Supervisors		
		Academic Achievement		
		Works of Professional Development		
		Participation in Scientific Forums		30%
		Organizational Experience in the field of Education and Social		
		Awards that are Relevant to the Field of Education		

Table 2 Weight Rating

Value Rating	Weight
Not Proven	1
Still Weak	2
Simply	3
Competent	4
Very Satisfactory	5

Table 3 Gap Rule

Gap	Value
0	5
1	4,5
-1	4
2	3,5
-2	3
3	2,5
-3	2
4	1.5
-4	1

4. EVALUATION

This section shows the illustration of the Profile Matching calculation. Assume there are four teachers those will be rated. The following table shows four teachers have been mapped into the weight rating. The value is between "1" and "5". Number "1" is the lowest value while the number "3" is the highest one.

Variable X is individual citeria, variable Y is competencies criteria and variable Z is porto polio criteria. While A until P are sub criteria from each individual citeria, competencies, and porto polio criteria

Table 4 Teacher Rating

Teacher	X		Y				Z									
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Amru	4	3	3	3	4	4	3	3	4	4	3	4	4	3	5	3
Fahmi	3	4	4	4	3	3	3	4	4	4	3	3	4	2	5	4
Sayono	3	4	3	5	3	2	3	3	4	3	3	4	3	4	3	3
Nedy	3	3	4	4	3	3	2	3	4	3	4	3	3	3	3	3
Target	5	4	4	4	4	4	4	4	4	5	4	5	4	4	5	4

The next step is finding the gap value. Each parameter is filled with the value of the previous score and compared with the existing target value in Table 4. The gap result after calculation will be in Table 5, 6 and 7.

Table 5 Gap of Individual Criteria

Teacher	Gap of Individual Criteria	
	A	B
Amru	-1	-1
Fahmi	-2	0
Sayono	-2	0
Nedy	-2	-1

Table 6 Gap of Competencies Criteria

Teacher	Gap of Competencies Criteria				
	C	D	E	F	C
Amru	-1	-1	0	0	-1
Fahmi	0	0	-1	-1	0
Sayono	-1	1	-1	-2	-1
Nedy	0	0	-1	-1	0

Table 7 Gap of Portopolio Criteria

Teacher	Gap of Portopolio Criteria									
	G	H	I	J	K	L	M	N	O	P
Amru	-1	-1	0	-1	-1	-1	0	-1	0	-1
Fahmi	-1	0	0	-1	-1	-2	0	-2	0	0
Sayono	-1	-1	0	-2	-1	-1	-1	0	-2	-1
Nedy	-2	-1	0	-2	0	-2	-1	-1	-2	-1

After the gap values are retrieved, those values will be converted into Profile Matching rule using the gap rule as seen in Table 3. The Core Factors and Secondary Factors are retrieved from the values by using the earlier formulas. It must have previously determined which are the core factors and secondary factors. So we can get the value of Core Factors and Secondary Factors from all individual criteria, competencies criteria, and Porto polio criteria will be in Table 8, 9 and 10.

The result of the value of individual criteria, competency criteria, and criteria for Porto polio will be in Table 11, 12 and 13.

Table 8 Core Factor and Secondary Factor of Individual Criteria

Teacher	Individual Criteria			
	A	B	CF	SF
Amru	4	4	4	4
Fahmi	3	5	3	5
Sayono	3	5	3	5
Nedy	3	4	3	4

Table 9 Core Factor and Secondary Factor of Individual Criteria

Teacher	Competence Criteria				CF	SF
	C	D	E	F		
Amru	4	4	5	5	4	5
Fahmi	5	5	4	4	5	4
Sayono	4	4.5	4	3	4,25	3,5
Nedy	5	5	4	4	5	4

Table 10 Core Factor and Secondary Factor of Porto polio Criteria

Teacher	Porto polio Criteria										CF	SF
	G	H	I	J	K	L	M	N	O	P		
Amru	4	4	5	4	4	4	5	4	5	4	4,28	4,33
Fahmi	4	5	5	4	4	3	5	3	5	5	4,28	4,33
Sayono	4	4	5	3	4	4	5	5	3	4	4	4
Nedy	3	4	5	3	5	3	4	4	3	4	3,85	3,66

If all Core Factor and Secondary Factor values for each criterion are individual criteria, competency criteria, and criteria for Porto polio has been obtained, then the next stage is to find the total value for individual criteria, criteria of competence, and criteria of polio Porto

The percentage weight of CF and SF for each criterion has been predetermined.
a. Individual Criteria
   CF Presentage: 60%
   SF Percentage: 40%
b. Competencies Criteria
   CF Presentage: 80%
   SF Percentage: 20%
c. Porto polio Criteria
   CF Presentage: 70%
   SF Percentage: 30%

Table 10 value of Individual Criteria

Teacher	Value of Individual Criteria		
	CF	SF	Total
Amru	4	4	4
Fahmi	3	5	3,8
Sayono	3	5	3,8
Nedy	3	4	3,4

Table 11 value of Competencies Criteria

Teacher	Value of Competencies Criteria		
	CF	SF	Total
Amru	4	5	4,2
Fahmi	5	4	4,8
Sayono	4,25	3,5	4,1
Nedy	5	4	4,8

Table 12 value of Porto polio Criteria

Teacher	Value of Porto polio Criteria		
	CF	SF	Total
Amru	4,28	4,33	4,295
Fahmi	4,28	4,33	4,295
Sayono	4	4	4
Nedy	3,85	3,66	3,793

After the total score for individual criteria, criteria of competence, and criteria of polio porto are obtained, the next step is to find the final value.
The results of the final recruitment value will be used as a recommendation for teachers who deserve certification allowance. The percentage weight of individual criteria, criteria of competence, and criteria for polio porto for each criterion have been predetermined.
a. Percentage of individual criteria (50%)
b. Percentage of competency criteria (40%)
c. Percentage criteria of porto polio (10%)

To calculate the final value of recruitment using the formula:

Final value = (% of individual criteria weight * Total score of individual criteria) +
(% of competency criteria weight * Total score of competency criteria) +
(% of criteria porto polio * Total score Porto polio)

The result of final score and ranking will be shown in Table 13 and 14.

Table 13 Final Score

Teacher	Individual	Compe tencies	Porto polio	Final Score
Amru	4	4,2	4,295	4,2075
Fahmi	3,8	4,8	4,295	4,3475
Sayono	3,8	4,1	4	3,99
Nedy	3,4	4,8	3,793	4,0165

Table 14 Descending Order of Final Score

Teacher	Final Score	Ranking
Fahmi	4,3475	1
Amru	4,2075	2
Nedy	4,0165	3
Sayono	3,99	4

5. CONCLUSION

A teacher's performance appraisal in the field of education is very influential in the process of the recommendation of teacher certification allowance. With the provision of teacher, certification allowance is expected to improve the performance of teachers in making the design of learning which is good especially the field of vocational education. Implementation of Decision Support System with Profile Matching method is able to provide analysis of teacher assessments that are eligible to receive teacher certification allowance. With accurate calculation results then recommendation will produce the right policy. Because if the right target, it will improve the quality of students who are able to compete and meet the demand of industrial markets.

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IMPACT OF THE TRAINING WITHIN INDUSTRY MODEL IN LEARNING PROCESS ON VOCATIONAL EDUCATION

Kinanti Wijaya[1], and Daniel Irvansius Tampubolon[2]

[1] Department of Building Engineering Education, Engineering Faculty, Universitas Negeri Medan, Willem Iskandar Street, Indonesia

ABSTRACT: This research see the difference the learning outcomes by using the conventional model and the training within industry (TWI) model. The draft study was quasi experimental research design consists of two classes, the class of experiments and classroom control. The source of the data in this study is the results of observations through assessment instruments used to collect data are the results of the student's skills assessment comprise 7 assessment rubrics. The results showed that: the class is taught by learning TWI earns an average rating of 93.59, standard deviation of 3.75. While the class is being taught by conventional learning model gained an average rating of 74.82 and standard deviation of 4.54. It was concluded that there is a significant and positive influence on learning outcomes learning TWI against construction of the stone and concrete. It is made students to be passionate and skilled use of the practice

Keywords: learning model; learning outcomes; concrete construction; training within industry

1. INTRODUCTION

Education in Indonesia faces severe challenges in the era of the ASEAN Economic Community (MEA) 2015 which began rolling on December 31, 2015. The presence of MEA in the regional arena in Southeast Asia can be an opportunity, hope and challenge for countries in Asia including Indonesia (Nur Nisai Muslihah, 2008).

Education is a process of establishing qualified human resources. Improving the quality of education can only be achieved through improving the quality of learning process that leads to improving the quality of educational outcomes (Nur Nisai Muslihah, 2008). According to the Indonesian Language Dictionary Education comes from the words of learners which means nurturing and giving training, so Education is the process of changing the attitude and behaviour of a person or group of people in an effort to mature human beings through teaching and training.

In the global era, education in Indonesia in the present and the future still faces increasingly heavy and complex challenges. Indonesia must be able to compete with other countries both in products, services, and in the preparation of human resources. Based on research of Will W.K. Ma, Kirindi Sun and Jamie Ma (2014), the cognitive learning styles that is found in most students can influence learning outcomes. Therefore many teacher still trying to modify the learning model to reach the learning goals.

Based on observations, there are now many using conventional models hence addressing the need for innovative learning model that brings students as if or as if jump directly into the world of work that the model of learning is applied now less effective and from there obtained Independence and recognized skill. Therefore, this research is conducted with the aim to find differences in results obtained by students through teaching and learning activities by using the model of Training Within Industry (TWI) with conventional model.

Training Within Industry (TWI) is a vocational training that implements methods that encourage students to master the materials and practices and knowledge and behaviors that are directly related to those skills (Wena Made, 2009). The Training Within Industry (TWI) learning model is one of the developed learning models with training to meet the demands of the industrial world. This model consists of 5 learning stages: Preparation, Demonstration, Impersonation, Practice, and Evaluation (Chilmar, 2011).

The implementation of the Training within Industry (TWI) strategy Assessed quite effectively it was proved in the previous research in his research, applied to vocational education, revealed that Average learning outcomes after students applied the learning strategy Training Within Industry is experiencing improvement, the average score of student learning outcomes is 73.76 increased to 83.05 with the average increase in mastery of the material in cycle I and cycle II by 11%. From the result of the

improvement of learning result means that the implementation of learning strategy of training within industry in training eye drawing Construction of Ladder has increased (Boby Simbolon, 2016).

The purpose of this study is to investigate the influence of TWI learning model of stone and concrete learning in vocational education.

2. LITERATURE REVIEW

2.1 Definition

The definition of learning is as a process of activity change, reaction to the environment. Meanwhile, according to Harold Spears, revealed that "Learning is to observe, to read, to imitate, to try something themselves, to listen, to follow direction. Learning is observing, reading, imitating, trying something by yourself, listening, and following directions". Changes that occur in a person a lot of good nature and type but not every change in a person is in the sense of learning (Fera Andriyani, 2015). Based on the description of the opinions of experts above can be concluded that learning is observing, reading, imitating, try something yourself, hear, and follow the direction.

Learning model is a whole set of presentation of teaching materials covering all aspects before and after learning by teachers and all related facilities used directly or indirectly in teaching and learning process (Istarani, 2011). As one component of teaching, the model has a role that is not less important than other components in teaching and learning activities. The use of appropriate and varied models can be used as a tool in teaching and learning activities at school.

According to Hamzah B. uno said that learning focuses on how to membelajarkan students and not on what students learn so in social learning theory emphasizes through the phenomenon of model (Istarani, 2011). He further confirms that the definition: Learning through the model aims to help students find the meaning of self in the social environment and solve the dilemma with the help of the group with learning through the model of students will know the journey of life and activities of hard work of someone in achieving success (Benget S Lumbantoruan, 2015). So it can be concluded the model is in this learning is very necessary to use an interesting model, which stimulates interest in students to learn it.

2.2 Training Within Industry (TWI)

TWI is a method that emerged during World War II in America where at that time very shortage of workers in the country so it takes workers who have skills in a fast time. And in the Beginning Initially the workers trained were to make the weaponry needed for war (Chilmar, 2011).

Nolker & Schoenfeldt mentioned that to teach the practice of vocational skills it is necessary to use certain strategies so that students understand, both cognitively and simultaneously on a motor basis the basic steps of a vocational skill. Then the right learning strategy to teach basic vocational skills is TWI (Benget S Lumbantoruan, 2015). The steps of learning model TWI (Wena Made, 2009) are:

2.2.1 Preparation phase

Broadly speaking the teacher's activities in this phase are preparing the worksheet, explaining the purpose of learning and training, explaining its importance, arousing student interest, assessing and establishing students' early skills. The main activities of teacher in this stage are to plan, organize, and formulate the conditions of learning and training so that there is an activity systematically with the strategy to be applied.

2.2.2 Phase of the demonstration

At this stage of the demonstration the delivery strategy used should be tailored to the learning media and available practice training. If the learning and training practice is available audio visual, it would be better first students exhibited work to be learned through audio visual media. The next step is that the teacher demonstrates the actual work to be learned, explains how good works in relation to the whole process, by taking such a position that students can follow the work process from the same viewpoint as the teacher.

2.2.3 Phase of simulation

At this stage, students should be organized and organized learning activities so that students are really able to understand and perform work activities in accordance with the purpose of learning and training practice. In this stage the teacher should really pay attention to the stages of work done by students. Teachers must always monitor the work process of students. If there is something inappropriate, the teacher should

have the students do a repetition of the work and help students to be able to perform the job duties correctly.

2.2.4   Practice

Once students are able to simulate the workings well, the next step is the implementation of practice activities. At this stage the student repeats the newly learned work activity until the learned skills are fully mastered. Important things that need to be done and paid attention of teacher in this step is arranging management strategy and organizing of learning and practice training, so that student really able to do activity learn optimally. In order for students to be able to practice optimally, besides influenced by the condition of learning and practice training is also strongly influenced by the application of methods or strategies of learning and training practices in accordance with the ends achieved goals.

2.2.5 Phase of evaluation

The evaluation stage is an important final stage for every learning and training process, especially in vocational practice learning and training. In learning strategy and TWI model practice training, evaluation activities are conducted at practice stage. Through the evaluation of learning and practice training, students will know the ability clearly so that students can improve and improve the quality of learning and training. Similarly, evaluation activities are very important for a teacher, because of the results of the evaluation can be known how far the objectives have been set. In addition, with the evaluation of one will be able to understand the weaknesses of learning strategies and training that have been done so that the evaluation also serves as one of the techniques to improve the program of learning and training.

3. RESEARCH METHODS

This research was conducted on the subjects of Construction Stone Construction Program of Stone and Concrete. The subjects of this study are the vocational education students of grade XI. Stone and concrete constructions program consisting of two classes, namely class KBB -1 consists of 31 students and class KBB-2 consists of 27 students. So the total of the subjects in this study were 58 people. The object of this research is the influence of learning model of training within industry to improve learning activity on Stone Construction subjects. This type of research is quasi experimental research. The approach is qualitative approach.

Before the treatment is done, researchers have prepared materials and materials in the form of a teaching unit program formulated according to the curriculum applicable in the school. The study was conducted in 2 meetings on each learning model, one class was given learning with TWI model (experimental class) while the other class was given conventional learning (control class) so total there were 4 meetings.

At the end of the meeting conducted tests to test student learning as well as to obtain student learning outcomes so that the data obtained in the form of numbers in which this number will be analysed data.

4. RESULTS AND DISCUSSION

4.1 Results

The average learning result of stone construction practice for experimental class is 93.59 with the lowest value of 86 and the highest value is 100. From the result it shows the increase of student learning result and the average of student learning result has been completed because it fulfill the minimum passing criterion   70 (see figure 1).

Figure 1. Experimental class test result diagram
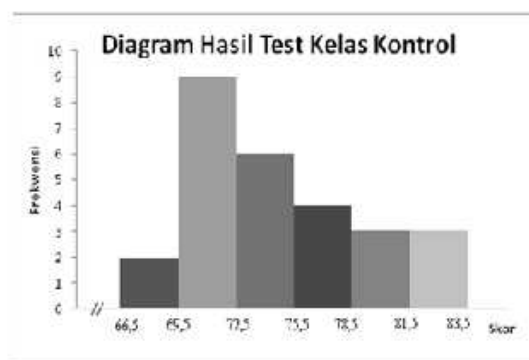
The average learning result of stone construction practice for control class is 74.82 with the lowest value equal to 67 and the highest value is value 84. From the result show the happening of the increase of student learning result but the mean of result of student learning have been completed

because fulfill the minimum mastery criteria 70.

Figure 2. Diagram of control class test results

Table 1. Learning results

Items	Experimental Class (TKBB 1)	Control Class (TKBB 2)
Highest Score	100	84
Lowest Score	86	67
Average	93,59	74,82
S. Deviation	3,749	4,538
Varians	14,051	20,598
N	31	27
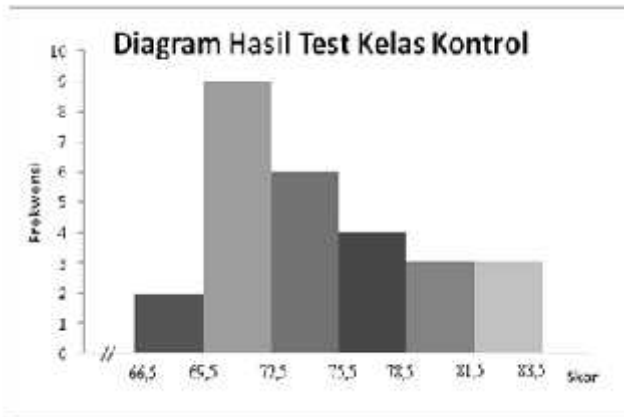
The experimental class is taught by TWI learning model and control class taught by conventional learning model, so to see if there is any difference from the influence of TWI learning model to the learning result of stone construction, one hypothesis test by using t test.

According to the learning result (table 1) of stone construction study after taught with model of learning of TWI at student of KBB1 class and result of stone construction after taught with conventional learning model on student of KBB2 grade got t count value 17.24. Distribution value of t at significant level = 0.05 and 56 obtained by t table value equal to 1.67.

For learning result data obtained t count > t table that is 17.24 > 1.67 mean Ha accepted and Ho rejected hence result learn stone construction practice class student experiment higher than at control class. So it can be concluded that the results of learning by using TWI learning model is higher than the learning outcomes using Conventional learning model with the percentage increase of 25.07%.

3.2 Discussion

The results of this study indicate that there is a significant influence of the median in learning of stone construction learning outcomes in grade XI students of Construction Engineering Program of Stone and Concrete. This is because using the TWI learning model has important meaning because the activities of the material that is not clearly delivered can be assisted by question and answer and also by direct practice to understand.

The learning result of stone construction taught by using TWI learning model is higher than using conventional learning model, this is because by using TWI model, students are more active in practice because the model teaches one by one students to understand, because the syntax is taught accordingly with learning in the field they will work, imitate and demonstrate and practice that can ultimately improve student learning outcomes and can also cover all students given the TWI model unlike classes that use conventional models.

4. Conclusion

Based on the result, it shows that using the TWI learning model in learning gives a significant influence on the stone construction learning outcomes in grade XI students The Stone Construction and Concrete Construction Engineering Program in vocational education school.

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THE EFFECT OF SOFTWARE MASTERCAM TOWARD MECHANICAL ENGINEERING STUDENTS PERFORMANCE IN MAKING PRODUCT WITH CNC MILLING MACHINE IN VOCATIONAL HIGH SCHOOL 1 PADANG

Kms. M. Avrieldi[1], Suparno[2], Nofri Helmi[3]

[1]Engineering Faculty, [2]State University of Padang, [3]Indonesian

ABSTRACT: This study started from the less of student skills in operating a CNC milling machine. This study was quasi-experimental design using Randomized Two-groups design, posttest Only. The total sample is 32 students. The experimental group consist of 16 students are provided media software Mastercam were given the treatment and 16 students of the control group were given the conventional methods. The results of this study showed that t-test analysis of experimental group test scores and grade control obtained t = 20.311 while t.table at significant level of 0.05 with df = 16 + 16-2 = 30 is t.table (30) = 2.042. with t.count> t.table (20.311> 2.042). Based on the research can be concluded that study by using software Mastercam in making work unit by CNC Milling can help students getting more accuracy, efficiency, quality of the work than the study by using conventional method.

Keywords: Media, Study Performance, CNC.

1. INTRODUCTION

Education is primarily important in the construction and development the potential of the nation. The relationship between education and improvement quality of human resources of generally. In education, there are some basic concept one of which namely education for a lifetime. Quality improvement of human resources as required during certain specified by the relevant innovation of education. Vocational education is educated which links, fix, trained a human being in order to have the habit for working to be able entering the real work (industry), so it can be used to improve life (Alfujri B. Sharif, 1998). Therefore, vocational education is educated which one of result a skilled manpower in expert in the field work then it can working in the industry. Vocational Secondary School (SMK in Indonesian) having a function to prepare students entering the real work in the industry. Therefore, to achieve goals of vocational education must orient based on needed by industry. Educational programs must to relevant needed of the industry. According Wirawan (2009:9) performance is a function of competence, attitudes, and actions a students toward the content of the subject course. Performance in operating a CNC Machine is an important thing for studying in CNC programming subject. Less in understanding students toward CNC programming has been the primary problem in getting skilled to operate the machine. This cause the low ability students understanding in the coordinate system in making of the manual program. Students having a problem for calculated the coordinates on working job sheet making it difficult to make material using CNC Machine.

Based on an interview with the students in class XII TP - B at Thursday, October 27, 2016, showed that the conventional method makes students less in understanding to having ability using CNC Machine with CNC programming. That cause students feel saturated an often absent and late for coming to the school when the studying started.

Based on the problem above, the need for a learning software which can be used for students in making material job using CNC Machine. The learning software used by researcher namely Mastercam. Mastercam is a software used for designing an object that will be worked into a program that will be included (input) into CNC Machine, lathe machine, milling machine, etc.

Based on the problem above, identification of the problem in this research are as follows: 1) the lack of skills of students in operating CNC Machine this cause by the less ability the students understand CNC Machine making it difficult to operate. 2) students unable for making material job using CNC Machine. 3) students not interesting for studying CNC Programming subject. 4) learning method in class not varied. 5) students is difficult to operate CNC Machine.

In accord with the identification of problem this research has goals are: 1) describe the performance of the students of grade XII in Mechanical Engineering Department Vocational High School 1 Padang in making the material job used CNC Machine. 2) Describes the performance of students of grade XII in Mechanical Engineering Department without used mastercam software on the learning process. 3) Describes the influence performance students making a material job with mastercam software.

2. METHODS

2.1 Model of Research

This type of research used by experiment method. According Margono (2010:110) experiment research using a specially designed experiment in order the data needed for the research question. On the other hand, according to Suharsimi Arikunto (2010: 206) experimental research aims to find out the cause of a result of something that is imposed on the subject research. And then, according to Seniati, Liche (2011:23) experimental research of examining the causal relationship and not just examine the relationships between variables.

2.2 Population and Technique Sample

According to Sugiyono (2011:61), the population of the region is a generalization of a subject that has certain qualities and characteristics set by the researcher to learn and then drawn the conclusion. The population in this research is overall Students grade XII in Mechanical Engineering Department Vocational High School 1 Padang with a total 0f 66 students. Techniques sampling in this research used was random sampling technique. Based on the sampling method by using random sampling technique getting a sample number of 32 students.

2.3 Instrument usable

The instrument in this research is the observation of performance evaluation model graphic rating scale. Wirawan (2009:88) said that the model checklist uses a scale namely the graphic rating scale. The form of the graphic rating scale is an indicator of the performance can be explained short definition. In addition, performance level descriptor presented in the form of scale. Each of scale having each value number.

2.4 Technique of analysis data

2.4.1 analysis of descriptive

This descriptive aims to describe what was found on the research result and provide information in accordance with the data obtained in the field.

2.4.2 Inductive Analysis

The inductive analysis aims to associate two or more variables. In this case, the researcher linked between the influence used software Mastercam toward on performance grade XII students in Mechanical Engineering Department in making material job using CNC milling.

2.4.2.1 Normality Test

Normality test aimed to see whether the distribution of the data is normally distributed or not. Normality test using Kolmogorov-Smirnov are processed with SPSS program. If significant value more than alpha value means data is distributed normally.

2.4.2.2 Homogeneity Test

Homogeneity test aimed to find out whether or not the variation using homogeneity variances formula (Sugiyono, 2008:275)

2.4.2.3 Hypothesis Test

Hypothesis test aims to determine whether the performance of students grade XII in Mechanical Engineering Department.

Based on the normality test and homogeneity test can obtain hypothesis test using t-test. T-test using based on randomized two groups design, posttest only. The equation used by Liche, et al (2011:128).

3. RESULT AND DISCUSSION

Based on the research that has been conducted in class XII TP-A as experiment class and class XII TP-B as control class in Vocational High School 1 Padang in academic year 2016/2017. In the below the result of average score test.

Table 1. Value Test of Experiment Class

Subyek	Skor (X_1)	X_1^2
1	86,8	7534,2
2	87,4	7638,8
3	88,8	7885,4
4	93,8	8798,4
5	89,6	8028,2
6	96,6	9331,6
7	90,0	8100,0
8	91,6	8390,6
9	81,8	6691,2
10	92,2	8500,8
11	90,0	8100,0
12	92,2	8500,8
13	92,2	8500,8
14	86,8	7534,2
15	86,4	7464,9
16	89,4	7992,3
	1435,6	128992,5

Table 2. Value Test of Control Class

Subyek	Skor (X_2)	X_2^2
1	61,2	3745,4
2	63,0	3969,0
3	58,0	3364,0
4	62,0	3844,0
5	70,8	5012,6
6	68,8	4733,4
7	64,8	4199,0
8	65,2	4251,0
9	64,4	4147,4
10	58,0	3364,0
11	64.8	4199,0
12	63,0	3969,0
13	61,0	3721,0
14	67,8	4596,8
15	68,2	4651,2
16	61,8	3819,2
	1022,8	65586,3

Based on the above, the data two score between experiment class higher than control class can be concluded that learning using software Mastercam given the influence of learning outcome performance students. Following is the result of the analysis of the data from the studies have been in learning to operate NC/CNC Machine.

3.1 Normality Test

Based on the calculation using SPSS program on column Kolmogorov-Smirnov obtained the value of experiment class is 0.458 and the value of control class is 0.459. If the significant value higher than 0.05 means the data has distributed normally. Can be inferred the data,

Experiment class : 0.458 > 0.05

Control clas : 0.459 > 0.05

The data on the variables has distributed normally.

3.2 Homogeneity Test

Variance score of experiment class is 12.219 and variance score of control class is 13.589 can be obtained F(count) is 1.11 with dk numerator = n - 1 = 16 -1 = 15 and dk denominator = 15 getting F(table) (15:15) is 2.40 and the result F (count) < F (table) means that revealed the data homogeneity.

3.3 Hypothesis Test

Based on the result of the analysis used t-test toward score the value test between experiment class and control class can obtained t(count) 20.311 while t(table) on 0.05 value significant with df = 16+16-2 = 30 so t(table) for 30 is 2.042. Therefore, t(count) > t(table) with score 20.311 > 2.042.

Based on the above analysis, it can be concluded that the result of learning student in experiment class using software Mastercam better than control class learning without software Mastercam. Thus the research means hypothesis Ho was rejected and Hi was received sound "there is a difference in performance grade XII students in Mechanical Engineering Department Vocational High School 1 Padang making a material job using CNC machine using software Mastercam compared to using conventional method.

4. CONCLUSION

Based on the result of data analysis research that has been done, then the conclusion to be drawn as follows: 1) experiment class student performance results in making the material job using CNC machine. On the experiment class getting the average score was 89.72. On the control class, the test result obtained the average score was 63.92 only learning using conventional method. That means, software Mastercam given the influence of performance students making a material job in grade XII Students in Mechanical Engineering Department Vocational High School 1 Padang.

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LEARNING BROADCAST VIDEO SYSTEM WITH H264 VIDEO ENCODING RASPBERRY PI

Leni Marlina[1] and Aswandi[2]

Doctoral Student at PTK UNP and Lecturer at the Computer Science Faculty of Panca Budi Pembangunan University of Meda, Indonesia, Lecturer of Information Technology and Computer State Polytechnic of Lhokseumawe, Indonesia

ABSTRACT: To produce the quality of learning depended on the facilities owned by the University of Pancabudi (Unpab) Medan. Currently Unpab Medan had implemented a network-based system used to access integrated information systems, learning process using internet network (e-learning). Judging from the condition of existing infrastructure, it was important to improve teaching and learning process using learning media in campus area of Unpab Medan. In improving the learning process by using more effective technology, students could interact directly by using video conference and streaming facilities. In the process of teaching and learning using Broadcast Video system with H264 Video encoding raspberry pi was more emphasized to how to present directly by the teacher to the students so that the video on teaching and learning process conducted by face to face can use video live or stream. The video runs on an internet-connected network with available bandwidth that could be enabled and optimized. The result of the research was a system of teaching and learning process with Broadcast Videoing system of learning with H264 Video encoding raspberry pi was used live or streaming video with some user could run well.

Keywords: Broadcast Videoing, Server, Client, QoS

I. INTRODUCTION

In the world of higher education, learning using technology was growing very rapidly until today. However, the application of the learning system was still using conventional way. The method of learning was still face to face by emphasizing the interaction between students with lecturers directly either in the provision of lecture materials or question and answer in the class.

To increase the interest of students to attend the college education, it must improve education service to the availability of places and educational facilities with adequate facilities. By adding the facility of broadcast video system from server to client through the network as a means of supporting the learning process as well as the replacement of teaching and learning process in the classroom in order to improve the quality of education in the campus of Unpab Medan.

Provision of networking facilities to conduct Broadcast Video system learning required adequate bandwidth so that network utilization could be optimized. This would require bandwidth to send video learning. But the problem now was how to build this system to work in accordance with the plan. Then the assessment, testing and analysis of the system that had been built needed to be done. From the description above, this research would be focused on Broadcast Video system with H264 Video encoding raspberry pi that would be implemented in Campus Area of Unpab Medan.

II. REVIEW OF LITERATURE

Relevant Studies

Research conducted by Andreas Deni Sekundianto (2007) entitled "Implementation of internet broadcast for web-based campus radio" generates a web streaming audio and live broadcast over the internet. The study aimed to expand the network of radio broadcasting using the internet.

Research by Damendra (2010) He conducted a study on the implementation of campus television on informatics engineering at Islamic State University of Suska Riau by using video streaming technology and web-based broadcasting audio, there were several testing phases done on the software.

Research by Arie S. M. Lumenta (2014) conducted a study on Streaming Video Performance on Unsrat Campus Network, there were several samples that had been tested at 25 fps frame rate with 84.5Mb file size, with 400 compression speed and compression output was 31.7Mb. While the same file with a fps rate of 30 produced a smaller output of 28.3 MB.

Research by Ari Haryadi, Yohanes Suyanto (2012) conducted research on H.264 / AVC coding standard was the result of formulation of Joint Video Team (JVT), H.264 / AVC was designed to address the need for high levels of compression and to be implemented on a variety of applications. In this study, comparisons of PSNR, bitrate, and MOS

values for each video with different characteristics were performed.

Research by Leni Marlina and Aswandi (2016) conducted research on Effect through Broadcasting System Access Point for Video Transmission at International Journal of Scientific & Technology Rresearch Volume 5, Issue 10, October 2016, ISSN 2277-8616. Building a wireless network using access point, building a server computer as a learning video server, supporting software that could be used for video server to be broadcasted via access point and build a video transmitter system from server to client through access point in Unpab Medan.

Research conducted by Ari Haryadi, and John Suyanto (2012), "Comparison of PSNR, Bitrate, and MOS on H.264 Encoding Using the Method of Temporal Prediction", IJEIS ISSN: 2088-3714, Yogyakarta explained H.264 / AVC coding standard was the result of formulation of Joint Video Team (JVT), H.264 / AVC was designed to address the need for high levels of compression and to be implemented in various applications. In this study the comparisons of PSNR, bitrate, and MOS values for each video with different characteristics were performed.

Quality of Service (QoS)

Quality of service was a concept that aimed to qualify user satisfaction in relation to an offered application and did not view any network used, because the basic principles were the same, including applications that used TCP / IP based networks. (Ward and Oodan, 1997)). Quality of service means providing superior service, service that could meet or even exceed user expectations. So the quality of service was good when there was no gap between user expectations and the actual service they received.

QoS stands for Quality of Service. In the book Quality of Service written by Paul Ferguson (1998), it is defined that QoS is a measure of how well the network and is an attempt to define the characteristics and properties of a service. QoS was usually used to measure a set of specified performance attributes and was usually associated with a service. In IP-based networks, IP QoS referred to the performance of IP packets passing through one or more networks. QoS was designed to help end users became more productive by ensuring that they got reliable performance from network-based applications.

QoS referred to the ability of the network to provide better service on certain network traffic through different technologies. QoS was a significant challenge in IP and internet based networks as a whole. The purpose of QoS was to satisfy different service needs, which used the same

infrastructure. QoS offered the ability to define the network service attributes provided, both qualitatively and quantitatively.

III. RESEARCH METHOD

Instrument to determine the effect of service quality of broadcasting system through media access point as a learning video transmitter used to collect data from research result was using Quality of Service (QoS) parameter on ITU G.711 standard. There were several factors that affected the quality of service broadcasting video learning system, namely time delay and packet loss and the type of selection of codecs. Then the size of the video file and the allocation of network capacity would also affect the overall service quality. The data collected from these parameters would be tested. This research used two data analysis techniques, namely 1) qualitative descriptive analysis techniques and quantitative descriptive statistical analysis. Qualitative descriptive analysis techniques used to process data test results in this study, descriptive statistical analysis techniques used to process data obtained through numbers in the form of deskriftif percentage. The formula used to calculate Throughput was as follows:

$$Throughput = \frac{Total\ Bytes}{Duration}$$

Description :
Total Bytes   : number of bits sent
Duration   : total time of package delivery

To define or describe a condition that indicated the total number of packets lost (loss), could occur due to collision and congestion on the network, and this affected all apps because retransmission would reduce overall network efficiency even though there was sufficient amount of bandwidth available for those applications. Generally the network device had a buffer to hold the received data. If there was sufficient congestion, the buffer would be full, and new data would not be accepted. Packet Loss, the number of data packets lost during the transmission process.

$$Packet\ Loss = \frac{Packet\ sent - Packet\ received}{Packet\ sent} \times 100\%$$

Description:
Package sent: total UDP packets sent.
Packet received: packet received successfully

The Quality of Services (QoS) parameters on the ITU G.711 standard divided the time delayed characteristics based on the user's comfort level, could be shown in Tables 1 and 2.

Tabel 1. Packet Loss Versi ITU

PACKET LOSS	CATEGORY
0	Very Good
3	Good
15	Medium
25	Poor

The time required for data to travel from the origin (server) to the destination (Client) was known as Delay.

$$\text{Delay} = \frac{\text{Duration}}{\text{Total Packet}}.$$

Description :
Duration: total time of packet delivery
Total Pakcet : total packets sent

Tabel 2. Illustration of Delay

DELAY TIME	QUALITY
< 150 ms	Very Good
150 s/d 300 ms	Good
300 s/d 450 ms	Medium
>450 ms	Poor

IV. RESULTS AND DISCUSSION

This research would be built in accordance with the system architecture in the campus area of Panca Budi Pembangunan University of Medan. Architecture was a representation that enabled Software engineers: analyzed the effectiveness of the design with respect to the prescribed conditions, considered architectural alternatives at a level when to make design changes which were relatively easy, reduced the risks associated with software construction [Roger S. Pressman]. The design of the video transmitter system architecture was illustrated in Figure 1.

Figure 1. Broadcast Video System Architecture

Streaming video or learning video could be viewed online using web browsing by opening the

IP address link that had been configured on the server side before, this could be seen as follows :

Figure 2. Video Learning Running Results

In the test, the results of this study were in accordance with the Broadcast Video system architecture in the campus area of Panca Budi Pembangunan University of Medan. This was the result of observation of Broadcast Video quality of learning done in live or streaming video. Quality of Service (Qos) testing included delay testing, jitter testing, and packet loss testing. Testing was done by using wireshark software on http port to measure testing delay, jitter, packet loss, and throughput. Clients to be used by researchers were 1, 5 and 10 clients who accessed web applications on Raspberry Pi server simultaneously.

Observation of Quality of Learning Broadcast Video

From the observations made, when 1, 3, 6 and 10 users accessed the learning video. The results of observation made to measure the quality of broadcast video were as follows:

a. Testing of the quality of Broadcast Videoed learning on the internet network in Unpab.

Table 3. Observation Results of The quality of Learning Broadcast Video on the internet network

User	Through put	Packet Loss	Delay	Video Observation
1	135 Mbps	2,15%	98,21 ms	Very Good
3	129 Mbps	2,23%	111,25 ms	Very Good
6	126 Mbps	3,58%	151,91 ms	Good
10	119Mbps	3,82%	167,37 ms	Good

In Table 3 above, it could be seen that the results of Broadcast Video quality testing of internet network learning in Unpab already met good quality standards.

b. Video Quality Testing of Broadcast learning on network in Unpab.

Table 4. Observation results of Broadcast Video quality learning on LAN network

User	Throughput	Paket Loss	Delay	Keterangan Video
1	254 Mbps	1,75%	23,54 ms	Very Good
3	242 Mbps	1,93%	23,98 ms	Very Good
6	238 Mbps	2,18%	24,51 ms	Very Good
10	236 Mbps	2,32%	25,34 ms	Very Good

In Table 4 above, it could be seen that the results of Broadcast Video quality testing on unpab internet network already met very good quality standard.

Graphical Observation on the Quality of Learning Broadcast Video

The results of this study were in accordance with the system architecture of Learning Broadcast Video in the campus area of Panca Budi Pembangunan University of Medan. A graphical Broadcast Video quality observation was charged to users who accessed live or streaming video services with an increasing number, from 1 to 10 users.

a. Throughput

From the test results of The quality of Learning Broadcast Video that could be accessed by the user simultaneously, then comparison of Throughput value was shown in Graph 1 and 2.
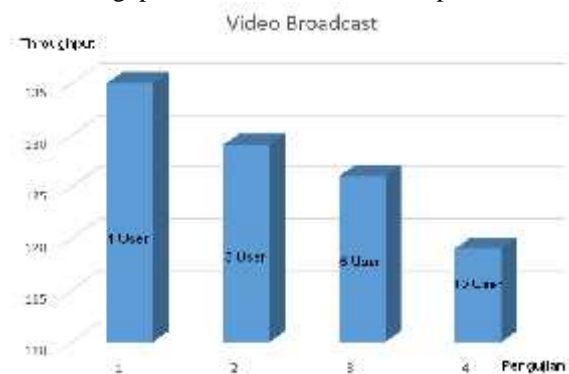
Graph 1. Throughput Value Using Internet Network
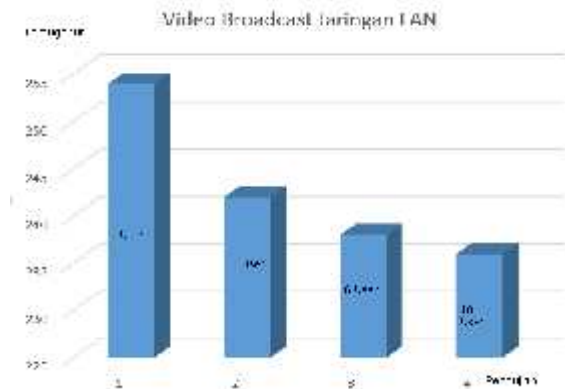
Graph 2. Throughput Value Using LAN Network

b. Delay

From the test results on the The quality of Learning Broadcast Video that could be accessed by the user simultaneously, then the comparison of Delay values was shown in Graphs 3 and 4.
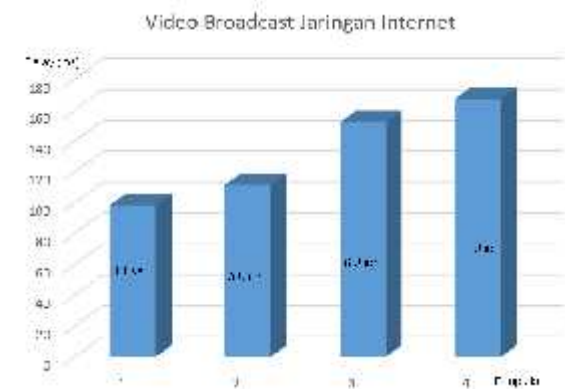
Graph 3. Value Delay Using Internet Network
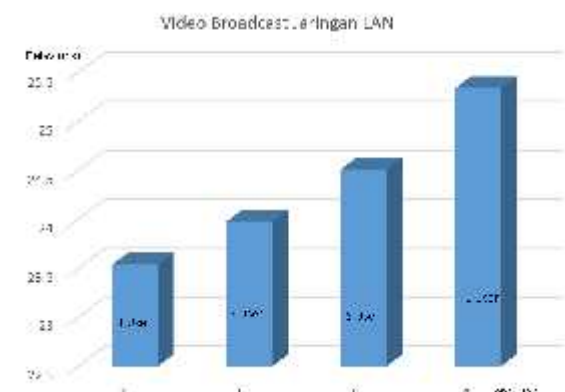
Graph 4. Value Delay Using LAN Network

c. Packet Loss

From the test results on the The quality of Learning Broadcast Video that could be

accessed by the user simultaneously then the comparison of Packet Loss values was shown in Graphs 5 and 6.
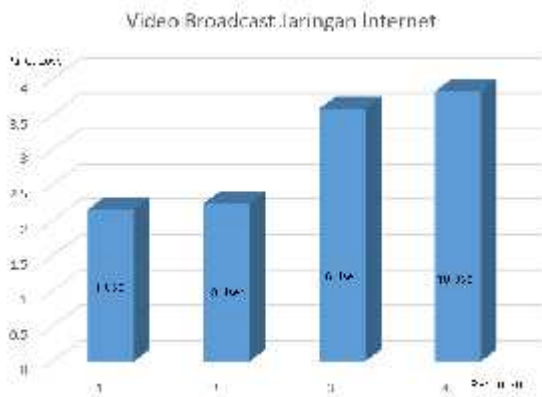
Graph 5. Value of Packet Loss Using the Internet Network

Graph 6. Value of Packet Loss Using LAN Network

IV. CONCLUSION

Based on the results of the research being analyzed and discussion, some conclusions were as follows:

a. Tests performed with live video or streaming on the internet or LAN to access video learning run very well.

b. Tests performed starting from 1, 3, 6, and 10 users using LAN, and then the results had been concluded very well.

c. Testing was performed starting from 1, 3, 6, and 10 users then the result had been concluded very good by using internet network.

d. Using additional Raspberry Pi as Single Board Computer (SBC) could save costs to serve as Live / Streaming video server.

e. The performance of the learning broadcast video system on LAN or Internet network was

influenced by the number of users, the more users connected to the server then users who accessed live or streaming video services at the same time will get less and less quality. If this happened, it would result in a decrease in overall throughput, as well as increased delay, and finally there was an increasing percentage of packet loss.

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OPTIMIZATION OF EXTERNAL LIGHTNING PROTECTION SYSTEM DESIGN IN BUILDING CENTER FOR INFORMATION TECHNOLOGY AND DATABASE (PTIPD) UIN SUSKA RIAU

[1]Liliana, [2]Afriani, [3]Anwardi

[1]Pascasarjana UNP, [2,3] UIN Suska Riau

Email: liliana@uin-suska.ac.id, susiafriani@gmail.com, anwardi@uin-suska.ac.id

ABSTRACT: External protection system at the tall building is critical to protecting it from lightning strikes. The building of Pusat Teknologi Informasi dan Pangkalan Data (PTIPD) is one of the tall buildings in UIN Suska Riau, which should have a good security from interference by lightning. This study aims to analyze the needs of Lightning Protection System (SPP) of the building, evaluate the condition of the current building protection system now, and trying to optimize the system of protection that has to do the analysis and design of external protection system of the building. In this study, external protection system design of buildings using conventional methods, there are Mesh Size, Rolling Sphere, and protective angle. The results of analysis needs of lightning protection systems for buildings PTIPD UIN Suska Riau based on the level of protection at the level of IV with forecasts of great danger, the protection system of the building is currently showing at least the area protected, the result of design shows the method of Rolling Sphere which provides overall protection area of the building with optimal.

Keyword: External Protection System, Building of PTIPD, SPP, Conventional Methods

Background

Lightning protection systems in the building protection system include external and internal, external protection system serves to reduce the risk of the danger of damage due to lightning strike directly. A direct lightning strike can cause damage to buildings, equipment, fire, and casualties. While the internal lightning protection system serves to protect the installation of equipment in buildings against overvoltage due to a lightning strike, such as affecting the performance of the equipment contained within the building as well as shorten the life of the use of the equipment. This can cause huge losses so that it takes the effort to reduce it to use a lightning protection system. Lightning strikes can cause disturbances in the power system. In the building/buildings,

State Islamic University Syarif Kasim Sultan Riau is one of the State University in the city of Pekanbaru, located on the equator at 101 degrees 18'-coordinates of 101 degrees 36 'east longitude and 0 degrees 25'-0 degrees 45' north latitude, lightning the higher the closer the location of lightning to the equator. The lightning strike in order to not harm humans and equipment on the building, the building protection system should be planned so as to protect the building from lightning strikes. The lightning strike may contain the value of current or voltage impulse is very high if it is not secured can harm the system struck.

One of the existing building at UIN Suska Riau is Building Center for Information Technology and Data Base (PTIPD). This building is a one-story building which was founded in 2006, the building was intended to be a place the operational activities of the information technology and databases to improve the quality of education and teaching, research and community service. As a center for information technology and databases, this building there are many electronic devices such as computers, television, air conditioner and other electrical equipment, as well as many human activities, are carried out. Hence the need for a lightning protection system for securing the building and that it contains any danger of lightning.

The results of the interview persons namely one technician UIN Suska Riau Mr. Nurman Indra unknown although this building has had a system of external protection, from the information obtained from his house PTIPD still experience a disruption in the database and servers that exist inside the building after a moment the lightning strikes that happened. This disorder causes loss of activity in the building Puskom UIN Suska Riau and all academics who use the services of this building.

With the abundance of equipment and human lives in the building as a central database PTIPD UIN Suska Riau it is necessary to design an external lightning protection system that is used to minimize the impact caused by a lightning strike to the building. The problem here is the reference the

authors to raise the research entitled "Optimization of External Lightning Protection System Design In Building Center for Information Technology and Data Base UIN Suska Riau".

Basic Theory

Lightning strikes Effects

Natural state tropical climate of Indonesia in general, including areas with high lightning days per year. Due to data limitations magnitude of the lightning to any location in Indonesia, at this point it is assumed that the locations are high on a mountain or a tower that stands out amid the free area such as the fields have the possibility of strokes higher than the places in the middle being surrounded town surrounded by other high-rise building (Tabarani, 2009).

The annual frequency of direct lightning strike (Nd) may be formulated

$Nd = 4. 10\text{-}2. T1.26.\text{ab} + 6h (a + b)$

$+ 9\ h2.10\text{-}6$

(1)

Where:
a = length of the roof of the building (m)
b = width of the roof of the building (m)
h = height of buildings (m)
T = days of thunder per year

Building Supplies Lightning Rod Installation Will Existence

The magnitude of the needs of a building will be the installation of a lightning rod, is determined by the magnitude of potential damages and the dangers posed when the building was struck by lightning. The magnitude of the needs can be calculated empirically based indices stating certain factors such as shown in the table below. The sum of these indices will obtain the approximate value of the dangers (R) as a result of lightning strikes by General Rules standard Lightning Distributors Installation (PUIPP).

$R = A + B + C + D + E$ (2)
Where
A = Hazards Based on Usage and Content
B = Various Building Construction
C = Various High Building Construction
D = Various Building Situation
E = Wide Day of Guntur per Year
Where the greater the R value, the greater the danger and damage that caused the lightning strike.

Table 1. Index F - Estimated hazard

R	Danger Forecast	security
under 11	be ignored	No need
With 11	Small	No need
12	moderate	recommended
13	biggish	recommended
14	Big	Highly recommended
More than 14	Very large	It is necessary

Source: General Rules of Installation Distributors Lightning (PUIPP) for buildings in Indonesia

Estimated Ratio Based on the International Electrotechnical Commission (IEC) 1024-1-1. Based on the standard IEC 1024-1-1, the selection of adequate levels of protection for a lightning protection system is based on the frequency of direct lightning strike (Nd) which is expected to a protected structure and frequency of lightning strikes annually (Nc) are allowed. Decision-making on whether or not to install lightning protection systems in buildings is based on the calculation of Nd and Nc performed as follows (ISO 2006):

1. If Nd   Nc do not need lightning protection systems
2. If Nd> Nc required lightning protection system with efficiency:

$E \geq 1 - \dfrac{N_c}{N_d}$ (3)

Table 2. Lightning Protection System Efficiency

level of Protection	efficiency SPP
I	0.98
II	0.95
III	0.90
IV	0.80

External Protection System

External protection is the installation and equipment outside of a structure to capture and deliver the lightning current into the grounding system. External good protection consists of air terminations, the conductor supplier and grounding system.

Table 3. Placement of Termination In accordance with the Air Protection Level

Level Protection	rolling Sphere r (m)	Corner 20 M	protected 30 M	45 M	0 60 M	width Jala (M)
I	20	25	-	-	-	5
II	30	35	25	-	-	10
III	45	45	35	25	-	15
IV	60	55	45	35	25	20

Source: SNI-03-7015-2004

The method used to determine the placement of air terminations and to know the area

of protection in this study is the method of Jala, Rolling Ball Method and Angle Method of Protection. Jala method used for the protection of a flat surface because it can protect the entire surface of the building, both Rolling Ball method used in the building that looks complicated. With this method as if there is a sphere with radius R rolling on the ground, around the structure and on top of the structure in all directions to meet with the land or structures related to the earth's surface that is able to work as a conductor. Point touch the ball rolling on the structure is a point that can be struck by lightning, and at that point must be protected by air termination conductor,

(a)   (B)

(C)
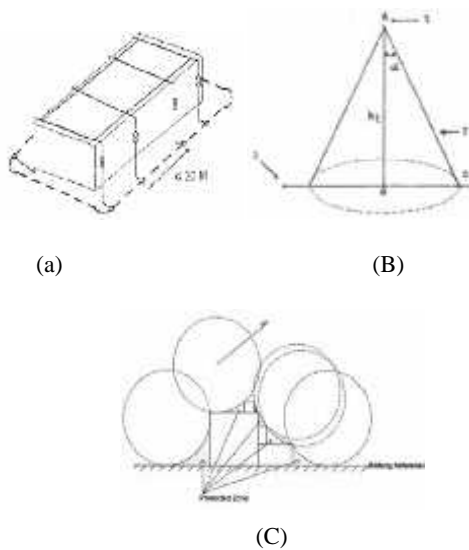
Figure 1. Method (a) Method of Jala, (b) Protected angle, (c) Ball Rolling

Research methods

Data collection

Table 4. Data PTIPD Building UIN Suska Riau

Long Building (a) Meter	22
Building width (b) Meter	26
Number of People (N) People	160
Present Time (F) Hours / Year / People	2080
Grounding Resistivity (R) Ohm	10
Distance Grounding Of Building (D) Meter	3
Surface Outdoors	Concrete
Building And Characteristics Material Type	ordinary; Concrete

Table 5. Data Protection Building Material Specification

Protection components	type of Material	Form	Size	amount
Lightning Rod Upright	Galvanized steel	Cylinder pipe	10 mm	1
Conductor Top Distributors	Copper	gyre	50 mm2	1

Table 6. Data Meteorology, Climatology, and Geophysics Pekanbaru

Magnitude / Parameters	Value
Data IKL (Days of Thunder Average Per Year) (Day) (Fg)	136
Geographic Location (Latitude) (Degrees) (Li)	00:28 LS
Geographic Location (Longitude) (Degrees)	BT 101.27
Rainfall Average Per Year (mm / yr)	3073.8
High Low Clouds (m) (Ha)	304.8
High Above Sea Level (m)	31

(Source: BMKG, 2014)

In this study, there are several stages to the results obtained in the form of an external lightning protection system design which will be explained as follows.
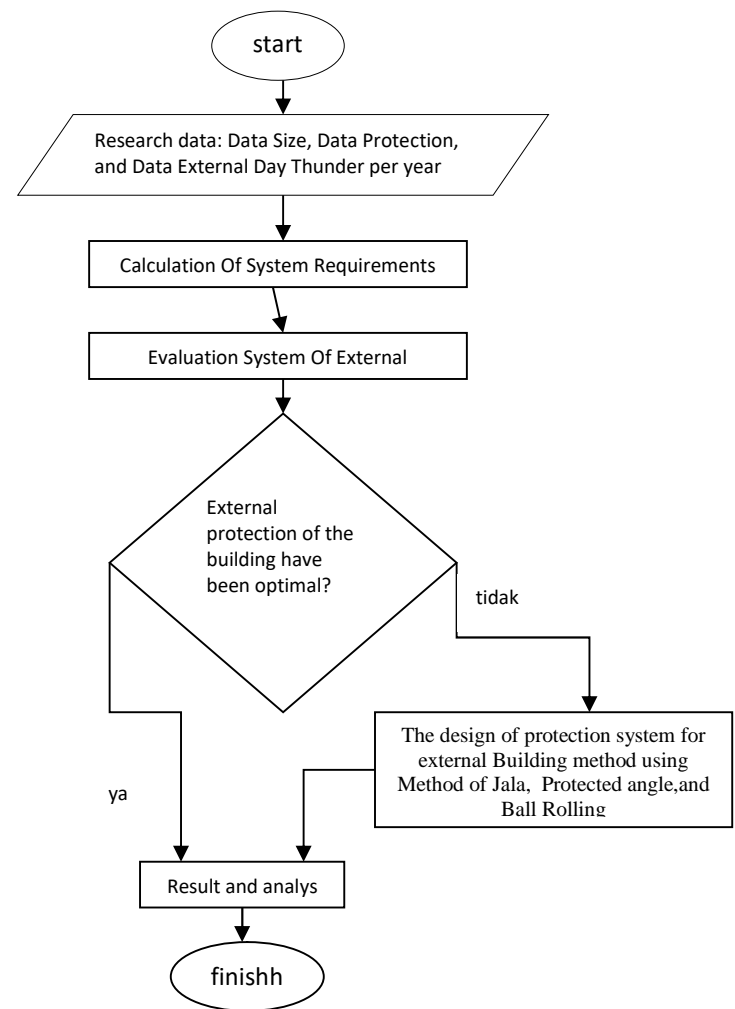
Figure 2 Stages Research

Results and Analysis

Results Calculation of Lightning Protection System (SPP)

Table 7. Results of Calculation of Lightning Protection System (SPP)

Calculation	value Calculation building PTIPD
The density of ground lightning strikes annual average (Ng)	19.5128
Area coverage equivalent (Ae) km2	19977.78
The frequency of direct lightning strike (Nd)	.389
Efficiency	0.74
Rated R	14
Estimated hazard	Big
Level of Protection	IV
Protected corner	550
The width of the net	20 meters
The radius of Rolling Sphere	60 meters
External SPP needs	Yes

From Table 7 it can be analyzed that would need lightning protection systems for buildings Puskom UIN Suska Riau based on the level of protection at the level of IV with forecasts of a very great danger, will do the evaluation of external protection current building methods Corner Protected with an angle of 550, if the result then the next evaluation is not to design optimal placement of air terminations using Protected by a large angle 550, Rolling ball method with a radius of 60 m, and a method of inter-mesh nets with a width of not more than 20 m.

Building Protection Systems External Evaluation PTIPD
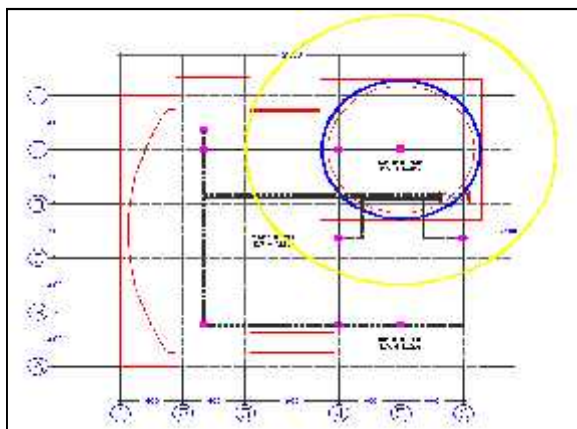
Figure 3. Air Termination length 40 cm (Top View)

Based on the method of corner protection, which is visible from the building rector that the placement of the termination of the air in the highest part of the building with the termination-conditioned building PTIPD not be protected as a whole, the placement of termination is appropriate which is located at the highest position of the building, but because the building has only one termination with only 40 cm long, so it does not provide protection for the entire building. Need for additional air termination and also increase in length at each termination air. Based on SNI 03-7015-2004 air termination in SPP that is used should have a length of 2 m to 3 m, also rearranged termination laying of air so that the entire building PTIPD protected optimally.

Results of the External Protection System Design

Corner Protected method

The design of this study was first done with Angle Protected method, this method makes an angle of protection in accordance with the upright conductor, where the protected areas are areas that are within the cone with angle protection in accordance with the level of protection. In the application of hedge angle method, based on data from Table 4.1 it can be seen that the building PTIPD UIN Suska Riau have protection level IV, so based on Table 3 can be obtained according to the method of protection of the space protected corner building heights of 20 meters is equal to 550.

From the evaluation performed on the external lightning protection system exists, UIN Suska Riau PTIPD buildings not protected optimally, so that the need for increasing the number of terminations into 3 pieces with a length of 3m, is expected to protect the whole building PTIPD UIN Suska Riau.
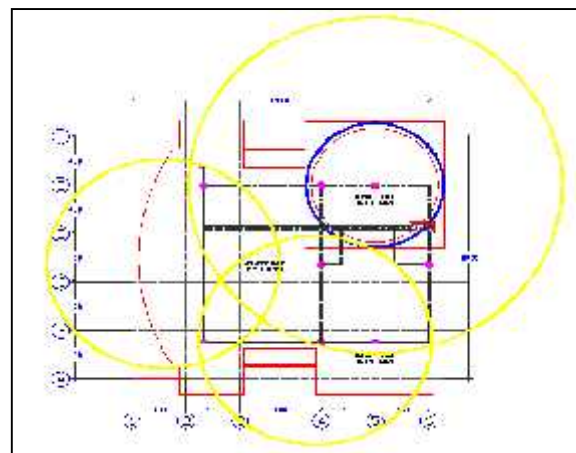
Figure 4. Building with 3 Termination Air PTIPD length 3m (Top View)

Corner Protected method obtained with the draft placement of air terminations that practically protect the entire building, there are still parts of the left side of the front and rear and right front side of the building that has not been fully protected.

Rolling Ball Method

Good rolling ball method used in the building that looks complicated. With this method as if there is a sphere with radius R rolling on the ground, around the structure and on top of the structure in all directions to meet with the land or structures related to the earth's surface that is able to work as a conductor. Point touch the ball rolling on the structure is a point that can be struck by lightning, and at that point must be protected by the air termination conductor. The design with this method can be seen in the following image
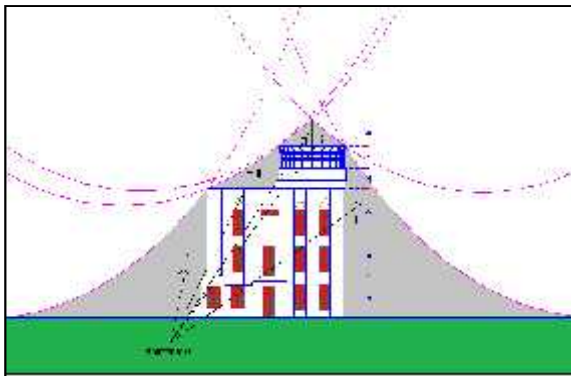
Figure 5. Building PTIPD Protection Method Using Rolling Ball (Front)

Based on the results of observations made, then using a rolling ball 4 termination are to be installed in the building PTIPD UIN Suska. By planning the installation of 4 pieces finial on the roof of the building PTIPD UIN Suska Riau have been enough to protect the entire building from lightning strikes. For fixing air termination is at the highest point of the building and at the ends of the building.

Methods Jala

This method is used for the protection of a flat surface because it can protect the entire surface of the building. The protected area is the entire area that is in the nets. If this method is applied to buildings PTIPD UIN Suska Riau Pekanbaru, the obtained minimum net width appropriate, placement of air terminations in accordance with protection level IV reaches 20 meters. With the placement of air terminations at the ends of the roof of the building. The dotted lines depicted is a conductor on the roof and down conductors.
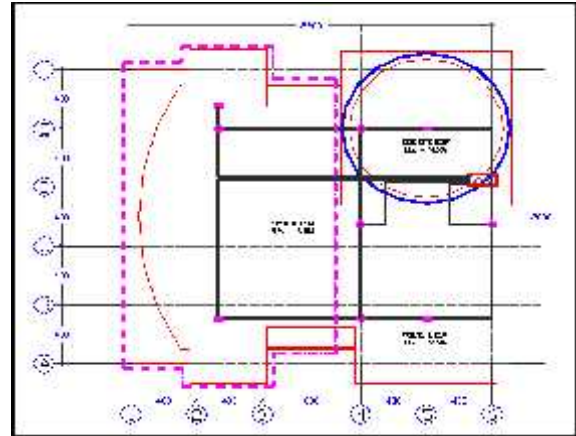
Figure 6. Protection PTIPD Building Method Using Jala (Top View)

When analyzed using the mesh method for the placement of air terminations on the ends of the roof of the building Puskom the highest part of the building is not protected. This leads to a high risk of lightning strikes directly. This method is considered unsuitable if applied to buildings Puskom UIN Suska Riau. Due to the shape of the roof of the building that is not flat. However, when given a termination air on top of antenna contained in the building so the building can be optimally protected against direct lightning strikes.

Building Grounding System PTIPD

Measurement of the earth in building PTIPD prisoners had been done, the measurement is done by way of implanted electrodes kinds of the copper rod with a diameter of 1.5 cm into the soil to a depth of 1 m, grounding resistance value obtained at 179 ohms, grounding prisoners measurement can be seen in the picture below

Figure 7. Grounding Resistivity Measurements in Building PTIPD UIN Suska Riau

Table 8. Calculation of Soil Resistivity type PTIPD Building UIN Suska Riau

number of Electrodes	Type	Diameter (cm)	Grounding Resistivity (ohm)	Prisoners Soil type (ohm meter)
1	Copper	1.5	179	212.94

The calculation result obtained soil resistivity 212.94 ohm meter, based on Table 2.13, the type of soil found on wet gravel categorized PTIPD building.

Prisoners grounding can highest-value 5 ohms, based on calculations by the electrode single rod obtained depth electrodes should be planted along 72 m, but in practice the planting of the electrodes do not allow reaching a depth that is supposed to be, more research is proposed to reduce the value of resistance grounding include planting rod electrodes in parallel, adding zat reducing and so forth.

Conclusions and Recommendations

Conclusion

1. Needs lightning protection systems for buildings PTIPD UIN Suska Riau based on the level of protection at the level of IV with forecasts of a great danger to the placement of the termination of the air for the method of nets minimum distance between an antidote to her is as big as 20 meters, diameter of the method of ball rolling is 60 meters, while the protection angle method with 20-meter high protective angle is equal to 550.
2. The results of the evaluation of external protection system building UIN Suska Riau PTIPD currently not able to protect the building with optimal from a lightning strike.
3. External protection system design is done by three methods: Corner Protected method, the method Eye nets, and Rolling Ball method that has given the region a better protection of the external protection system that already existed.
4. External SPP protection PTIPD building with optimal UIN Suska Riau has been obtained, the results of the three draft note that switch ball method that provides optimal protection results in buildings with protected areas covering the whole area of the building.

Suggestion

1. Need for assessment or evaluation of internal lightning protection system of the building PTIPD UIN Suska Riau.
2. Need to assess the external lightning protection system with the Base Transceiver Station (BTS) located next to the building PTIPD UIN Suska Riau.

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A NEW MODEL MOBILE LEARNING MANAGEMENT SYSTEM BASED ON MOODLE IN UNIVERSITY

Lita Sari Muchlis[1], Kasman Rukun[2], Krismadinata[2], Yahfizham[3]

[1]Informatics Management, IAIN Batusangkar, Indonesia

[2]Faculty of Engineering, Universitas Negeri Padang, Indonesia

[3]Postgraduate Technical and Vocational Education and Training, Faculty of Engineering, UNP, Indonesia

ABSTRACT: Learning model is changing the development of information technology. Conventional learning becomes collaborative and self-sustaining by utilizing the internet, mobile and wireless technologies. It needs the change of acceleration in the learning process, which leads to being more effective, efficient, and optimal. In this paper, we construct the new model mobile learning management system support service based on Moodle application for the future. Under the support of the mobile moodle technology, the system can be accessed that emphasizes the approach aspects of design, function and user interface. The method used the research and development approach (R&D) with ten steps. By this results, a new model has been come suitable for using in the applying DIVA syntax display, information search, virtual problem solving, appraisal and support the individualized independent learning.

Keywords: Model, Mobile Learning Management System, Moodle.

1. INTRODUCTION

Based on the Education for All Global Monitoring Report (EFA-GMR) issued by UNESCO awareness of a survey on the monitoring of education outcome in 2014 Indonesia ranked 57 out of 115 countries. From 76 countries in Indonesia's 2015 PISA test at 69. It shows the quality of education in Indonesia is still relatively low, whereas education as the progress of a country[1], beside education as one of the determinants of the progress and successor of the young generation.

In Law No. 20 of 2003 on National Education System Article 3 stated that "National Education aims to develop the potential of learners to become human beings who believe and piety to God Almighty, noble, healthy, knowledgeable, skilled, creative, independent and become a democratic and responsible citizen.

The survey conducted by online magazine Tech in Asia and marketing research firm Markplus Insight, Indonesia is the most promising technology market in Asia. The survey revealed that in 2016 netizen in Indonesia reached 88.1 million Internet people, up 51 percent to the number of 132.7 million internet users in 2017. But, it used to access the internet of 69 percent, 31 percent through mobile desktop devices or tablet. Users of social media service Indonesia keep the third position of the world after Brazil and the United States.

Students who are underachieved not caused by the lack of ability but due to lack of motivation to learn therefore students are not trying to direct all his abilities. One way teachers in improving motivation to learn are to use mobile-based learning media[2]. This is in line with[3] states that mobile-based learning as an alternative has unique characteristics that can be used anywhere and anytime.

One of the subject experiencing problem in learning is programming algorithm, because in that course of algorithms and programming in the department of informatics management is a core course that must be mastered by every student, in fact students are not used to shaping thinking pattern in analyzing programming logic just as recipient of information, and still the low understanding and motivation of students about this course due to problem by understanding abstraction concept in the programming and algorithm that affect the learning hail lessons studied.

The use of Mobile Learning Management System (LMS) model in learning will improve the interaction between lecturer and student in information exchange and learning material. LMS is the basis from extensions that can be added to meet the complex need of the University's institution. Learning Management System used mobile technology, allowing users to interact with the system and its users using mobile devices such as PDAs, cell phones etc. This extension arises the problem of a new learning model that we have to deepen in order to understand if the media alter and enhance our knowledge of the computer.

Learning Management System is software for administration, documentation, material search, activity report, giving of online learning activity

training material connected to internet, application with LMS concept is able to track, send content and ensure student attendance and track student achievement.

Mobile learning management system (MLMS) is a model of learning result of integration between Problem Based Learning and Creative Problem Solving which is develop to be a new model in vocational education. As we know that the model Problem-Based Learning and Creative Problem Solving model requires mastery of knowledge in critical thinking and creative in solving the problem, but from these two models, there is a weakness that the student difficult to analyze the problem with different capabilities.It is necessary to develop interaction with mobile learning management system model.

The result integration between the Problem Based Learning and Creative Problem Solving model resulted in a new model called Mobile Learning Management System. The step of developing Mobile Learning Management System model consists of four procedures, namely (1) Display; (2) Information Search; (3) Virtual in Problem Solving; (4) Appraisal. In essence, the learning steps are applied to develop student thinking to think critically, creatively in solving problem, therefore, students are able to think meaningfully, by working alone, finding their own way and constructing new knowledge and skill which they have.

In improving the learning process of course programming algorithm is needed to develop mobile-based learning model as a solution. The model has been developed is mobile learning management system model where that is adopted or elaboration from two models that are learning problem-based learning model and creative problem-solving model to produce mobile learning management system model with DIVA syntax order.

Problem-Based Learning Model is learning a model with students' learning approach to authentic problems so that student can develop their own knowledge, cultivate higher and inquiry skills, establish student and increase self-confidence[4].

The purpose of Problem Based Learning or problem-based learning helps develop students' problem-solving skills by covering question or problem, focusing on the interdisciplinary linkage, authentic investigation, collaboration and producing work and demonstration. Problem-based learning is not designed to help the teacher provide as much information as possible to the student.

The creative problem-solving model is defined as a framework for thinking both individually and group by finding an idea, developing the idea, formulating, solving the problem, producing and analyzing new idea that implemented these ideas in the form of effective action programs.

Two model of Problem based learning and creative problem solving can solve the problem in the learning process of algorithm and programming that is model of learning of mobile learning management system that able to develop the creative idea and critical of a student in creating and solving problem and case on course algorithm and programming.

2. LITERATURE REVIEW

Learning model should be supported by five components, which include; syntax, social system, reaction principle, support system and instructional effects and accompanist[5].

The development of learning model used in mobile learning management system by combining two models namely Problem Based Learning and Creative Problem Solving.

The essence of PBL is to present the student with authentic and meaningful issues, which serve as a springboard for investigation and inquiry. The detailing the steps of implementing PBL in learning there are 5 phases. The PBL model syntax is (1) Student orientation to the problem, (2) organizing student to learn, (3) guiding individual and group investigation; (4) developing and presenting the work; (5) analyzing and evaluating the problem-solving process.

Creative Problem Solving (CPS) model is a form of variation in problem-based learning because this model will be able to improve the creativity of student in solving the problem. The detailed the summary of CPS in learning there are 4 phases[6]. The syntax of the CPS model is summarized as follows:

a. Question formulation
b. Idea generation
c. Evaluation and action
d. Action Implementation

To implement the development of mobile learning management learning model system by using DIVA syntax is Moodle. It is an application change the learning media into a web form. The application allows students to enter the digital "learning space" to access learning materials. By using the moodle app, we can create learning materials, quizzes, electronic journals and others. Moodle itself stands for Modulator Oriented Dynamic Learning Management which can be accessed at http://www.moodle.org.

3. METHOD

The product development model used in this research is[7] development model on developing mobile leaning management system model with DIVA syntax only in the third stage of validation of expert team with FGD point from ten steps of research stage Borg & Gall development which

includes: (1) preliminary research, (2) research planning, (3) development of initial model, (4) expert test and initial field trial, (5) revision of initial field test result (7) main field test revision, (8) feasibility test/operational field test, (9) final revision of feasibility test results, (10) dissemination and implementation.

4. FINDING AND DISCUSSION

Based on the background and the theoretical basis that support a model of mobile learning management system, then developing model is visualized based on several factors, namely: (1) learning theory, (2) Interactivity, (3) learning model, problem-based learning and independent, 4) student learning style.

Mobile Learning Management System that will be developed for the course of Algorithm and Programming. It is conducted both face-to-face in the classroom and outside classroom full online-based mobile can be used PC and smartphone, the application used at portal www.lms-mobille.org which is obtained accessible on a web browser or Android or using smartphone that is installed first on the play store with the name of mobile learning applications. In Mobile Learning Management System model have 5 main syntaxes, namely (1) introduction and preparing the material, (2) providing information on the mechanism of learning in virtual learning based on mobile (3) Virtual Problem Solving Learning (4) Appraisal.

The Mobile Learning Management System learning model should be supported by five components, which include; syntax, social system, reaction principle, support system and instructional effect and accompanist.

4.1 Syntax

The new model of mobile learning management system based on Moodle as that save two models namely problem-based learning and creative problem solving till produce syntax with the implementation which is illustrated in the following table as follows:

Table 1. The model of DIVA syntax

Syntax	Activity
Display	1. Explain how to operate mobile learning that can be accessed on PC and smartphone on portal www.lms-mobile.org with accessed two version web and android.
	2. Explain the syllabus, rps, learning objective and lecture rules and assessment that can be
	directly accessed by mobile learning.
	3. Motivate student involved in selected problem-solving activities through creative and critical thinking.
Information based learning Inquiry	1. Encourage student to collect information systematically, critically and creatively;
	2. Support student to determine and develop ideas for solving problems;
	3. Support and motivate student to express opinion or ideas by analyzing information in contributing to understanding problem solving;
	4. Supporting student starts learning activities by forming multiple groups and understanding their function and role in group.
Virtual Learning in Problem Solving	1. Encourage student to expect learning to be conducted in virtual learning process learning system in the classroom or outside by using application on the portal www.lms-mobile.org connected to the internet that can be directly accessed by lecturers and student.
	2. Lecturer directly and guide students to explore and investigate to solve problem individually or in group.
	3. Encourage student to be able to express the problem with strategies are suitable to solve the problem in the real life.
	4. Lecturer offers opportunities for student to be able to solve problem by making a valuable contribution to the communication with virtual learning that is done on the portal in the form of chatting and teleconference.
	5. Prepare academic skills by resolving cases such as: making relevant theory of studies and the process of making final report of case to the student.

6. Encouraging student to solve problem in practice is given the task independently to the students either independently or supported by others in class by using full mobile application that can be accessed anytime with material that can be uploaded in the portal www.lms-mobile.org.

7. In completing and improving students' understanding, lecturers are conducting mobile-based online discussion process in order to consult students to lecturers knowing learning.

8. Encourage the student to prepare the work by collecting creative ideas with the process of analyzing the problem to create the work presented and discuss the results of the problem-solving.

9. Assist the student in planning and preparing appropriate works such as a report, video, and model and helping them to share the task with their friend.

10. Lecturer helps the student to analyze and evaluate giving an explanation and summarizing the subject matter either given in front of the class or providing independently to the student, so it will construct teaching and activities undertaken during the lecture.

11. Discussing the rubric of assessment will be used for assessment with evaluation in the form of quizzes and summary of inputs assessed by the lecturer integrated into the mobile assessment system

Appraisal

1. To reflect on what has been learned.
2. Evaluate learning experience.

4.2 Social System

Social system states how the role and relationship between lecturer and student as well as describe the underlying rule Social system on the mobile learning management system model is cooperation with creative thinking and critical in solving the problem in the course of algorithm and programming with mobile-based learning system.

4.3 Reaction Principle

The development of mobile learning management system model is seen based on the principle of reaction, namely how the attitude of the lecturer to the student because the lecturer act as a facilitator in the learning should be centered for the student. This is almost the same as the social system of synchronization in performing their respective roles.

In the implementation of learning model of mobile learning management system, students are divided into a small group in discussion with creative and critical thinking so that solution will arise in solving, while the lecturer act as facilitators or mentor who are ready to provide assistance if the student has difficulty in both individual and group.

4.4 Support System

The support system of the mobile learning management system model is the elements that can help the implementation or requirement and support what is needed outside the technical facilities of this model.

The Mobile Learning Management System model requires the support system listed below:

a. Computer.
b. Internet Network.
c. The ability of the participant to access with mobile learning, learning planning in the form of SAP, learning media and evaluation sheet.
d. Learning model book mobile learning management system.
e. Moodle by using hosting and domain www.lms-mobile.org.
f. Handbook of students and lecturers in using mobile learning management system model
g. Textbook
h. Video
i. An interactive simulation
j. Links to relevant material

4.5 Instructional Effect and Accompanist

The Mobile Learning Management System model has an impact on student impact, both in direct impact on learning. In learning algorithm and programming are scholarly and skill, with this course students, are expected to analyze a problem related to the logic that is implemented into a programming language. Most of these courses are an intensive exercise to improve students' ability to find a solution in logical problem

encountered in the algorithm and implemented into algorithm and programming.

5. CONCLUSION

The mobile learning management system model with DIVA syntax can be synergy in learning model of mobile learning management system based on learning management. Model mobile LMS can be accessed by using mobile-based moodle application to improve achievement on learning outcome. A new model mobile LMS based on Moodle can be controlled and construct student knowledge. A student can access the learning tool in mobile so that the learning process in advance and anytime by mobile.

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DEVELOPMENT OF MECHANICAL TECHNOLOGY LEARNING MODULE PROGRAM EXPERTISE OF SMK ENGINEERING

M. Giatman[1], Waskito[2,] and Maruli Sihombing[3]

[1]Faculty of Engineering, Universitas Negeri Padang, Indonesia

ABSTRACT: The low learning outcomes in the workshop is estimated by the limitations of existing learning media. Therefore the need to design a learning media workshop in the form of mechanical technology module. The purpose of this research is to develop a valid, practical and effective learning module that is adjusted to the 2013 curriculum. The research type used is Research and Development (R & D) with development procedure using 4-D model (four-D model). Research consists of four stages, namely: define, design, develop, disseminate. This study uses primary data obtained from material experts and media experts. Data analysis technique used is descriptive data analysis techniques. This research resulted in the development of a learning module for the basic program of good mechanical technology expertise. The results show that the module meets the principle of relevance in the qualification of instructional media with 86% validity value for material and 92% for media (very valid). Module practicality level based on teacher's response with value 87,81% (very practical) and learners response 89,19% (very practical). Level of effectiveness learns learners learn from pretest and posttest value. Where with the average value of pretest 52.14, the average value of posttest 72.61 or up 20.14, Therefore the effectiveness of the use of the module is effective in an effort to improve learning outcomes of learners. Based on the findings, this study concludes that this module is valid, practical, and effective to be utilized as a learning media on the basic mechanical technology of machining engineering skills program.

Keywords: Learning Media, Module, Validity, Practicality, Effectiveness

1. INTRODUCTION

The development of a nation is always accompanied by development in the field of education. Based on the National Education Act aims to "develop the potential of learners to become human beings who believe and be cautious to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become citizens of a democratic and responsible [1], meaning education is to lead learners towards behavioral, intellectual, moral, and social changes, so hopefully can live independently.

The role of educators in learning is very decisive learning outcomes. Educators must be able to create a good learning environment that allows for learners to study harder. To create a better atmosphere, the educator must be professional and have a number of abilities, including the ability to plan and implement the teaching [2]. Therefore, teachers as professionals serve to improve the dignity and role of teachers as learning agents who are always trying to improve the quality of education [3].

To get the maximum learning outcomes, it takes an appropriate and effective learning media [4]. One of the standard learning components in supporting effective and efficient learning process is using media [5]. Learning media is one important component in supporting the learning process, and one of them is the module. The learning module is a systematically and attractively taught material that includes material content, methods, and evaluation

that can be used independently to achieve the expected competencies [6]-[7]. The module consists of 1) the introduction, 2) the learning part, and 3) the bibliography. The introductory section contains (a) a general explanation of the module, (b) the learning indicator. The learning section contains (a) a description of the learning content, (b) summary, (c) tests, (d) key answers, and (e) feedback [7].

In its implementation, it is necessary to consider the specifications and characteristics of the basic group of skills program that will be taught and the development of the students, so that in the learning process create a conducive class atmosphere and eager to follow the learning. With the help of the learning, the module is expected learners will more easily understand the theoretical material conveyed by the teacher [8]-[9].

Vocational High School (SMK) is a formal educational institution that prepares students to have competence in a particular vocational field with the mastery of materials theory and practice, to meet the needs of society and the world of work. In accordance with the vision of SMK is: "Formation of human beings and educational ecosystems of SMK with character based on mutual assistance", with the mission: "To realize strong SMK education behavior, access to vocational school that is widespread, equitable and fair, quality learning, , increased bureaucratic effectiveness and public engagement "[10].

SMK Negeri 2 Padangsidimpuan as one of the middle-level formal education institutions in

Padangsidimpuan City has an important role in improving the quality of education and produce qualified graduates who are able to fill jobs according to the competence of expertise. Mechanical Technology is one of the basic skills programs that must be mastered by the students of class ten and in the study in the odd semester and even semester with a duration of 8 hours per week. In the 2013 curriculum, there is an emphasis on the improvement and balance of soft skills and hard skills, including aspects of attitude, skills and knowledge competencies that can support the maximum success of learning achievement.

Based on the reality of the field, learning of mechanical technology in machining engineering work in the workshop, less supported by basic knowledge. Students are given direct practice learning in the process of making the workpiece without preceded by adequate theoretical knowledge, except with only a few explanations of the work instructions. The learning process has not been effective yet, the teaching method is still traditional and there is no source of learning module that is distributed to the learners during the learning process. Table 1. shows the distribution of the students' odd semester grades for the academic year 2016/2017

Tabel 1. Student Scores Semester of Academic Year 2016/2017

No	Class	The number of students	Value ≥ 70	Value ≤ 70
1	X TPM 1	33	23	10
2	X TPM 2	28	25	3
	Number	61	48	13
	Percentage	**100 %**	**78,68%**	**21,32 %**

Source: Master of Mechanical Technology SMK N. 2 Padangsidimpuan

By looking at table 1. it can be seen that the percentage of students who have not graduated or not yet reached KKM (70) is still quite large and this indicates that the learning outcomes through the learning process that is applied is still not optimal, it is deemed necessary to approach the use of effective learning media and efficient. Thus it is expected that the learning process can take place more active, innovative, creative, effective and enjoyable for learners, which in the end expected the results of learning to be better. One of the learning media that can support the practice activity in the workshop is the availability of modules. This is reinforced by several research results and theories that reveal that the module can guide participants to study systematically, structured, and independent [11]. Observing the facts that have been described, it is deemed necessary to research the development of mechanical technology module in SMK N.2 Padangsidimpuan.

2. RESEARCH METHODS

In accordance with the purpose of this research will develop a module of learning mechanical technology so that the type of research used is Research and Development / (R & D) with the Model approach (four-D model) Define, Design, Develop and Disseminate. The 4-D model was chosen in this study because the development model has a systematic procedure, in accordance with the background problems of this research [12]-[13].
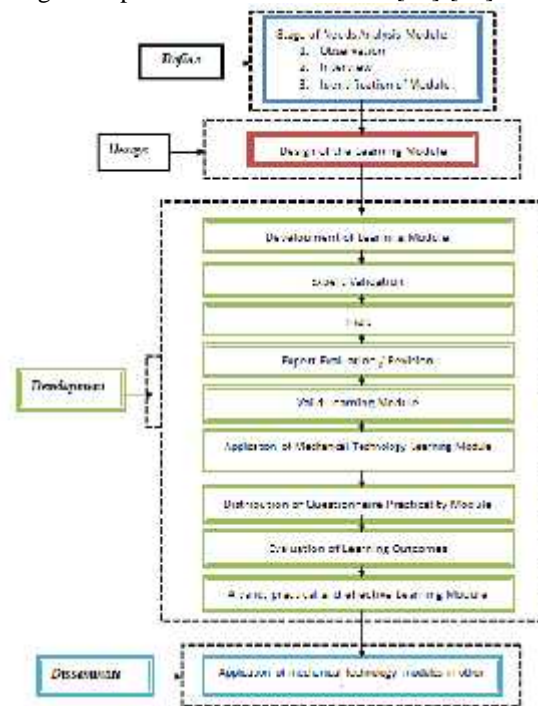
Figure 1. 4-D Module Development Procedure in the modification of (Trianto, 2009: 190)

3. RESULTS OF DEVELOPMENT AND DISCUSSION

3.1 Development Results

The following will explain the development results based on the stages.

3.1.1 Definition stage

The Define stage aims to define and define various sources of information related to the module to be developed. Stage Define includes three steps, namely:

- Observation
  Observation is done in the package of machining engineering expertise by observing the learning process in the classroom, looking at the learning resources used by the students. The implementation of the 2013 curriculum requires that learning is done through a scientific-based approach, an approach that uses the stages of observing, asking, trying, reasoning, conclude and communicate. The results of observations made found 1) The book of mechanical technology in the school library books published

1978; 2) Module of mechanical technology not yet enough in library; 3) Theoretical learning still uses conventional methods; 4) Slow work practice process (one job one semester); 5) The existence of dependence of students to the teacher; 6) Learning outcomes are still low.

- Interview

Interviews were conducted with mechanical technology teachers. Interviews conducted with teachers aims to determine the learning process and learning outcomes for learners. The results of interviews obtained information; 1) The theoretical learning is given to learners still uses conventional methods; 2) Handbook of learners in the form of learning module of mechanical technology not yet exist. The next step is to collect the required module material information in accordance with the basic competencies and demands of the 2013 curriculum.

Identification of the material is done by collecting and selecting the relevant material and according to the curriculum of 2013 where the learning must be in accordance with the Core Competence and Basic Competence (KD).

- Stage Design

At this stage, module design is made to be made in accordance with the define stage that has been done. The purpose of this stage is to design a module that can be used as a learning medium, and get an overview of the modules to be developed.

- Development Stage

This stage aims to produce valid, practical and effective products. This stage consists of validity test by the validator, practicality test according to the teacher and student appraisal, and effectiveness test.

The experimental data of the basic mechanical technology module of the mechanical engineering skills program are as follows:

➢ Phase module mechanical technology validation.

The validity test data is obtained from the validator response about the validity of the module used in the learning of mechanical technology. Validation is done by five validators, 2 (two) material validators and 3 (three) media validators. Assessment results provided by material validators with an average value of 86% and media validators with an average rating of 92% are in accordance with [14]. it can be concluded that the module developed in the category included "very valid".

➢ Practical Stage

The practicality of the module used as a learning medium obtained an average score of 87.81% then according to opinion [14] modules developed in the category of Very Practical.

Student's response to the practicality of using the module as learning media obtained average score 89,19% then according to opinion [14] this developed module is in the very practical category.

➢ Stage of Effectiveness

The effectiveness test result of the module can be seen from the pretest result of the learner (before using the module) and the postest learners (after using the module). To see a comparison of learning result used t-test. From the analysis result, it is known that the value of sig (2-tailed) is 0,000 <0,05 then according to the decision of paired sample t-test, it can be concluded Ho is rejected and Ha accepted, which means there is the difference between pretest learning result with posttest.

- Dissemination Stage

The stage of dissemination or dissemination is done by mechanical technology teachers who will disseminate or introduce this module in class.

3.2 Discussion

This research produces a module as a media of mechanical technology that can be used as instructional media for basic machining technique program. The development of this module is based on the initial observation of the learning process aimed to find out the problems, obstacles, and phenomena encountered in the field related to learning. Furthermore, the authors do needs analysis (need analysis), including the analysis of teaching unit, identification of the required materials. This module has passed the test phase of validity, practicality, and effectiveness. In the validity, the test is done by seeking expert opinion through validation sheet. The validated aspect contains the feasibility of content, language, content, and usefulness of the content and content, language, appearance, ease of use, consistency, format, and keypad for the media. From the experiments conducted got results that the whole aspect is in the category very valid.

Practical testing is done by asking the practitioner (teacher) and the participants to do the questionnaires through a questionnaire of practicality. From the test of practicality is known that the resulting product is in the category very practical to be used as a medium of learning.

The effectiveness test is done by looking at the average ratio of pretest results (before using the module) and posttest (after using the module) at the learning of mechanical technology.

3.2.1 Validity Test Analysis.

Module validation is obtained from validator responses about the validity of learning media

developed. Validator consists of 5 (five) lecturers of Faculty of Engineering UNP. Module validation for material aspect 86% and 92% for highly valid category media.

3.2.2 Practicality Test Analysis.

Assessment of module practicality is obtained from questionnaires which are filled by teachers of mechanical technology. Practitioners assessed the developed module is in a very practical category with an average percentage of 87.81%.

In addition to assessments from teachers/practitioners, the practicality of the module as a learning medium is also assessed based on the responses of learners through questionnaires with an average percentage of 89.19% with the very practical category.

3.2.3 Effectiveness Test Analysis.

Effectiveness is an important factor in learning. Effective learning is a match between learners who implement learning with the objectives or learning objectives to be achieved.

The effectiveness test is done by giving the test to the learner. Instruments of multiple choice test as many as 40 items. Before the test is given first tested the problem and analyzed. After analyzing the test results obtained 34 items that remain to be used and 6 items are discarded.

The effectiveness of the use of the module is done by conducting the test of learning outcomes conducted at the beginning and end of learning. These two test results are then compared to see the effectiveness of module usage. Based on the implementation of pretest obtained an average value of 57.93 and posttest implementation obtained an average value of 76.97. The results of the t-test also showed that there was a difference between the mean of the learning outcomes before the treatment was given and the average learning outcomes after treatment were given.

4. CONCLUSIONS AND SUGGESTIONS

3.1 Conclusions

Based on the research findings of module development that has been done, then obtained the following conclusion:

1. The process of developing the module into a learning medium begins from analyzing the needs consist of curriculum analysis, learners, and concepts that support the application of developed media. Then do the design of learning module refers to the material component that is the feasibility of the content, language, dish, and benefits, while the media components include the feasibility of content

(content), language, appearance, ease of use, consistency, format, and abandoment. The result of module development in this research is mechanical technology module which can be used as valid learning media, practical and effective

2. Validity test results that refer to two aspects of material and media components are in very valid categories. For the material composing the average value is given an 86% validator and the average value provided by the media validator is 92%. Practice module according to practitioner appraisal 87,81% and learners 89,19%. The effectiveness test data, this module learning can improve learning outcomes where the pretest results obtained the average value of 52.14 and at the end of the learning done posttest the average value increased to 72.61 or increased 20.46 so it can be explained that the learning outcomes of learners using the module as a learning medium can be declared effective.

3.1 Suggestions
Based on the research conducted, it is suggested the following things:
1. It is suggested to other researchers to do module development
   the basis of the program of mechanical technology expertise by increasing the sample of research in some vocational schools, so that obtained the results of more rigorous research and produce better learning media as well.
2. It is recommended for teachers to use this module as a supporting medium in learning and for learners with the use of modules can be more active learning so that the learning outcomes increase.
3. It is suggested to the school to prepare module which can be used as learning media in the learning process

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SECURITY OF MEDICAL RECORD WITH RIVEST SHAMIR ADLEMAN (RSA) METHOD

M.Syaifuddin[1], Ahmad Fitri Boy[2,] and Ali Ikhwan[3]

[1][2][3] Sistem Informasi, STMIK Triguna Dharma, North Sumatera

ABSTRACT: Medical Record is an inspection note that situation a patient by clinics at home pain. This supersecret medical Data Record in character and have to be taken care of by its authenticity, because of in it there are in secret boldness, for disease diagnosis, disease type and others which in this case it is, of course, have the character of a person. Hence from that this data may not know by others besides the interested parties to getting [him/ it], because if/when others or someone know and or getting it, is felt concerned about will do something that can harm to patient side and Hospital. So that later hospital side and or individual owning this data will feel getting a disadvantage.

To anticipate from undesirable things like forgery of data, and theft of data hence conducted by security to data with a technique of cryptography. With the existence of security of this information consequently expected by data of clinics existing at home pain would be more awake its authenticity, it is so that society having on file data identity at home pain does not feel to worry and is anxious.

As For Insecurity of data, there are many methods which can be used, one of the processes which can be used by is Rivest Shamir Adleman. This Method, general differentiate between encoding key and key of intake, so that will felt difficult to process the return if do not have authority for open it.

Keywords: Medical Record, Cryptography, Rivest Shamir Adleman

1. INTRODUCTION

The development of computer network technology causes the connection of one computer to another computer making it easier for one part with the other part to communicate with each other. Like the existing system at Mitra Sejati Mitra General Hospital whose system is connected using the network and computerized. By means of this kind, it is very easy for the inter-unit part at Mitra Sejati General Hospital to be able to communicate.

Record Medical Center and ICTC (Information Center Technology Communication) is part of existing work units Mitra Sejati General Hospital are interrelated. Medical Record Center is the recording of patient data related to Inpatient, Outpatient, and other patient data. While ICTC is a part unit that provides services on Information Technology to the units that require the service, both handling, and provision of data storage (server).
Because the existing system at Mitra Sejati General Hospital is already connected, the Medical Record Center with ICTC can directly communicate, one of the forms of communication is the storage of medical record data in ICTC by the Record Medical Center.

Medical Record is a patient's medical information covering health, disease and handling methods performed by the doctor to the patient. This medical record data will be sent by the medical recorder to the server through the public network. This public network is used to connect work units in the Hospital so that anyone can use this network. The submission of this medical record data using a public network, then this is very potential medical record posted data can tapping and obtained by other parties. When the data in tapping is clear text, the clear meaning here is the contents of the data can be read and understood without any action. With the work system and messaging model that posted like that then emerged a crime yan potentially to happen. The crime could have changed data, deletion of data and so forth. If this happens then the Hospital and patients certainly very disadvantaged. In other words, this medical record does not have the security to protect confidential data.

Examples of unsafe medical record data transfers can be illustrated by this scenario: The doctor sends a medical record of a patient with Dengue Hemorrhagic Fever (DBD) stage IV. Before the data until the server, on the way the data is tapped and changed its contents. Patients who initially contracted DHF Stadium IV disease was changed to Dengue Fever (DHF) stage I, so the data stored into the server is patient with DHF Stadium I disease. Of course in this case very dangerous for the patient, because later patient will get a description and service different that does not fit the actual situation.

From the description of the above background, it is necessary to make security against medical record data. One of the techniques of securing data by encoding, changing the structure of its data content. The way of data recording is known as encryption. Encryption is a branch of the field of cryptography. Cryptography is the science that studies the techniques of data security by changing the structure and change to new data whose results cannot be understood by just anyone. By using the original data cryptography (*plaintext*) is converted into the form of data (*ciphertext*) before it is sent, so that by encoding the information contained in the medical record data, then this data will be more awake secret and wholeness.

2. THE REVIEW OF LITERATURE

Use at most three levels of headings that correspond to chapters, sections, and subsections. The first level headings for chapter titles should be in 10pt, bold, justified, and uppercase font. Leave one blank line before and after the first level headings, respectively.

2.1 Cryptography

Bisht and Singh said (2015) cryptography comes from the Greek word for "hiding the message". Based on the purpose of "hiding the message" it can be defined that cryptography is a method of science that studies how to design a secure information when information is sent through the medium of delivery and can only be seen and understood by the intended person. Messages sent through a reliable medium are called plaintext, in which data is encrypted before it is delivered through the delivery medium. The encrypted message is called ciphertext, where the receiver decrypts the message to get the original message.

In general, cryptography can be divided into two categories, namely symmetric and asymmetric key cryptography.

2.1.1 Symmetric Key Cryptography

In symmetric key cryptography, the same key is used for the encryption and decryption process. In this algorithm, the process of encryption and decryption is very simple and takes a long time in processing, so this algorithm is usually used for long messages. There are two types of symmetric algorithms, namely, block cipher and stream cipher. Examples of this symmetric key implementation are found in the AES and DES algorithms.

2.1.2 Asymmetric Key Cryptography

In different key cryptography, asymmetric keys are used for encryption and decryption processes. Inside the asymmetric key, there are two keys,

namely public key and private key. The public key is given to the party who will send the message and the nature of this key is common. General here anyone can get and find out the public key but, for private key only owned or given to the recipient of the message. In other words, the sender uses the public key for the encryption process and the private key is used by the receiver for the decryption process. One of the algorithms that use this asymmetric key is RSA. Tripathi and Agrawal (2014) mentioned that cryptography has several purposes, namely as follows:

a.   Confidentiality

It is a means used to maintain the confidentiality of information from anyone who does not have the right to access the information (non-authenticated user) so that the information can only be read by an authenticated user.

b.   Authentication

This process is to prove the identity of a sender. Information received by the system, then the system will check its identity. Whether the information comes from the authorities or unauthorized parties or even from the wrong parties.

c.   Integrity

Only the authorized party can change the message or information

d. Non-Repudiation

The mechanism to prove that the sender actually sends a message or information.

e.   Access Control

Only authorized parties are able to provide information about the related information.

Besides according to Tripathi and Agrawal (2014) about the purpose of cryptography, there is another opinion that suggests the purpose of cryptography, that is according to Ayushi (2010). Ayushi said the purpose of cryptography is the following reasons:

a. Confidentiality
b. Integrity
c. Authentication

Rifki Sadikin said (2012) cryptography system consists of 5 (five) parts, namely:

Plaintext: Messages or data in their original form that can be read. Plaintext is the input for the encryption algorithm. For the next use of the original text as a plaintext.

Secret Key: Secret Key which is also an input for the encryption algorithm is a value that is free of the original text and determine the output of the encryption algorithm. To further use the term secret key as the equivalent of the word secret key.

Ciphertext: Ciphertext is the output of encryption algorithm. Ciphertext can be regarded as a message in a hidden form. A good encryption algorithm will produce a random-looking ciphertext. To use the term password text as a ciphertext word equivalent.

Encryption Algorithm: The encryption algorithm has 2 (two) entries: the original text and the secret

key. The encryption algorithm transforms the original text so that it generates the passcode.

Decryption Algorithm: The decryption algorithm has 2 (two) entries: password text and secret key. The decryption algorithm restores the passcode to the original text when the secret key that the decryption algorithm uses is the same as the secret key used by the encryption algorithm.

3. Rivest Shamir Adleman System

In the book Rifki Sadikin (2012) explains in 1977, Rivest Shamir and Adleman formulated a practical algorithm that implements public key cryptographic systems with RSA cryptographic systems. To illustrate the RSA cryptographic system can be seen in Figure 3.1

Figure 3.1 RSA Cryptography System

3.1 RSA Algorithm

3.1.1 Key Generator

In the book Rifki Sadikin (2012) steps in generating public and private keys are as follows:
Steps in a key generation:
- Choose two arbitrary primes, let p and q.
- Calculate n = p x q, with p q.
- Calculate (n) = (p-1) (q-1).
- Select the public key e, which is relatively prime to (n).
- Generate the private key d = 1+ k (n) / e or d = e^{-1} (1 + k. (n)).

The result of the above algorithm is the public key (n, e) and private key (n, d).

3.1.2 Encryption Algorithm

The RSA encryption algorithm uses an exponential function in modular n by using a public key.

$$C = P^e \bmod n$$

3.1.3 Description Algorithm

The RSA decryption algorithm uses the exponential function of modular n by using the private key.

$$P = C^d \bmod n$$

4. METHOD OF THE STUDY

4.1.1 Framework

In the methodology of this study, there is a sequence of frameworks to be followed, the order of this framework is a description of the steps that must be passed so that research can run well.
The framework to follow can be seen in Figure 4.1
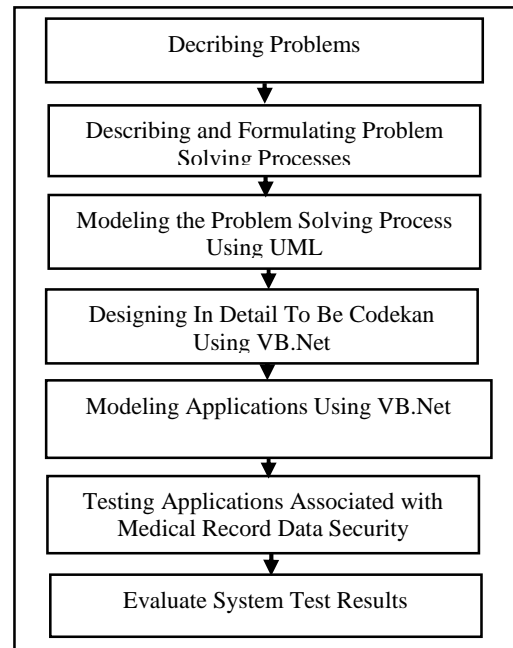
Figure 4.1 Framework the Research

5. IMPLEMENTATION

This new system has two functions, namely the function of encryption and decryption. The encryption function is used for the process of converting a data into random data that can not be understood its contents for anyone who does not have the authority to open it, while decryption is to restore the data that has been encrypted into a data original or original text.

5.1 Main Menu

In this main menu, there are 3 (three) buttons, namely Open button, Save, Encrypt, and Decrypt. The display for the main menu design can be seen in Figure 5.1 below:
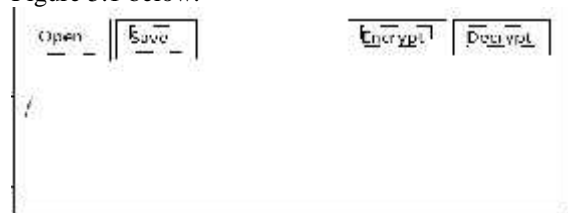
Figure 5.1 Main Menu

5.2 Key Generator

In the lock form there are 3 (three) buttons, namely Generate Key, OK, and Cancel. For the key form, images can be seen in Figure 5.2
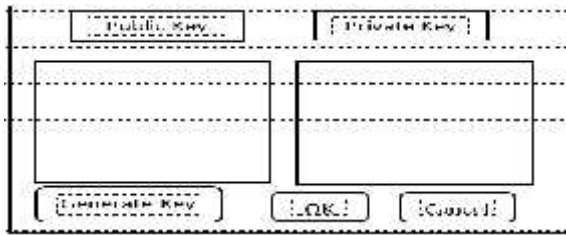
Figure 5.2 Key Generator

6. CONCLUSION

From the results of testing the system, shows that the data Record Medical which * doc or * docx extension can be at random or in encryption so as to produce ciphertext. The results of this ciphertext then in return using the decryption process to produce the same Medical Record data with the original Medical Record data. Based on the above test results, it can be concluded that the RSA method designed on the built system has been running well.

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RAHMATAN LIL ALAMIN, THE CONCEPT OF MULTICULTURAL EDUCATION

Muh. Barid Nizarudin Wajdi[1], Achmad Fathoni Rodli [2]

[1]Islamic Education, STAI Miftahul Ula Nganjuk, Indonesia; [2] UMAHA Sidoarjo, Indonesia

ABSTRACT: Indonesia is a country consisting of different peoples such as religion, tribe, race, culture, customs, language, etc. make Indonesian society as a plural society. In this diverse life, it is a challenge to unite the Indonesian nation into a force that can uphold the diversity and diversity of its people. This can be done with a multicultural education that is invested in the student through learning at college. This article explores patterns of multicultural education at Universitas Maarif Hasim Latif (UMAHA University) Sidoarjo in East Java. A lecturer is responsible for providing education to their students and assisted by society in seeing the differences that occur in their daily lives that promote the importance of tolerance in diversity making Indonesians accept that they live in diversity. Finally, this paper figure out the multicultural education processes establish since the preparation of curriculum, learning and evaluation processes. These three processes are implemented in the formal and informal learning processes.

Keywords: Rahmatan Lil 'Alamin, Concept, Multicultural, UMAHA Sidoarjo,Cultivation

1. INTRODUCTION

Indonesia is a country of various ethnic, cultural, and religious groups that can simply be called a multicultural society. On the other hand, however, the multicultural reality confronts the urgent need to reconstruct the Indonesian national culture which can be an integrating force that binds the entire ethnic and cultural diversity. Pluralism must be found in every community.

Indonesia has tribal pluralism. The plurality of this tribe is one of the characteristic of Indonesian society that can be proud of. However, without we realize that the plurality also holds the potential conflicts that can threaten the life of nation and state. This has been proven in some areas of Indonesian conflict.

Education is essentially a unifying tool of the nation, equality of opportunity, and the development of the self-potential to the fullest. Therefore, education is expected to minimize the differences of the citizens, rich and poor, men or women are all get the equal opportunities to develop their potential optimally. But in reality, the education is still not able to make it happen. However, the real education is the education which is able to recognize, to accommodate the all possibilities, to understand the heterogeneity, to respect the differences of tribes, nations and religions.[1]

The multicultural values are an important value to be applied in the higher education environment, the universities are the social life miniatures of Indonesian people as pluralistic in term of race, gender, ethnicity, religion and social life [2] . Furthermore, the empirical facts indicate that this nation is multicultural nation [3] , the differences will always continue between the existing cultural entities to be in more attractive based on their tendencies and interests. If the cultural relationship between those citizens with the different cultural backgrounds are not maintained, then it can lead to the disharmony of the citizens' relation [4] .

That is why the multicultural education is a worthy of being introduced. The multiculturalism education emerged as a solution to the society's dissatisfaction with the education system that has been implemented. The multiculturalism education has a philosophical foundation that accommodates the gaps in education, culture and religion. These three things have an interrelated orientation that leads to the humanity. This is in line with one of the multicultural education orientations of humanity [5] .

The educational institutions especially the Islamic universities, are one of the educational institutions which have the responsibility and a strategic role in developing a multicultural-oriented Islamic education. This is because the Islamic universities print and produce the muslim scholars [6].

So does Maarif Hasim Latif University which will print and produce the professional and competent moslem academics. In addition, the students in UMAHA Sidoarjo are mostly come from pesantren, one form of the educational institutions which are closely emotional and cultural with the grassroots community. It is expected with a multicultural education that the learners later can take a part in a pluralism society.

In a descriptive context, the multicultural education should contain themes on tolerance, ethno-cultural and religious differences, the danger of discrimination, conflict resolution and mediation,

human rights, plurality, universal humanity and other relevant subjects [7] .

DISCUSSION

Education in a multicultural insight in James A. Bank's formulation is a concept, idea or philosophy which is as a belief or explanation that recognize and value the importance of cultural and ethnic diversity in shaping lifestyle, social experience, and personal identity, educational opportunities of the individual, group and countries [8] .

According to Sonia Nieto, multicultural education is a comprehensive and fundamental education process for all learners. This type of education opposes the all forms of racism and discrimination in schools and communities by accepting the plurality that is reflected among learners, among their communities and among teachers. According to Sonia, the multicultural education must be inherent in the curriculum and teaching strategies, including in every interaction among teachers, students and families as well as the overall teaching and learning atmosphere. This type of education is a critical, reflective pedagogy and a basis for change the action in society, then the multicultural education develops the principal of democracy in a social justice [9] .

In his paper entitled "Multicultural Awareness: A Movement of "Interest Minimalization" in Reducing Social Conflict" which was introduced in Multicultural Education book by M. Ainul Yaqin (2005). Prof. Dr. H.M. Amin Abdullah explains broadly the discourse of the multiculturalism to understand the differences which are naturally and inherently exist in human beings and how then the differences can be understood and accepted as natural so as not to cause the discriminatory action as a result of the life patterns and behaviors that reflect jealousy heart, spite, and bad thought [10] .

Meanwhile Bikhu Parekh defines the multicultural education as "an education in freedom, both in the sense of freedom from ethnocentric prejudices and beasts, and freedom to explore and learn from other cultures and perspectives" [11] .

The application of multicultural values in universities is expected that the learning process will not only make the students have many good skills and understanding in the course they are studied, but also have a good understanding related to the value application of pluralism, humanism and democracy in the daily. [12]

From the description above, there are many important things in the multicultural discourse in education that is identity, openness, cultural diversity and social transformation. Identity as one element in education which assumes that the learners and teachers are an individual or group representing a particular culture in society.

Concerning to the focus of multicultural education, H.A.R. Tilaar reveals that in a multicultural education program, the focus is no longer directed solely to the mainstream social, religious and cultural groups. Multicultural education is actually a caring and understanding attitude or acknowledgment of other people. In that context, multicultural education sees the society more broadly. Based on the basic view that the attitude of indifference and non-recognition is not only rooted from the inequality racial structure, but the paradigm [13] .

The concept of Islam *Rahmatan lil alamin* is an interpretation of the verse 107 of al-Ambiya (21) as noted above. This verse by Ahmad Mushthafa al-Maragy is interpreted as follows. *wa maa arsalnaaka bi haadza wa amtsaligi min al-syara'ii wa al-ahkaami all althi biha manaathu al-sa'adah fi al-darain illa rahmat al-naas wa hidayatahum fi syu'un ma'asyihim wa ma'adihim*. Meaning: I have not sent you Muhammad with this Qur'an and similarly in the form of shari'ah and the law which guides a happy life in the world and the hereafter, but as a grace and guidance for their lives in this world and the hereafter [14] .

Rahmatan lil alamin described by Fuad Jabali and his friends. According to him, *Islam Rahmatan lil alamin* means to understand the Qur'an and Hadith for the good of all human beings, nature and environment. The Islam brought by the Prophet is Islam for all. Islam teaches compassion for all beings: human beings, animals, plants, water, earth, fire, air and so on. Islam sees that those who have souls are not only people but also plants and animals, pity. Plants have the soul of eating (*al-ghaziyah*), grown (*al-munmiyah*), and multiplying (*al-muwallidah*) While animals in addition to having a soul as well as the spirits, also have a moving soul (*al-muharrikah*), and capture (*al-mudrikah*) consisting of capturing from the outside (*al-mudrikah min al-kharij*) using senses; capture from within (*al-mudrikah min al-dakhil*) with the shared senses (*al-hissi al-musytarak*), the power of representation (*al-khayal*), the power of imagination (*al-mutakhayyialh*), estimation (*al-wahmiyah*), and recollection (*al-hafidzah*) [15] .

Islam as *rahmatan lil alamin* is normatively understandable from Islamic teachings relating to *aqidah*, worship and morals. *Aqeedah* or belief possessed by man must give birth *rabbaniy* (a life in accordance with the rules of God), the purpose of life is noble, *taqwa, tawakkal*, sincere, worship. This aspect of aqidah, must cultivate an attitude of emancipation, raising human dignity, human awareness, fairness, openness, democracy, harmony in pluralism[16]

Therefore, the implementation of Islam rahmatan lil alamin requires a wise attitude in managing it. That is a professional attitude, not easily hooked, not emotional, but still patient while providing a

complete understanding of Islam. Implementation of Islam rahmatan lil requires rationality, self-control, patience, keep looking for way out, persuasi, pema'af, kasing sayang, husn al-dzann (kindly), tasamuh (tolerant), tawasuth (moderate), fair, democratic, take and give. Because of the difficulty of administering this rahmatan lil alamin Islam, it is not surprising that occasionally turmoil and explosion depict the ineffectiveness of Islam rahmatan lil alamin. The incidents of mutual attack and burning of houses of worship, the prohibition of establishing houses of worship, assault on the so-called religious schools, can be regarded as a disturbance of the implementation of Islam rahmatan lil alamin, and at the same time the strength of the disorder as well as the limited power of tangkal and the ability to manage it.'

By expressing the facts mentioned above, it is known that Islam *rahmatan lil alamin* has had great service and contribution in unifying the hearts, minds and movements of Muslims that produce progress in various areas of life whose benefits not only felt by the Muslims themselves , but for all mankind. Islam *rahmatan lil alamin* not only has brought the progress of the Islamic world, but also the world of Europe and the West. Islam *rahmatan lil alamin* further has also been transformed and practiced in the life of the Indonesian people who accept unity in diversity, moderation, tolerance, harmony and peace.

THE METHOD

This research is generally intended to obtain data on multicultural values, pluralist attitudes of students and the pluralist effect on student plural at UMAHA University,

The method used in this research is quantitative method with observation data collection techniques, interviews and questionnaires. The population in this study were all students college of UMAHA University, amounting to 585 new students college. Sampling was done by Purposive cluster sampling technique [17] .

Analysis in research using percentage technique, in addition to tested the validity, reliability, test normality, linearity, product moment correlation, regression analysis, coefficient of determination, and hypothesis testing[18]. Based on the calculation of Product Moment Correlation Coefficient known that the correlation between variables X to variable Y is 0.70, with a strong correlation range. While the results of the hypothesis test obtained Sig results. 0.000 <0,05 means that the planting of multicultural values has a significant influence on the formation of pluralist attitude of students who are categorized strong relationships.

THE RESULT

Based on normality test results, it is known that the data on variables affecting the cultivation of multilangural values shows the significance value in the Kolmogorov-Smirnova test of 0.124 and the Shapiro-Wilk test of 0.57, it indicates a significant value. Whereas the variable data of pluralist attitude formation showed significance value at Kolmogorov-Smirnova test of 0,200 and Shapiro-Wilk test equal to 0,275. Then it can be concluded that the data of these two variables can be said to be normal distribution.

In addition, based on graphic Q-Q plots the research data of the two variables are the influence of multicultural values (X) and the formation of student pluralist attitude (Y) scattered around the normal line. So it can be concluded that the research data is normally distributed. While based on linearity test can be known that the value of Linearity in column Sig. 0,000 <0.05. So it can be concluded that the research data on the influence of multicultural values to pluralist attitude is linear patterned.

Furthermore, based on the calculation of simple linear regression obtained equation as follows = -1.275 + 0.956X. This shows that the influence of multicultural values (X) has significant influence with positive direction of 0, 956. It means that if the influence of multicultural values (X) grows 1, then the pluralist student's attitude will increase 0, 956 or 95, 6%.

The results of the calculation of correlation coefficient analysis can be obtained coefficient of determination (R Square) of 0.493. This means that multiplication of multicultural values (X) gives influence to the formation of student pluralist attitude (Y) of 0.493 (49.3%). While the rest that is equal to 0,507 (50,7%) influenced by other factor.

After the results obtained from the above calculation, then performed hypothesis testing by using the regression hypothesis that is when P-value or Sig. < (0,05) then H0 is rejected (significant influence) and vice versa if P-value or Sig. > (0.05) then Ho is accepted (no significant effect).

The result obtained is the value of Sig. 0.000 <0.05 then Ha accepted and Ho rejected. So it can be concluded that the planting of multicultural values has a significant influence on the formation of student pluralist attitude.

CLOSING

Based on the above description, it can be concluded that the impact of the development and application of multicultural values in UMAHA to the social and academic life is very real which is able to assist the efforts to improve the academic ability and students social activities.

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LESSON STUDY FOR IMPROVING A LEARNING QUALITY

Muh. Barid Nizarudin Wajdi[1], Andi Mursidi[2]

[1]Islamic Education, STAI Miftahul Ula Nganjuk, Indonesia; [2,3] STKIP Singkawang, Kalbar Indonesia

ABSTRACT: Nowadays, the education system is required to run dynamically. A teacher is expected to participate actively by involving the various groups. Therefore, the teachers are required to be able to find the right method in their learning. The lesson study is one method that can improve the quality of a teaching profession and this method also able to improve the cooperation between the teachers' explanation. This method consists of three stages of planning, implementation, and reflection. This study was conducted in 5 Junior High Schools in Nganjuk. Lesson study gives real opportunity or process of student learning in the class. Lesson study guides teacher to focus their discussion in action planning, and reflection learning practice in the class. Lesson study is one of teacher in-service form that can do for improving teacher professionalism. The research proves that the method of lesson study can improve the learning quality and its objectives will be achieved more easily. This is because in the lesson study method there is a good cooperation and the togetherness between the teachers of that school.

Keywords: Lesson study, learning quality, increasing, improving

1. INTRODUCTION

School is a formal institution that served to help, especially to help the parents in providing the education to their children. The schools provide knowledge, skills, and attitudes to their students in full accordance with what they need. All the school functions will be ineffective if the components of the school are not working well, because the weakness of one component will affect the other components that will ultimately affect the course of the system itself. One of the component parts of the school is a teacher. The teachers are required to be able to master the curriculum, master the material, master the method, and also be able to manage the class in such a way that the learning process is active, innovative and fun. The teachers are also required to always improve the quality of learning by reviewing the process and the results, so he/she really becomes a professional teacher who is able to deliver the student for achieving success.

2. DISCUSSION
2.1. Lesson Study Definition

Learning is an activity which must be done and given by a teacher to the students, because learning is a key to success in reaching a bright future, to prepare the nation's generation with a high knowledge of science which will ultimately be used for the nation, state, and religion. Seeing such a vital role, then applying the effective and efficient methods in the learning process is a necessity, in the hope that the learning process will run with fun and not boring [1]. The lesson study in Japanese called by Jugyokenkyu [2] is a form activity that performed by a teacher/ group of teachers who work with others (lecturers, same subject teachers/ same grade level teachers, or other teachers), to design the activities improving the quality of student learning from the learning process which is done by one of the teachers from the jointly designed learning planning [3], then observed by the other teachers and afterwards they reflect together on the result of the recent observations. This shared reflection discussed by the observers and teachers to perfect the learning process where the focus of the discussion is on how the students learn, when the students learn, when the students are getting bored with the knowledge and when the students are able to explain the lesson to their friends and when the students are able to teach the whole class. [4]

Lesson study provides a real opportunity for the teachers to witness the learning and teaching process of the students in the classroom [5]. Lesson study guides the teachers to focus their discussion on planning, implementation, observation, and reflection on classroom learning practices. By watching the actual learning practices in the classroom, the teachers can develop a common understanding of what effective learning means, which in turn can help the students to understand what they are learning. Another unique characteristic of the lesson study is that the lesson study keeps the students at the center of the teacher's professional development activities. The lesson study provides an opportunity for the teachers to examine carefully the learning processes and the students' understanding by observing and discussing the classroom learning practices. This opportunity also strengthens the role of teachers as the researchers in the classroom. The

teachers hypothesize (for the example, if we teach in a certain way, the students will learn more actively) and test it in the class with their students. The teacher then collects the data while observing the students during the process of the lesson and determines whether the hypothesis is proven or not in the classroom [6].

Another feature of the lesson study is that it is a teacher-led professional development. Through a lesson study, the teachers can be actively involved in the process of learning change and curriculum development. In addition, this collaboration can help in reducing the isolation among teachers and develop a shared understanding of how to improve the teaching and learning process systematically and consistently in the school as a whole. Besides that, a lesson study is a form of research that allows the teachers to take a central role as their own classroom researchers and become an autonomous thinker and researcher about teaching and learning process in the classroom throughout their lives [7].

2.2. The History of Lesson Study

The term of lesson study itself was created by Makoto Yoshida, this practice has a long history and has helped significantly in improvements the learning and teaching process in the classroom and in the curriculum development. Many elementary and secondary school teachers in Japan claim that lesson study is one of the important professional development approaches that have helped them grows as the professional teachers throughout their careers. [8] In Japan, the teachers can improve their skills in teaching through the lesson study activities, it is a learning from the lesson. The lesson study is one form of teacher training which can be done to improve the professionalism of teachers. The lesson study is conducted in the area of a teacher teaching the method using the classes in the real environment, so it will familiarize the teachers collaboratively with both teachers in the field of study and with the teachers outside the field of study even with the community and experts. The lesson study is a collaborative between the teachers in preparing lesson plans and their lesson studies, the implementation of KBM in class accompanied by the observation and reflection. With the lesson study, the teachers can feely improve their performance and their professionalism that ultimately improve the quality of learning [9]. The lesson study is a process of developing the professionalism of teachers in Japan by exploring/ testing their teaching practices to be more effective [10]. The lesson study was introduced in Indonesia through piloting activities undertaken in the INSTEP-JICA follow-up project at three universities: UPI, UNY, and UM. At UM, the lesson

study was introduced in Malang formally by JICA expert Eisoke Saito, Ph.D. in January 2004, followed by the implementation of lesson study in SMA Laboratorium Universitas Negeri Malang [11]. The lesson study itself is a new program for most teachers. Lesson study was adopted from Japan and tested in several schools as a pilot project including Bandung (under UPI), in Yogyakarta (under UNY) and in Malang (under UM) [12]

2.3. The Process in Lesson Study

To start this lesson study process, it is needed for the teacher to change the attitude as follows: 1) the spirit of introspection to what has been done so far on the learning process. The question such as whether I have done a good educational task? Have I done my task as optimally as possible? A series of questions that must be answered honestly, the answer will certainly encourage the process of searching the ways to perfect the deficiencies of the answer. 2) The courage to open up for receiving the suggestions from the other in order to improve the teaching method. 3) The courage to acknowledge one's faults. 4) The courage to acknowledge the other people's ideas. 5) The courage to provide the honest and respectful input [13].

These five attitudes become the requirements which must be understood and sharpened before we do the lesson study activities. In addition to the basic attitudes that should be prepared by the teacher, it is also very important role of related components in the field of education, principal, MGMP, office of education, university, and educational observing on the real commitment in supporting the lesson study.

In a whole, the lesson study includes 3 (three) activity steps, they are Planning, implementation (action) learning and observation, and reflection, the details of these three stages are as follows:

2.3.1. Planning Step

In this stage, the teacher will identify the existing problem in the class that will be used for the lesson study and looks for the alternative solution. The identification of the problems and solutions relates to the subject matter, student characteristics and classroom atmosphere, learning methods or approaches, media, visual aids and evaluation process and also the learning outcomes. Furthermore, the discussion about the selection of subject matter, the selection of methods and media in accordance with the students' characteristics and the type of evaluation that will be used. In the discussion time, it will arise the opinions and the brainstorming advice from the teachers and experts. At this stage, the senior experts and teachers can introduce the new things that the teachers need to know and apply in the learning process later. It is also important to discuss the preparation of the observation sheet, especially the determination of

indicators during the learning process, whether viewed by the teacher or students. The indicators are compiled based on the lesson plan which was created and defined the basic competencies that will be owned by the students after participating the learning process. From the result of the problem identification and solution, then compiled and packaged in a learning device consisting of:

2.3.1.1   Lesson Units
2.3.1.2   Teaching Instruction Manual (Teaching Guide)
2.3.1.3   Student Worksheet
2.3.1.4   Media or Teaching Aids
2.3.1.5   Process Assessment Sheet and Learning Outcomes
2.3.1.6   Observation Sheet. [12]

This learning tool can be composed by a teacher or several teachers who have previously agreed on the learning aspect that has been planned. The result of the plan preparation needs to be discussed in the group by the teachers and experts to be defined.

2.3.2. The Implementation and the Observation Stage

At this stage, the teacher implements a planned learning plan while the other teachers and experts make the observations using the prepared observation sheets. Besides that, a video recording (audio-visual) is captured during the special events in the learning process.

2.3.3. Reflection Stage.

At this stage, the teacher who is implementing the lesson plan is given the opportunity to express his impression during the course of learning, both himself and the students encountered. Then the observers (other teachers and experts) present the result of data analysis observation, particularly regarding the activities of the students during the learning process with the playback of recorded video lessons. Finally, the teacher who performs the implementation will provide the feedback of the observers' comments. The also important thing in this reflection phase is to reconsider the learning plan, whether it is appropriate and can improve the students learning activities or not. If there is no suitability, what matters are not appropriate, the method of learning, the material in the worksheet, media or props, or others. These considerations are further used to improve the next lesson plan. Based on Robinson [14] suggests that there are eight (8) stages based on the number of the required activities in the implementation of lesson study, they are:

2.3.3.1.   The selection of the lesson study topics
2.3.3.2.   Review the syllabus to get the clarity of the learning objectives for the topic and to look for the ideas from the material in the textbook. Next work in groups to develop the lesson plan.
2.3.3.3.   Every team who has developed a lesson plan presents its lesson plan, while the other group provides the input until a better learning plan is obtained.
2.3.3.4.   The teacher designated by the group uses these inputs to improve the lesson plan.
2.3.3.5.   The appointed teacher presented her/his lesson plan in front of all members of the lesson study group to get the feedback.
2.3.3.6.   The appointed teacher corrects in more detail the lesson plan and sends it to all teachers member so that they know how the lesson will be carried out in the classroom.
2.3.3.7.   The teachers re-learn the lesson plan and consider them from the different aspects of their learning experiences, especially focused on the things that are important such as what the teacher will do, the students' understanding, the problem-solving process by the students, and the possibilities will occur in the implementation of learning.
2.3.3.8.   The appointed teacher implements the lesson plan in the classroom, while the other teacher with the lecturer/expert observes according to each task to give the input to the teacher. The reflection meetings are done immediately after the learning activities, to get input from the observer teacher, and finally the comments of the lecturers or experts on the whole process, and also the suggestion for improving the learning if they repeat in their own classes or for the different topics.

From the eight stages above it appears that there are the efforts to prepare and improve the repetitive learning plan to obtain the best learning plan.

2.4. The Benefits of Lesson Study

The increased teacher competence is a continuous effort, in line with the progress and the development of science and technology. Like another profession such as the medical profession; the doctors must have increased their competence by continuously following the program and the development in medical sciences. And so do the teachers, the teachers who never want to try to improve their competence will become a frozen teacher. Lesson study is chosen and implemented because it is an effective way to improve the quality of learning by teachers and student learning activities. This is because:

2.4.1.   The development of lesson study is conducted and based on the results of professional knowledge sharing and based on the practice and teaching outcomes of teachers.

2.4.2. A fundamental emphasis on the implementation of a lesson study is for the student to have the quality learning.

2.4.3. The competences that expected of the student are the focus and the main points of interest in classroom learning.

2.4.4. Based on the real experience in the classroom, the lesson study can be the basis for the development of learning.

2.4.5. The lesson study will place the role of teachers as the learning researchers [14]

The improvement of teacher competence is a mandate of Law Number 14 year 2005 regarding the teachers and lecturers. The effort to improve the teachers are not just a momentary activity, but rather an ongoing activity, which is carried out in accordance with the concept of Continuing Professional Development (CPD). The lesson study is one of the most appropriate activities for Teachers Working Group (KKG) and Teacher Subject Teaching (MGMP). Due to the lesson study, the teachers will conduct the learning process collegially and together to improve their competences.

There are several important things that can be obtained through the lesson study activities:

First, the teacher will be more open to the other world. The classroom is not locked and does not accept the other teachers to see what the teacher does every workday in the learning process. The teacher also needs to see what his colleagues are doing in the learning process.

Second, the teachers will learn and work together to improve their learning quality through the understanding - not just about the material - but also the methods, the media, and the teaching aids, and also the assessment techniques used in the learning process. Thus, the focus of the lesson study activity is the study of learning so that it can find the best practice based on the observed experiences in several learning stages by the teachers.

Third, with these best practices, the teachers will be trained to generate the new innovations in learning, through the suggestions of improvement which provided by the colleagues, and also through the creativity that emerged in the learning practices.

Fourth, the expected outcomes can be obtained in this lesson study is a more effective and efficient learning process, which is thus expected to improve the student achievement.

The advantages of the lesson study method are as follows:

2.4.1. Applicable in every field, from art, language, math and sports bat every grade level

2.4.2. Can be implemented between the teachers/ educators with cross-school, resulting friendship in the sense of collaboration, cooperation and loyalty among the teachers/ educators (cooperative and collaborate and collegial), which in turn can strengthen the

unity and improve the quality of teaching and participants educate together.

2.4.3. Lesson study has a double score in the case of luck for the children, students, and learners which can improve the innovation and the creativity of a teacher/ ustadz/ lecturer. For the "giver" group, they benefit from the teaching while together with their fellow teachers, in a useful collaboration concept which more powerful than their own, and also the deeds of worship. For those "given", children, student, and learner will get luck and improve the quality of learning outcomes.

With the interaction between the educators, the lesson study can open and improve the nature of opened mind, mutual love and affection, mutual of "*asah, asih and Asuh*". Besides that, it can also be a venue or a vehicle of awareness that life is very limited, the teachers do not feel the most powerful and perfect, and not willing to accept the criticism and suggestion. However, with the lesson study, it is expected that there will be the cooperation and collaboration among teachers who are willing to be given the input, criticism, and suggestion. The advised teacher does not feel underestimated, in case of an error or a deficiency. As for the teacher who gives the criticism and suggestion, is also not feel as an angel which the most correct and most know. Educators who give the criticism and suggestion must also be good, ethical and have a good attitude.

3. CLOSING

3.1. Summary

The lesson study is one method that can improve the teacher profession quality and can improve the cooperation between the teachers. This method consists of three stages of planning, implementation, and reflection. With the lesson study, the quality of learning process will increase and the learning objectives will be more achieved because there are a good cooperation and togetherness between the teachers.

3.2. Suggestions

3.2.1. In order for an optimal learning process results than learning components should be good and supportive. One of them is classroom management with the lesson study model.

3.2.2. The lesson study model can be used for all subjects and cooperation with several teachers at once including the general public and experts, for it can be used as an alternative model for teachers to create the quality learning process.

3.2.3. The teacher should be open-minded to create the creative innovation so that the knowledge and insight into learning are increasing.

3.2.4. The teachers should understand correctly that the cooperation among teachers is needed to improve the professionalism.

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THE ROLE OF INFORMATION TECHNOLOGY IN THE IMPROVEMENT OF TEACHER'S COMPETENCIES AND TEACHING LEARNING PROCESS EFFECTIVENESS IN ESA SEJAHTERA SCHOOL PEKANBARU

Muhammad Luthfi Hamzah[1], Hamzah[2] and Astri Ayu Purwati [3]

[1]Sekolah Tinggi Ilmu Komputer Pelita Indonesia, Pekanbaru; [2,] Universitas Islam Riau, Pekanbaru, [3] Sekolah Tinggi Ilmu Ekonomi Pelita Indonesia, Pekanbaru,

ABSTRACT: *The need of technologies in human life grows stronger and faster. Basically almost every business and non business sector in this world has integrated with information technology especially in the education sector. The purpose of this study is to analyze the effect of information technologi toward teacher's competence and teaching learning process effectiveness. Population of this research are 53 teachers in Esa Sejahtera School Pekanbaru and the sampling technique used is total sampling with 53 teachers as respondents. Data analysis technique use path analysis on the basis of regression coefficient where the research variabel consist of Information Technology (X1), Teacher's competence (Y1) and teaching Learning Process Effectiveness (Y2). The result of this research found that Information technology directly has significance influence toward teacher's competence and also teacher's competence directly has significance influence toward teaching learning process effectiveness. Besides that, the result for indirectly influence show information technology has significance influence toward teaching learning process effectiveness through teacher's competence. Suggestion of this research is management of Esa Sejahtera School Pekanbaru should enhance the information technology applied in Esa Sejahtera School Pekanbaru in order to improve teacher's competencies and teaching learning process.*

Keywords : Information Technology, Teacher's Competence, Teaching Learning Process, Education

1. INTRODUCTION

Educational success is essentially influenced by many factors, among others: teachers, learners, curriculum, facilities, and environmental education. Teachers and educators is one of the factors determining the success of any educational sector. That is why in every educational evaluation in curriculum and human resource always comes down to the teacher factor. This shows that the role of the teacher in the world of education is very important. to improve the quality in education, teacher's competence is the things that need to be considered. Teacher's competence is a combination of personal ability, academic, technological, social, and spiritual and creating the competence standard for teaching profession's, which includes mastery of the material, an understanding of learners, learning Educational, personal and professional development [1].

Environmental change outside the world of education such as social, economic, environmental, technological, political world requires education to rethink how these changes would affected and how to interact with those changes. One of the changes in the environment that greatly affect the world of education is the presence of Technology,

information and communication. Technology integration should be defined not simply as a question of access but rather as a tool both for improving educators' professional productivity and promoting student learning [2].

Technology can be a powerful tool for transforming learning. It can help affirm and advance relationships between educators and students, reinvent our approaches to learning and collaboration, shrink long-standing equity and accessibility gaps, and adapt learning experiences to meet the needs of all learners.

Esa Sejahtera School is a school which was founded in 2005 and is located in Pekanbaru. Esa Sejahtera School has a vision to be a leading school with excellent services to create a learning community who highly embraces challenges and seeks opportunities through creative approaches.

Table 1. Final Year Students achievement in Esa Sejahtera School year 2014 to 2016

Year		2014	2015	2016
Student's achievement	**Elementary School**	79.8	82,8	83.8

	Middle School	-	82.8	75

From the table 1 above, it can be seen the student's achievement in Esa Sejahtera School Year 2014 to 2016 for students elementary school increase from 79.8 to 83.4 from 100. The different case happen in middle school level where student's achievement in 2015 is 82.8 in the average and go down to 75 in year 2016. This phenomenon is the basis for knowing how the teacher's role in carrying out the teaching and learning process so that it is able to boost student's achievement. Meanwhile, like many other researchers (see for example Darling-Hammond, 1999), have concluded that the school effect on achievement derives mainly from variations in teacher quality. [3]

The research question in this research are : 1) Does information technology directly influence to teacher competencies ? 2) Does information technology indirectly influence to teaching learning process effectiveness through teacher's competence ? 3) Does Teacher's competence directly influence teaching learning process ?
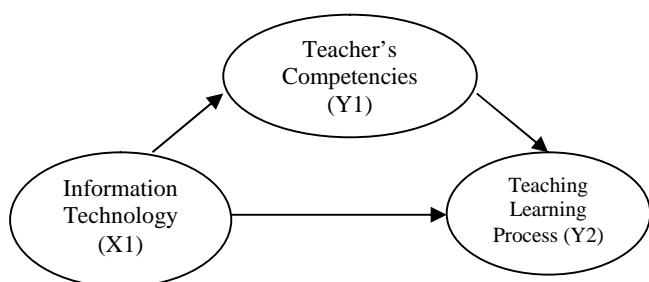
Figure 1. Research Framework

From the research framework above, can be formulated as the following hypotesis :
H1 : There is directly influence between information technology toward teacher's competencies.
H2 : There is indirectly influence between information technology toward teaching learning process through teacher's competencies.
H3 : There is directly influence between teacher's competence toward teaching learning process.

2. LITERATURE REVIEW

1. Teaching Learning Process

The learning process is an activity of interaction between teachers and students which will end with the process of evaluation as a results of the study. The learning process is also interpreted as a process of interaction between teachers and students as an attempt to reach the learning objectives, which takes place in a particular location and within a specific time.

In the overall educational process at school, learning is the most important activity. This means that the successful achievement of the education objectives depend on how the process of learning can take place effectively. Understanding a teacher in understanding learning will greatly affect the way teachers teach [4].

In a way to make the learning activities process comply with education purpose, the teaching learning process activities have to prepared well by the teachers and this plan named RPP (Rencana Penyelenggaraan Pembelajaran). RPP is a learning scenario would be implemented by the teacher in class and in the specified time interval. This plan functioned as a teacher's tools in implement and evaluate students learning activities.

In addition, teachers are also required to have a good learning strategies in order to produce an effective learning process. Vienna Senjaya (2008) suggests that Strategy Learning is a learning activity to do the teachers and students to learning objectives can be achieved effectively and efficiently. One of a good learning concept is create a creative learning strategy. [5]

Indicators in the teaching learning process [4]:

- Absorption of the students towards learning materials or knowledge (student's achievement index)
- Students change in behavior and attitudes.

2. Teacher Competencies

Competencies are the skills and knowledge that enable a teacher to be successful. To maximize student learning, teachers must have expertise in a wide-ranging array of competencies in an especially complex environment where hundreds of critical decisions are required each day. Few jobs demand the integration of professional judgment and the proficient use of evidence-based competencies as does teaching. [6]

There are two problems with this description of the concept of competence: Firstly, it tries to set cognitive standards for behaviours that cannot be standardized. Secondly, from a research point of view, competences make up a sub-category of cognitive skills; the idea of "competence" as a distinct category different from "cognitive skills cannot be sustained."
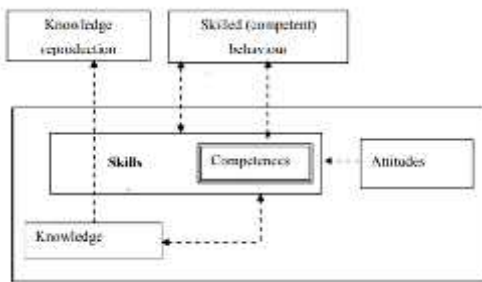
Figure 2 Competences as sub-skills

However, this debate about the description does not mean that the term competence should not be used. The term might also be reserved to indicate that the associated knowledge and skills originate. from a professional practice. But when all is said and done the only determinants of human abilities are knowing (the cognitive), feeling (attitudes) and doing (skills) [6].

In a much broader sense, competence is a highly valued quality that accounts for the effective use of knowledge and skills in specific and concrete contexts. The mastery of relevant knowledge and skills alone is no guarantee of successful performance in complex environments. Individuals should be able to select from their available knowledge and skills in such a way that efficient and effective behaviour occurs which requires special "abilities" that take into account the characteristics of a specific context [6].

To measure the teacher's competencies in order to determine the teacher's performance in teaching learning process used the following indicators [8] :

- Pedagogic
- Personality
- Professional
- Social

3. Information technology in teacing learning process

Information and communication technology (ICT) is a crucial element in the life of nation and State. The role of information technology on human activity at this time is very important. Information technology has become the main facilities for the activities of the various sectors where technology functioned as a changes to the structure and operation of organizational management, education, transport, health and research. [9]. Therefore it is very important to the company to upgrade human resources (HR) in mastering information technology, ranging from skills and knowledge, planning, operation, maintenance and surveillance, as well as

increasing the ability of ICT leaders in government institutions, education, Enterprise, SME (small medium enterprise), and ect.

The development of information and communication technology has given influence to the world of education particularly in the learning process. In the world of education, the existence of information and communication systems is one of the components which cannot be separated from the educational activities. Educational institution must have the components needed to run operations education, such as students, facilities and infrastructure, organizational structure, processes, human resources (educators), and the cost of operation. Whereas communication and information system in education consists of supported components to provide the information required as decision makers while doing educational activities. Furthermore, the rule of information and communication technologies in education can be conclude as following :

- Information technology as a skill (skill) and competence
- Information technology as the infrastructure of education
- Information technology as a source of teaching materials
- Information technology as a tool and educational facilities
- Information technology as education managemet tool
- information technology as a decision support system

3. METHODOLOGY

This research conducted at Esa Sejahtera School Pekanbaru. The design of this research employs descriptive research. Descriptive research is the study of problem society as well as the procedure that apply in the community and specific situation, including on relation activities, attitudes, views, ongoing processes and the effect of phenomenon.

Data were gathered via an anonymous questionnaire. In an introductory section, participants were acquainted with the aims of the study and asked to participate by filling out the questionnaire. The questions obtained from the variabel's indicator.

The populations in this research are all teacher at Esa Sejahtera School with total 53 respondents. Based on the number of population that allows it to be taken as whole as a sample (census sample).

Data analysis technique of this research use validity and reliability test for the whole question item in research questionnaire. Thus, this research conducting hypothesis tests (path analysis) for direct and indirect influence between dependent and independent variable.

4. RESULT AND DISCUSSION

1. Structural Model Test

Tabel 2. The Significance Test Result for Direct Effect

Direct Effect	Path Coefficient	$t_{statistic}$	Sig.
X1 to Y1	0.740	10.881	0.000
X1 to Y2	0,923	2.754	0.033
Y1 to Y2	0,521	3.865	0.000

Source : Primary Data Processed

Based on the table above, it can be concluded several thing as follows:

a. Information Technology directly has positive influence on teacher competencies. It is proved by path coefficient value is 0.740 and t-statistic value is 10.881. t-statistic value is higher than t-table (10.881>2.009) which mean that Ho is rejected or information technology (X1) significantly influence on teacher competencies (Y1) at 0.740 indicating the higher value of information technology will lead the higher value of teacher competencies.

b. Information Technology directly has positive influence on teaching learning process. It is proved by path coefficient value is 0.923 and t-statistic value is 2.754. t-statistic value is higher than t-table (2.754>2.009) which mean that Ho is rejected or information technology (X1) significantly influence on teaching learning process (Y2) at 0.923 indicating the higher value of information technology will lead the higher value of teaching learning Process.

c. Teacher Competencies directly has positive influence on teaching learning process. It is proved by path coefficient value is 0.521 and t-statistic value is 3.865. t-statistic value is higher than t-table (2.754>2.009) which mean that Ho is rejected or teacher competence (Y1) has significantly influence on teaching learning process (Y2) at 0.521 indicating the higher value of information technology will lead the higher value of teaching learning Process.

Tabel 3. The Significant Test Result for Indirect Effect

Indirect Effect	Aroian Test					t_{tabel}
	A	B	Sa	Sb	z-value	
X1 to Y2 through Y1	0,74	0,52	0,08	0,11	6.67	2.009

Based on the table above, it can be concluded that the effect of information technology (X1) on teaching learning process (Y2) through teacher performance (Y1) and it is proved by z value is more than t-table (6.67>2.009).

The result of this research show that the key success of teaching learning process is part of the impact of teacher competencies. It means, student learning success can be seen from the quality or changes that shown by the student after following teaching learning process. An important factor influencing whether learning activities effectiveness have a positive impact on outcomes for students is the extent to which those outcomes form the rationale for, and ongoing focus of, teacher engagement. Such a focus requires teachers to understand the links between particular teaching activities, the ways different groups of students respond, and what their students actually learn.

Further, according to the research finding by Rosdiana (2016) where the effectiveness of the learning process is the influence of teacher's competence and commitment to teaching. In this case, the level of teacher's competencies can support the teacher's performance in order to provide quality of learning process. This research also in line with the opinion of Carl Rogers that suggests the practice of education operates on in terms of teaching. He asserted that the professionalism the teacher is very necessary to support improvement in the achievement of the learning results [10].

Moreover, one of the key success of teacher's competencies is ability in use of technology. The existence of technology can enable teachers to transform their teacher practices, given a set of enabling conditions. Teachers' pedagogical practices and reasoning influence their uses of technology, and the nature of teacher's technology use impacts student achievement. The most effective teacher uses of technology can challenge the students to understanding and thinking, either through whole-class discussions and individual/small group work using technology. Technology are seen as important tools to enable and support the move from

traditional 'teacher-centric' teaching styles to more 'learner-centric' methods [11].

5. CONCLUSION

The conclusion that can be drawn from this research is to create an effective learning process and produces a good student's achievement, school need to improve their teacher's competencies. Competent teachers is based on the ability of pedagogic, social abilities, professional abilities and personal ability. The ability of teachers in using information technology gave an impact in the development of the learning process at the present time where the use of information technology is able to create competence of teachers in support and provide a creative teaching learning process and learn the students to be able in preparing themselves with their technological capability.

Along with the conclusions, propose the following suggestions: (1) the school management should monitor the performance of teachers through classroom observation, laboratory and workshop and to gather information from students about the implementation of learning, and the results are returned to the council inform the teacher, (2) the school management should be provide teacher with the technologies facilities and training in order to improve the teacher's ability in use of technology.

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IMPLEMENTATION OF PROJECT BASED LEARNING MODEL IN COURSE WEB DESIGN

Muhammad Sabir Ramadhan[1], Neni Mulyani[2], Muhammad Amin[3]

Faculty of Engineering, Universitas Negeri Padang, Indonesia

ABSTRACT: One of the main competencies of STMIK Royal Kisaran graduates is able to design the web properly. Web Design course aims to train students to be able to transform the concept of planning a web into the picture. One of the obstacles encountered in the course is the concept and drawings made by students often do not match the theme of the web. This study aims to develop a project-based learning model so that student design results more in accordance with the theme of the web that will be made. The activities of this research will be done by classroom action research through the following stages: (1) Pre test, (2) er Planning learning, (3) Implementation of learning model project based learning, (4) Monitoring and evaluation, to see (test) modeling, (5) Reflection and revision, (6) Implementation of learning in the next cycle, and (7) Evaluation of learning outcomes. This research was conducted for four months in 2017 by taking a location at STMIK Royal Kisaran. The subjects of this study are students who take Web Design courses. Data analysis used is descriptive qualitative and descriptive statistic. The results of this study are: (1) Implementation of project based learning model proven to improve the process and student learning outcomes in the course of Web Design through the assignment of web image planning in accordance with the theme of the web. The tasks are delivered each time face to face and improved on the next face-to-face based on feedback delivered by the lecturer, (2) Learning based project model learning will be easier implemented if accompanied by web that has been applied in real condition online.

Keywords: Project Based Learning, Web Design, Constructivist Learning Theory, Peer Tutor

1. INTRODUCTION

In a globalized world, competition in various fields is getting tighter. Only people who have competence will be able to survive in competition. Competition in the world of education is also inevitable. That is why STMIK Royal Kisaran started the process towards leading universities (PTU). In order to improve the quality to PTU, STMIK Royal Kisaran requires various efforts, both in academic excellence, as well as on quality improvement efforts on all aspects of campus activities. Improving the quality of learning both in terms of materials, processes, and evaluation is one of the main factors to be done in academic excellence.

One of the activities to support the PTU program is improving the quality of learning, including on Web Design courses. Juridically, Web Design courses at STMIK Royal that weighs 3SKS is the underlying subject of courses such as Web Programming, Android Programming as well as other subjects that require drawing and design skills using computer software. The software used to create images in the course of Web Design is Adobe Photoshop CC while for designing web content using Adobe Dreamweaver CS.

Ideally, a STMIK Royal graduate student is required to have the ability to draw and design web content by using an adequate Adobe Photoshop and Dreamweaver program. Every field of work that requires graduate students of computer science always demands the ability tobe able to do it with a computer. Therefore, the ability is an absolute thing that must be mastered by STMIK Royal students. From pretest observations through the pretest it is known that the competence of students who follow the course of Web Design is very large standard deviation.

As many as 30% of students are in good level of competence, 40% are in sufficient level of competence and 30% are in very low category category. This condition causes difficulties for lecturers in implementing learning.

If the learning starts from the basic level, it can be ascertained that students who already have good competence will feel bored, bored and did not get additional knowledge despite attending college. Conversely, if the learning is done at a high level, then students who are still low competence can certainly not follow the lecture, given the course of Web Design is a practice course that requires a structured skill.

Ideal learning is student centered, students will try to construct their own knowledge and actively engage in seeking information (Permendiknas No. 22, 2006). One of the learning that is expected to be able to overcome the problem is through Project Based Learning (PBL) approach. The focus of the PBL lies in the core concepts and principles of a study discipline, engaging students in problem-solving investigations and other meaningful task activities, giving students the opportunity to work autonomously to construct their own knowledge, and

culminate it in real products .

PBL is an innovative learning that emphasizes contextual learning through complex activities. Project-Based Learning (PBL) is a learning tool designed for complex issues that students undertake to investigate, to emphasize learning with long activities, the tasks assigned to students are multi-disciplinary, product-oriented. Tresna Dermawan, et al, (2008: 30) explains that PBL is a systematic learning method, involving students in learning knowledge and skills through a long and structured inquiry and structured process of authentic and complex questions and carefully designed tasks and products.

According to Mahanal and Wibowo (2009) PBL learning generally has step guidance: Planning (Planning), Creating (creating or implementing), and Processing (processing). PBLs assist students in learning solid knowledge and skills that are built through authentic tasks and tasks. The learning, environment, content, and tasks that are relevant, realistic, authentic, and present the natural complexity of the real world are able to provide students' personal experience of student objects and information obtained by students bringing suggestive messages strong enough.

The project-based learning approach is supported by constructivist learning theory. Constructivism is a broadly supported learning theory that rests on the idea that students build their own knowledge within the context of their own experiences. The possibility of conveying ideas, listening to other people's ideas, and reflecting on one's own ideas on others' ideas, is a form of individual empowerment experience. Project based learning is a model learning effective for learning in vocational education (Jalinus, et al. 2017)

Interactive process with colleagues that help the process of construction of knowledge (meaning-making process). According to this view social transactions play a very important role in the formation of cognition (Richmond and Striley, 1996). According to I Wayan Santyasa (2006: 12) Project Based Learning can be applied by following five main steps, as follows.

(1) Define project theme. The project theme should meet the following indicators: (a) contains general and original ideas, (b) important and interesting, (c) describes complex problems, (d) reflects the relationships of ideas, (e) prioritizes ill-defined problem solving.

(2) Establish learning context. Learning contexts should meet the following indicators: (a) project questions address real-world problems, (b) prioritize student autonomy, (c) conduct inquiry in community context, (d) students are able to manage time effectively and efficiently; (e) students learn full of self control, (f) simulate work professionally

(3) Planning activities. Learning experiences related to project planning are as follows: (a) reading, (b) researching, (c) observation, (d) interviewing, (e) recording, (f) visiting project-related objects, (g) internet access .

(4) Processing activities. Indicators to process activities include: (a) sketching, (b) describing the analysis, (c) computing, (d) generating, (e) developing prototypes.

(5) Application of activities to complete the project. The steps taken are: (a) trying to work on the project based on the sketch, (b) testing the work done and the results obtained, (c) evaluating the results already obtained, (d) revising the results already obtained, (e) recycling other projects, (f) classifying the best results.

Some principles that must be followed in the implementation of project based learning according to Thomas (2000: 3): (a) centrality, (b) driving questions, (c) constructive investigation, (d) autonomy, and (e) realism, with explanation as follows:

(1) Centrality

The centrality principle asserts that project work is the essence of the curriculum. This model is central to learning strategies, where students learn the key concepts of knowledge through project work. Therefore, project work is not an additional practice and a practical application of the concept being studied, but rather being central to classroom learning activities.

(2) Driving Questions

The principle of the driving questions means that the project works focuses on "questions or problems" that can encourage students to strive for the key concepts or principles of a particular field. The link between conceptual concepts and real activity can be found through the questioning or by giving a problem in the form of a weak definition.

(3) Constructive Investigation

The principle of constructive investigation (constructive investigation) is a process that leads to the achievement of goals, which contain inquiry activities, concept building, and resolution. In the investigation contains the process of designing, decision-making, problem discovery, problem solving, discovery, and model formation. In addition, in this project-based learning activities must include the process of transformation and construction of knowledge.

(4) Autonomy

The principle of autonomy in project-based learning can be defined as the independence of students in implementing the learning process, which is free to choose their own choice, work with minimal supervision, and responsible.

(5) Realistic (Realism).

The principle of realism (realism) means that the project is something real, not like in school (Suhartadi, 2001). Project based learning should

be able to give students a realistic feeling, including in choosing the topics, tasks, and roles of work context, work collaboration, product, customer, and product standard.

Based on the above description, the problems that need to be solved are:

(1) How is the implementation of the project based learning model in the course of Web Design ?

(2) How is the development of a suitable project based learning model implemented in the course of Web Design ?

METHOD

The research design used is in the form of classroom action research (PTK). The purpose of this study is to improve the quality of learning at STMIK Royal, especially in Web Design courses. In this case, researchers go directly to the classroom from diagnosing the difficulties encountered in the learning process and formulating action plans, implementing lessons, monitoring the action process, reflecting and improving the action process, and evaluating the results of the action or the effectiveness of the model. The activities of this research will be conducted through the following stages:

(1) Pre-test.

(2) Learning planning.

(3) Implementation of learning model project based learning.

(4) Monitoring and evaluation, to see (test).

(5) Reflection and revision.

(6) Implementation of learning in the next cycle.

(7) Evaluation of learning outcomes.

The subjects of this study are students who become the participants of Web Design subjects that taken care of researchers. The time in this study was allocated for six months in 2016 by taking a location at the STMIK Royal Multimedia Laboratory. As a tool for monitoring are:

(1) Face-to-face presences in teaching and learning process,

(2) Monitoring sheets used to record student's creativity level, competency achievement, motivation and obstacle / difficulty encountered in training, and

(3) Which is used to record the value of training and tests. Technique of data retrieval done by direct observation in class by researcher herself with assisted member of researcher, and do test. In addition, data collection is also done through unstructured interviews to capture information that can not be obtained through observation.

RESULTS AND DISCUSSION

This research aims to apply and develop a model of learning based learning on Web Design courses at STMIK Royal Kisaran.

The research was carried out in the even semester of 2016/2017 located at STMIK Royal Multimedia Laboratory which has complete facilities to carry out Web Design lecture. Cycle 1 is implemented using the main web page image, page 2 and page 3 and so on which includes 3 meetings with 4 hours of face-to-face duration of each meeting. From the pre-test results it is known that there are 30% of students are in good competence level, 40% are in sufficient level of competence and 30% are in very low category level. These conditions cause difficulties in implementing learning. If the learning starts from the basic level, it can be ascertained that students who already have good competence will feel bored, bored and did not get additional knowledge despite attending college. Conversely, if the learning is done at a high level, then students who are still low competence can certainly not follow the lecture, given the course of Web Design is a practice course that requires a structured skill.

Therefore, in this study carried out the implementation of project based learning that begins with the image planning for the main page of a dvd movie sales web. Lecturers provide a framework of rules outline that must be followed by students. The detailed provisions are submitted to the students to find information directly or indirectly on the dvd movie sales store. The information in question can be obtained through direct observation in the field and observation via the internet. From cycle 1 in general it can be concluded that the learning project based learning on the course of Web Design has been running, but the results have not been in line with expectations. Although the main target of this study is on student achievement in the form of the value of practice results, but the impact of accompanist as stated in the observation table is also a component that will be improved through this research. Therefore it is necessary to do the second cycle by making improvements of what is the constraint in cycle 1. Constraints are still found in sub indicators: content, activities, conditions and results.

Implementation of project based learning in computer courses in cycle 2 is done by making improvements as follows: (a) Need to be redesigned learning so that students are not toofocused on how to use tools in Adobe Photoshop and Dreamweaver, but more focused on its use to create images intended for web pages. (b) Need to do peer tutors to facilitate the learning process. (c) Feedback to students needs to be done as quickly as possible. (d) Students need to be conditioned to keep a close watch on real conditions in the world of work, especially in web sales projects.

Implementation of cycle 2 in this research is done through material: background color detail, main menu, background image and displayed text. Lectures in cycle 2 are held for 4 times face to face

with a duration of 4 hours each face to face. The research procedure is still carried out using classroom action research by making improvements as described in the above cycle 2 planning.

The results of the learning design along with the level of student achievement for cycles 1 and 2 as in Table 1andTable 2 as follows:

Table 1. Learning Design Results along with Level of Student Achievement for Cycle 1

No	Indicator	Sub Indicator	Results
1	Project theme	a. Conformity with the course	The project is in the form of a main page plan of dvd movie sales web that is drawn using Adobe Photoshop CC 2013 program and designed its contents using Adobe
		b. Conformity with the employment needs	Terms of reference using www.tokosalman.com web that has been completely done and operated. So the task given to the students is very appropriate with the conditions that occur in employment at this time.
2	Contents	a. Problems are complex	Lecturers only give outline framework to students. For more detailed planning submitted to the students.
		b. Students think comprehensively	Students are required to be able to plan according to web themes and web design rules.
		c. Students motivation	Students who have early skills in the "good" and "enough" categories have high motivation to complete the task. However, students who have low "early" skills tend to be less motivated to think complexly about a given task. They tend to be more motivated to be able to use Adobe Photoshop and Dreamweaver programs, and ignore the planning task.
		d. Student interest in the problems raised	Students who have early skills in the "good" and "fair" categories also show a sense of interest in the issues that arise when planning the web. For students who have low "early" skills tend to be less interested in planning problems, as their concern is more on tools in Adobe Photoshop and Dreamweaver programs.
3	Activity	a. Investigation by students	Students are mostly actively investigating www.tokosalman.com, whether done directly through the purchase of dvd film or observing the pages on the web.
		b. Problem solving by students	When students encounter problems in the planning process then it is advisable to find a solution through observation of the actual web page. If they still have not found the solution then assisted by lecturers. In cycle 1 most of the students are experiencing
		c. Students connect the interrelationship between their ideas	The link between students ideas in cycle 1 has occurred, but there are still errors in connecting and students have not done any deep analysis.
		d. Students use the real equipment	The equipment used in this lecture is the same as the equipment used in the world of work to create web page main page planning, using personal computer with Adobe Photoshop CC and Dreamweaver program.
		e. Students do feedback	Students feedback is still small. This is because students have not done much in-depth analysis, so often unconsciously make mistakes in designing the image.
4	Condition	a. Students position themselves according to the role that is run in the employment needs (planner)	Students who have early skills in the "good" and "enough" categories can already play the role of planners in completing their tasks. However, students with low "early" skills tend to be less able to play the role of planners, and learn more using tools in Adobe Photoshop CC and Dreamweaver programs.
		b. Time management by students	The time given to the students to complete each task is 4 hours face to face. If not completed then given the extension of time of completion outside of face-to-face in accordance with the competence of each student.
		c. Student self evaluation	In the 1st cycle of self-evaluation most of the students have not run. Self-evaluation is only under way if the lecturer gives a lure to his work, especially for students who have
		d. Students work simulation	The working simulation in cycle 1 is not yet visible. Many students are at the stage of understanding the functionality of Adobe Photoshop and Dreamweaver tools rather than
5	Results	a. Output of work product	Average achievement of product of student work on cycle 1 equal to 74,79.
		b. Self assessment by students	*Self assessment* by students on cycle 1 has not run smoothly because students are still difficult to understand correctly the standards set by the lecturer in making the main page
		c. Students responsibility	All students have shown their responsibilities that are visible from their seriousness in doing the task. The lecturer has given explanation to the students that each meeting
		d. Student competencies include: social skills, majanement and techniques	Students social skills from the beginning have looked good, but for management skills and techniques especially for time management can not do well.

Table 2. Learning Design Results along with Level of Student Achievement for Cycle 2

No	Indicator	Sub Indicator	Results
1	Project theme	a. Conformity with the course	The project continues to use the main page plan of dvd movie sales web that is drawn using the Adobe Photoshop CC 2013 program and designed its contents using Adobe Dreamweaver CS6.
		b. Conformity with the employment needs	The terms of reference still use web tokosalman.com which is completely finished and operated. So the task given to the students is very appropriate with the conditions that occur in the employment needs at this time.
2	Contents	a. Problems are complex	Lecturers only give outline framework to students. For more detailed planning is left to the students.
		b. Students think comprehensively	Students can begin to plan according to web function and rules web planning.
		c. Students motivation	Students are already motivated to think complexly about that task given. For students whose initial ability is low still has a high enough
		d. Student interest in the problems raised	Students show interest in the problems that arise at the time of web planning dvd movie sales. Lecturers give flexibility to the students to perform improvisation in order to channel innovation and student creations.
3	Activity	a. Investigation by students	Students are mostly actively investigating www.tokosalman.com, whether done directly through the purchase of dvd film or observing the pages on the
		b. Problem solving by students	The problems faced by students are mostly solved by conducting fellow student discussions. Only a small part of that despite the discussion has not found the answer to the solution.
		c. Students connect the interrelationship between their ideas	The linkage between student ideas has gone well accompanied by in depth analysis through fellow student discussions.
		d. Students use the real equipment	The equipment used in this lecture is the same as the equipment used in the employment needs to create images of web dvd film sales planning, which is using personal computer with Adobe Photoshop CC and Dreamweaver
		e. Students do feedback	Students always make improvements on the tasks that have been submitted to the lecturer. Lecturers always convey suggestions on the tasks of students who are not in accordance with real conditions in the needs of employment
4	Condition	a. Students position themselves according to	Students can already play a role as a planner in completing the task while learning to use tools in the program Adobe Photoshop CC and Dreamweaver.
		b. Time management by students	The time given to the students to complete each task is 4 hours face to face. If not completed then given the extension of time of completion outside of face-to-face in accordance with the competence of each student.
		c. Student self evaluation	Students have been able to conduct self-evaluation based on suggestions given by the lecturer on tasks that have been collected previously.
		d. Students work simulation	The work simulation in cycle 2 is already visible. The student begins to show his performance as a planner.
5	Results	a. Output of work product	Average achievement of student work product in cycle 2 is 80.52.
		b. Self assessment by students	Self assessmentby students is already running well. Student already can estimate the value that will be obtained when collecting tasks based on the criteria assessed by the lecturer.
		c. Students responsibility	All students have shown their responsibilities that are visible from their seriousness in doing the task. The lecturer has given explanation to the students that each meeting should collect the assigned task.
		d. Student competencies include: social skills, majanement and techniques	Student social skills from the beginning look good. Time management has been shown by the students. Student's technical competence has shown improvement.

From cycle 2 in general can be concluded that the learning project based learning on the course of Web Design has been running well, and the results are in line with expectations. The main target of this research to improve student's learning achievement has been successful. Similarly, the impact of accompanist as set forth in the table of observation has also shown results as expected. Through this research can be concluded that the implementation of project based learning in the course of Web Design can increase achievement student learning.

The learning model will be more suitable for the course of Web Design after the following development:

(1) The project theme uses the main competence of the Web Design course, which is making a web planning picture of dvd film sales.

(2) The contents of the lectures are designed so that students can analyze the problems they encounter while performing the task. The analysis is done based on realconditions in the field. (3) Student activities are designed to be active, innovative, creative, effective and fun. Peer tutor models can be used to support student learning activities. (4) The condition of the learning process should always be monitored by the lecturer, not just focus on the learning outcomes. (5) The result of the learning process is always comparable with real condition in the field by giving understanding - understanding through analysis to the students

CONCLUSION

Implementation of learning-based project learning model proved to improve the process and student learning outcomes in the course of Web Design through the assignment of web image planning dvd film sales by referring to real conditions in the field. The tasks are delivered every time face-to-face and improved on the next face-to-face based on feedback delivered by the lecturer. Learning based project model learning will be easier implemented if accompanied by peer tutor model.

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MEASUREMENT MODEL OF CONTRIBUTED FACTOR AND INDICATOR TOWARDS VOCATIONAL EDUCATION PRODUCTIVITY

Mulianti[1], Ambiyar[1], Generousdi [2] and Rodesri Mulyadi[1]

[1]Department of Mechanical Engineering, Faculty of Engineering, Universitas Negeri Padang
[2]Kopertis X seconded to STITEKNAS Jambi.

ABSTRACT: This study aimed to: (1) identify the validity and reliability of indicators of factors that contribute to the productivity of vocational education; (2) create measurement model of contributed factors and indicators to the productivity of vocational education.The data were collected by using instruments that have been tested for validity and reliability. The research population is Diploma III graduates of vocational education from the Engineering Faculty of Universitas Negeri Padang and Padang State Polytechnic. Sampling technique used was simple random sampling, in which the respondents were 395 graduates from Diploma III of vocational education from Faculty of Engineering of Padang State University and PadangState Polytechnic. Data were analyzed with LISREL 8.80 in the form of normality test and multicollinearity test and were continued with asymptotic covariance matrix estimation and confirmatory factor analysis.The results of the research showed that there were 23 valid and reliable indicators in reflecting the six variables; they were managerial leadership, with idealized influence, inspirational motivation, intellectual stimulation, individualized consideration; academic atmosphere with physical environmental indicators, learning environment, and academic environment; lecturer competence with pedagogic competency indicator, professional competence of personality competence and social competence; learning system, with learner-focused, worker-focused, attribute-oriented indicators; the process of learning with quality information data indicator, learning quality, curriculum quality, resource quality; and productivity of vocational education, with indicators of graduate quality, management quality, internal efficiency, external efficiency, and income.

Keywords: *Productivity, Managers' Leadership, Academic Atmosphere, Lecturers' Competencies, Teaching Process, Productivity*

1. INTRODUCTION

This study is based on the issue of vocational education productivity that needs to be improved. It can be seen from the low productivity figures, the problem of unemployment, relevance, on-time graduation, public trust, graduate quality and others. Based on these productivity issues of vocational education, it is important to identify the problem in the form of factors and any indicators that contribute towards the productivity of vocational education. There was a previous research on school productivity in vocational [18], but it was still partial and there was not any similar research in vocational higher education.

This study aims to reveal the measurement model of indicators of vocational education productivity factors and variables that affect the productivity of vocational education comprehensively. It means that the model is created by specifying a hybrid model as a confirmatory factor analysis model (CFA), so the resulting model is a model of a whole set of indicators that reflect each variable in relation to the competence of graduates. The detail purposes of this study are (a) to analyze the productivity measurement model of Vocational education, including variables and indicators that contribute to productivity Vocational education; (b) to identify the validity and reliability of the factors and indicators that contribute to productivity vocational education.

2. RESEARCH METHOD

The study involved 395 respondents, who200 graduated from D3 Faculty of Engineering, Universitas Negeri Padang and 195 graduated from State Polytechnic of Padang.

2.1. Data Analysis

2.1.1. *Screening data*
Before performing a confirmatory factor analysis (CFA), a data screening was performed to provide descriptive data description to ensure that SEM assumptions were normality and multicollinearity.
   - Measurement Model Analysis/ Confirmatory Factor Analysis (CFA).
The measurement model in this study modeled the hypothesized correlation between the latent variables of managerial leadership (Man lead), academic atmosphere (Atmosac), lecturer competence (Lectcomp), learning system (Teachsym), process of learning and productivity of vocational education (Product) by observing 23

variables, based on substance and literature study. Then, the measurement model analysis/ Confirmatory Factor Analysis (CFA) was done, where the measurement model confirm whether the observed variable indeed reflected latent variables. The analysis phase includes model specification, data collection, making a simple program, running programs with LISREL 8.8, and output analysis.

Analysis of output, in general, is to examine the offending estimate (including negative error variance / Heywood cases); standardized loading factor >1,0; and a large standard error. If there was, then respecification model was needed.

- Analysis of the validity of the measurement model.

- The test of Goodness of Fix Index is conducted through checking the value of chi-square, p-value, RMSEA, Standardized RMR, GFI, AGFI, NFI, NNFI, CFI and others shown on the Goodness of Fit Statistics.

-The reliability analysis of the measurement model is done by calculating the construct reliability (CR) and the variant extracted (VE) values of standardized loading factor and variance error with the following formula [7]:

$$CR = \frac{(\sum s \cdot l\langle\ )^2}{(\sum s \cdot l\langle\ )^2 + \sum e_j} (1)$$

$$V = \frac{\sum s \cdot l\langle^2}{\sum s \cdot l\langle^2 + \sum e_j} (2)$$

with:

$\sum e_j = error measurement$ for each indicator

A construct has good reliability if the value of construct reliability (CR) $\geq$ 0.70 and the value of variance extracted (VE) $\geq$ 0.50 [9].

3. FINDINGS AND DISCUSSION

3.1. Confirmatory Factor Analysis (CFA).

The determination of observed variables consisted of 23 variables, has been done based on the literature study. Furthermore, the measurement model confirmed whether the observed variable was indeed a measure/reflection of a latent variable. Therefore, Confirmatory Factor Analysis (CFA) was conducted.
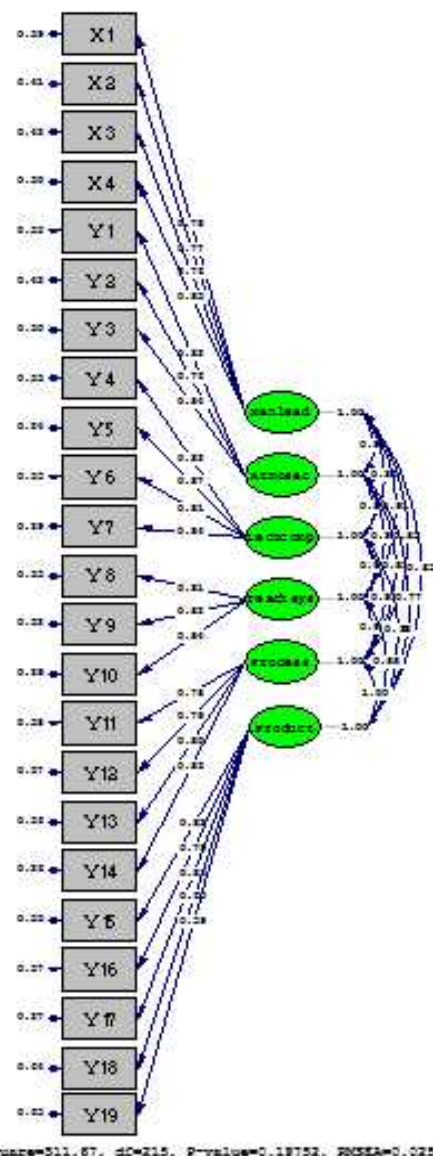
Figure 1.Measurement Diagram Model of Determinant Factor of Vocational Education Productivity (standardized solution).

There were several steps in analyzing the model towards the output, as follows.

3.1.1. *Preliminary analysis of the estimation results.*

The first step was analyzing the existence of offending estimate, namely the existence of negative error variance (Heywood cases) and standardized loading factor > 1.0, and the value of the standard error was very large. The observation results showed that there was not any negative error variance or standardized loading factor which was > 1.0. The value of variance error was observed based on Output, and there was not any negative variance error found.

3.1.2. *Analysis of the measurement model validity*

The measurement model validity was analyzed by using two ways, as follows: a) examining the t-value of the loading factor of the observed variable. A variable has a good validity to the construct or latent variable if the t-value of its loading factor is greater than the critical value (or ≥ 1.96 for the 5% significance level). [13] and [5]. From Figure 2, it can be seen that from all observed variables, there was not-value which was smaller than 1.96. The smallest value was 7.374 at Y19; b) Performing a Standardized loading factor (λ) check of the observed variables in the model, whether the value was ≥ 0.70 [13], or ≥ 0.50 [11], where the standardized loading factor values can be seen in the standardized solution in Figure 1 or the printed output section incompletely standardized solution. The observation of validity analysis shows that all the standardized loading factors (λ) of the observed variable were ≥ the cut off value set, i.e ≥ 0.50. In relation to the measurement model validity, the observed variable having t-value < 1.96 or standardized loading factor less than the selected cut-off value of ≤ 0.70 or ≤ 0.50 was excluded (or not included in the model), or in other words, the observed variable was removed from the model. Based on the validity analysis, it could be stated that everything was ≥ of the cut-off value specified. From both the validity analysis of output, it is concluded that the result of factor load estimation from the model is valid.

3.1.3. *Model overall fit analysis.*

From the Goodness of Statistic analysis, it was observed that the matching index, Normed Fit Index (NFI) = 0.974, Non-Normed Fit Index (NNFI) = 0.990, Parsimony Normed Fit Index (PNFI) = 0.928, Comparative Fit Index (CFI) = 0, 99, Incremental Fit Index (IFI) = 0.992, Relative Fit Index (RFI) = 0.969 (all were ≥ 0.90, good model matches [3] RMSEA 0.0256 (≤ 0.05) this indicates a good fit model [3].The value of Standardized Root Mean Square Residual (SRMR) 0.0269 (≤ 0.05) indicates a good fit model while Goodness of Fit Index (GFI) 0.839 is the marginal fit (0.8 ≤ GFI ≤ 0.9 is the marginal Fit according to [13], and the value of Adjusted Goodness of Fit Index (AGFI) 0.793, is also categorized as marginal fit (0.8 ≤ GFI ≤ 0,9 is the marginal fit according to [13]. Chi-Square 311.57 and p-value 0.19702 is a good fit (p-value ≥ 0.05). For values $\chi^2 / df = 311.57 / 215 = 1, 44$ (<2, meet by Meyer, 2013) it means that the overall model shows a good match.
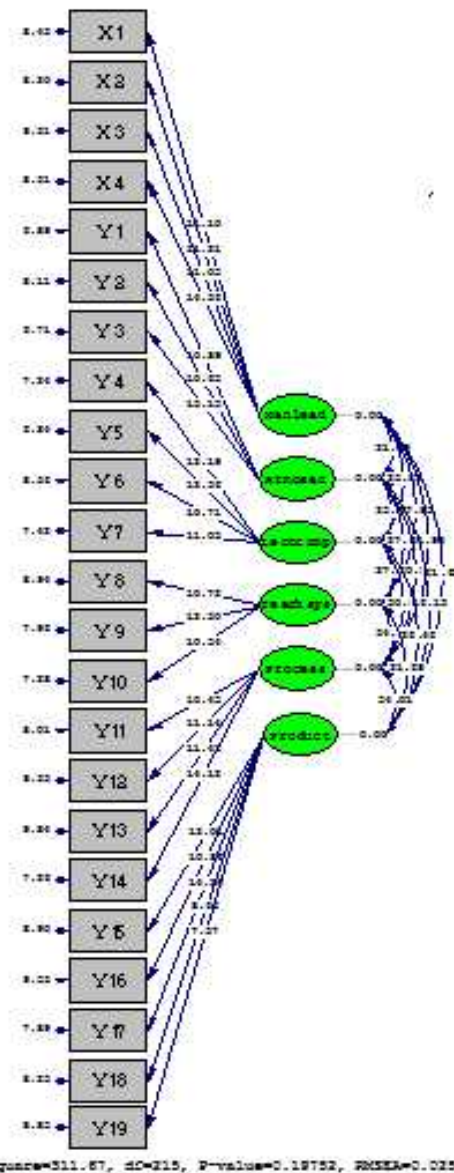
Figure 2. Measurement Diagram Model of Determinant Factor of Vocational Education Productivity (T-value)

3.2. Model Reliability Analysis.

The relationship between observed variables/indicators with latent variables can also be assessed from the combined reliability for each latent variable through construct reliability and variance extracted. The values of standardized loading factors and error variances (errors) were taken from the track diagrams of the printed output of the completely standardized solution title and the LAMBDA-X subtitle (for standardized loading factors) and THETA DELTA (errors), (for error variance). From the calculation results, it was cleared that all values of Construct Reliability (CR) were > 0.70 and Variance Extracted Value was > 0.50. It means that the reliability of the

variables Man lead, Atmos, Lectcomp Teaches, Process, and Product was reliable. A construct has good reliability if the value of Construct Reliability (CR) is ≥ 0.70 and Variance Extracted value (VE) is ≥ 0.50 [9].

In analyzing the reliability of individual indicators, it can be seen from the squared multiple correlations (R2) of the indicator through the LISREL OUTPUT option. R2 explains how much the proportion of the indicator variance was explained by the latent variable, while the rest was explained by the measurement error. From the output, it can be seen that from the latent variable of the leadership of the management, X4 (individual consideration) is the most reliable indicator, followed by X1 (idealized influence), X2 (inspiration motivation) and X3 (intellectual stimulation).

The research findings related to the academic atmosphere variable reveal that Y3 (learning environment) is the most reliable indicator, followed by Y1 (physical environment), then Y2 (academic environment).From the latent variable of lecturer competence, Y4 (pedagogic competence) is the most reliable indicator, followed by Y7 (social competence), Y6 (personal competence), and Y5 (professional competence). Besides, for the latent variables of the learning system, Y9 (work-centered) is the most reliable indicator, followed by Y8 (learner-centered), and Y10 (focused-attributes).

The latent variables of the learning process are Y14 (resources quality); Y13 (curriculum quality); Y12 (learning quality); Y11 (data quality and information). As for the latent variables of educational productivity, Y17 (waiting period) is the most reliable indicator, followed by Y15 (quality of graduates), Y16 (relevance), Y18 (public trust), and Y19 (income).

The relationship between observed variables/indicators with latent variables can also be assessed from the combined reliability for each latent variable through construct reliability and variance extracted. According to [9], a construct has good reliability if the value of construct reliability is ≥ 0.70 and the value of variance extracted is ≥ 0.50. Likewise, [1] state that the cut-off rate to say whether composite reliability is good enough is 0.60. The research findings show that all indicators are reliable, i.e. all indicators provide reliable measures for each latent variable. Based on the discussion above, it can be concluded that based on validity and reliability test (both in terms of individual indicator reliability and composite reliability, through construct reliability measurement and variance extracted), all indicators are valid and reliable, as well as all latent variables are reliable.

Table 1. Construct Reliability (CR) and Variance Extracted (VE

Variable	CR (≥0,70)	VE (≥0,50)	Reliability Conclusion
Manlead	0,866	0,619	Good Reliability
Atmosac	0,848	0,650	Good Reliability
Lectcomp	0,901	0,695	Good Reliability
Teachsys	0,865	0,681	Good Reliability
Process	0,885	0,657	Good Reliability
Product	0,854	0,546	Good Reliability

The explanation of factor or latent variable along with each indicator is as follows:

3.2.1. *Managerial leadership.*

Indicators of the latent variable of managerial leadership adapted from [10], [8], and [2], involve idealized influence, inspirational motivation, intellectual stimulation and individual consideration, with a questionnaire named Multifactor Leadership Questionnaire. The Multifactor Leadership Questionnaire has been used in various countries extensively for the past 20 years, which is valid and reliable for various cultures and types of organizations. According to [10], it is appropriate to be applied to this study, where managerial leadership indicators include idealized influence, inspirational motivation, intellectual stimulation and individual consideration have good validity and reliability to measure leadership constructs of vocational education managers.

The results of calculations and conclusions of validity and reliability for managerial leadership variables show that all indicators were valid (unstandardized t-values were greater than 1.96 and standardized loading has ≥ 0.50) and all indicators were reliable (Construct Reliability value CR) ≥ 0.70 and Variance Extracted Value (VE) ≥ 0.50), in the opinion of [9] and [11]. Therefore, it can be stated that the validity and reliability of managerial leadership variables are good, which means that all indicators are valid and consistent in measuring managerial leadership variables. The indicators for the managerial leadership in this study are: (1) individualized consideration includes giving attention to the individual, respecting differences between individuals, giving advice and direction. Leaders treat the subordinates differently but equally and equitably in order to maintain open contact and

communication; (2) idealized influence/charisma like to synchronize the values expressed through words and the values embodied in action, gain pride, respect, and trust. Leaders are charismatic and have a power and influence. Leaders awaken and encourage academicians with a vision and sense of mission that encourages them to do more effort in achieving goals; (3) inspirational motivation is about to motivate the subordinates, discuss high expectations, use symbols to focus efforts, and express goals. Leadership behavior stimulates the enthusiasm of the subordinates towards the task and can raise their confidence towards the ability to complete the task in achieving the goal; (4) intellectual stimulation includes creating a climate conducive to the development of innovation and creativity, appreciating promotional ideas, developing rationality and solving problems thoroughly. Leaders encourage the development of rationality by considering creative and innovative ways; individualized consideration, giving attention to the individual, respecting the differences between individuals, giving advice and direction. Leaders treat their subordinates differently but equally and equitably in order to maintain open contact and communication.

3.2.2. *Academic atmosphere*
Academic atmosphere variable, which has three indicators namely learning environment; physical environment; and the academic environment, referred to by [19]is proved to be valid and reliable in measuring the variables of academic atmosphere in vocational education. This is evidenced by the results of validity and reliability tests of individual and combined composite test.
Physical environments adopted from [15] are in the form of completeness and feasibility: laboratory equipment and workshop, library; classroom teaching aids; instructional media, textbooks and teaching materials and; facilities and infrastructure, is valid and reliable for this study.

The academic environment referred to [15] and adjusted to the obligations of universities as providers of education, research and community service, the Law Republic of IndonesiaNo. 12 of 2012 in this study proved valid and reliable, as being set in the questionnaire in this study, including full academic support, but all intelligence and competence are supported; high expectations for the success of the academic community; support for academic programs and academic activities of students and lecturers; interaction between lecturers and students through research activities and community service; interaction of faculty and students through seminar, symposium and others.

In accordance with the recommendation from [19], learning environment as an indicator of the academic atmosphere is valid and reliable. The learning environment refers to the social, psychological and pedagogical contexts of learning. Based on the questionnaire, learning environment in this study includes student cohesiveness, educators support, learners involvement in learning, investigation activities, task orientation, student co-operation, and equality.

3.2.3. *Lecturer competence*
The latent variable of lecturer competence, referenced from Law of Republic Indonesia, Number 14 Year 2005 and research result of [14], and [12], (Y5 (professional competence), Y6 (personal competence), and Y7 (social competence) the results of this study has good validity and reliability, proved by the results of validity and reliability test that has been described previously. Therefore, it can be concluded that the four indicators are valid and reliable in measuring the competency variables of vocational lecturers. Indicators of research findings from lecturer competence variable are pedagogic competence, personality competence, social competence, and professional competence, which are also part of the standard for human resources assessment which is contained in the item of BAN-PT, standard 4.

3.2.4. *Learning system*
The approach of the learning system to vocational education refers to the learning that focuses on the development of attribute skills (attribute-focused), learner-centered learning; work-centered learning adopted from [4]. This study was proved as valid and reliable in measuring the learning system variables in vocational education. The meaning of the learning system described in the questionnaire in this study is related to the principles, strategies, and philosophies of vocational education: the learning system is built based on the planning relevant to the objectives, learning and hierarchy. Learning is carried out by using challenging strategies and techniques, encouraging students to think critically about exploring, creating and experimenting with the use of multiple sources. Implementation of learning has mechanisms to monitor, review, and periodically improve lecture activities (lecturers and students attendance), preparation of lecture materials, and assessment of learning outcomes.

3.2.5. *Learning process*
The indicators for latent variable of learning process are the quality of data and information; quality of learning; the quality of the curriculum; and quality of resources, from the results of this study, it is proved that this study has good validity and reliability in reflecting the ability to measure

the latent variable of learning process, based on the results of validity and reliability test. The four indicators are valid and reliable in measuring the factors or variables of the learning process in vocational education. This is similar to the findings of the research conducted by [18].

3.2.6. *Productivity of vocational education*
Constructive educational productivity adapted from [6]; [17]is conducted by asking several questionnaires. Vocational education productivity indicators include the graduates quality; management quality; internal and external efficiency; and income. These five indicators are valid and reliable in measuring/reflecting the factor of vocational education productivity, based on the results of data analysis in this study.

4. CONCLUSION

Based on the research findings and previous discussion, there are several conclusions can be noted as follows:
4.1. The indicators and determinant factors that contribute towards the productivity of vocational education which are proved to be valid and reliable are: (1) managerial leadership: idealized influence/charismatic, inspirational motivation, intellectual stimulation, individualized consideration; (2) academic atmosphere: physical environment, academic environment, learning environment; (3) Learning System: learner-centered; work-centered and focused-oriented; (4) lecturer competence: pedagogical competence, professional competence, personality competence, and social competence; (5) learning process: quality of information data; the quality of learning; the quality of the curriculum the quality of the resource; (6) the productivity of vocational education: the quality of graduates; the quality of management; internal efficiency; external efficiency, and income.

4.2. Measurements Model of factors and indicators that contribute to the productivity of valid and reliable vocational education are shown in Figure 1 (standard solution) and Figure 2 (T value) with the following notation: Manlead = managerial leadership; Atmosac = academic culture; Lectcomp = lecturer competence; Teachsys = learning system; Process = learning process; Product = productivity of vocational education. The indicators are as follows: X1 = idealized influence; X2 = inspirational motivation; X3 = Intellectual Stimulation; X4 = Individualized consideration; Y1 = physical environment; Y2 = learning environment; Y3 = academic environment; Y4 = pedagogic competence; Y5 = professional competence; Y6 = personality

competence; Y7 = social competence; Y8 = learner-focused; Y9 = worker-focused; Y10 = attribute-oriented; Y11 = quality of data and information; Y12 = quality of learning; Y13 = curriculum quality; Y14 = quality of resources; Y15 = quality of graduates; Y16 = quality of management; Y17 = internal efficiency; Y18 = external efficiency; Y19 = income.

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2. ETHICS

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved.

ORNAMENTS ON THE TRADITIONAL ACEHNESE HOUSE IN CENTRAL ACEH, ACEH PROVINCE

N Novita, M Mukhirah, R Dewi, Fitriana, F Noer, F Fadillah, E Erni

Faculty of Teacher Training and Education, Syiah Kuala University, Indonesia

ABSTRACT. This study was aimed to explore ornaments on Traditional Acehnese Houses, to reveal various types of ornaments found in Aceh's traditional house, and express its symbolic meaning in Central Aceh. The method used in this research is Descriptive Method with Qualitative approach. Data were obtained by direct surveys to houses in two districts (Bebesen and Linge), interviewing owners, carpenters, and community leaders. Secondary data were obtained from literatures, manuscripts, and by visiting museums. We found most ornaments are dominated by elements from flora, nature and fauna. As many as eleven ornaments of the Traditional Acehnese Houses which consists of natural elements (5 ornaments), flora elements (5 ornaments), and fauna (1 ornament). The element of fauna that adorns traditional houses is referred to the prohibition in Islam that drawing any living creation which is not allowed in the Islam. Geometric patterns are applied around the engravings and there are limited scholars who have capability in simbolic meanings for the ornaments.

Keywords: Traditional House, ornament, Central Aceh.

INTRODUCTION

Aceh is a special territory of Indonesia, located on the northern tip of Sumatera Island. It is also proudly referred to as the "Port to Mecca", based on the history of Islam first arrived in Aceh before spreading throughout Southeast Asia (Marshal 2007). Aceh was the first area that strongly influenced the culture of Islam in Indonesia, and it is affected a profound effect on all aspects of community life, particularly in law, cultural, and arts.

Central Aceh (Aceh Tengah) is a district in Aceh Province located on higher landscape and it is dominated by a local tribe called Gayo. In addition, language used by this ethnic is different from other common language of Acehnese. Gayo people live in small community which is called *Kampong* (small village) with *Geusyik* as ethnic's leader. Group of several villages is called *Kemukiman* with *Mukim* as a leader. Main living of people in Central Aceh are farming and gardening with coffee as the main output. Moreover, they are also developing handicrafts making ceramics (pottery), wove, and craft weaving (Isnawan dkk, 2009).

Art of craft is being a part of life from Gayo's society which demonstrates the high level of civilization of a society in the past and it can be seen from the relics of handicrafts in the area. One of the typical features of Traditional Acehnese is the diversity of motives placed in certain parts. One of the functions of these ornaments in present is as decorative motif to beautify a certain field.

Ornaments are a group of art products that are added or purposely designed for the need of decoration. Adding ornaments on a product are aimed to make it look more attractive, and more valuable both spiritually and materially. Sometimes, an ornament also contains symbolic values or specific intentions in accordance with the goals and ideas of the maker (Sunaryo 2009).

The purpose of this research is to reveal the various types of ornaments found in Aceh's traditional house in Central Aceh and express its symbolic meaning. The outcome of this research is to preserve the various cultures of the nation and the regions of Acehnese in particular that are increasingly disappearing as a consequent of changing times.

METHODS

Data collection has been done since 2014-2017 in traditional house of Aceh in District of Linge and Bebesan Regency of Central Aceh. A total of two housing units were used as research samples due to the limitations of the traditional aceh house population in this district.

The method used in this research is Descriptive Method with Qualitative approach, as well as data analysis with inductive approach. Descriptive research is aimed to describe a certain condition or phenomena as it is, without doing manipulation or give special treatment to object of research (Sukmadinata, 2007). The qualitative approach is aimed at understanding the aesthetic concept of the ornamental style of society in Central Aceh. Observation method is applied to multiply the data in assembly with the ornaments found in Traditional Acehnese Houses. Documentary study is used to examine various sources and information related to ornaments, as well as Interview Methods as the primary means by using selected persons as a source of evidence in selected research with Purposive Techniques.

To obtain accurate data about various aspects of the material and symbolic meaning contained in an ornament is done with a phenomenological study (Isnawan et al., 2009). Primary data were obtained through direct observation of the various ornaments found on the houses. Interviews were conducted with a number of respondents: owners, museum employees, community leaders, and craftsmen (utoih).

RESULTS AND DISCUSSION
Diversity of Ornaments
The various ornaments found in Traditional Acehnese Houses in Central Aceh Regency are the result of a combination of various elements of life, way of life, religion, customs, community's culture. The presence of ornaments in a particular field serves to decorate and fill certain parts of Traditional Acehnese Houses. Probably some symbol only decorated for special purposes (Saffee and Said, 2013). When viewed from the side of its function, various ornaments can be classified as purely esthetic, and constructive technique.

Variety of ornaments contained in the Traditional Acehnese Houses in Central Aceh District can be classified into two forms, namely (1) Geometry Ornament that has a form composed of straight lines, irregular, and curved. Generally this variety of ornaments is composed of abstract/unclear, half abstract, and figurative. The geometry Ornaments are mostly found on poles, walls, doors, stairs, and ventilations; (2) *Organis* Ornaments is a form of ornaments imaged from objects contained in nature. These ornaments are commonly found on wind, walls, doors, stairs, windows, poles, and door latches. However, the skill of a carpenter becomes crucial to the level of art in designing an ornament.

We identified eleven ornaments of Traditional Acehnese Houses in Central Aceh Regency, which consists of five kinds of natural elements, five kinds of flora/plant elements, and one kind of fauna/animal element. At least the element of fauna that adorns traditional houses relates to the prohibition in Islam that drawing any living creation is not allowed in the religion of Islam. We also found many ornaments obselate and difficult to examined. This condition also similar with wood-carving motif on the traditional bulding in Malay Peninsula (Silah et. al. 2012)

Motif is defined as a design created from various shapes, lines or elements that are sometimes strongly influenced by the stylized forms from natural objects, with style and distinctive characteristics (Suhersono, 2005). The distinctive character on the Traditional Acehnese Houses H is the diversity of motifs that are placed on certain parts as decorative ornaments.

Motifs on Traditional Acehnese Houses in Central Aceh consist of a variety of shapes and patterns. Each motif is created in the design process of from an object, while pattern may be seen as a whole concept within motif of a central theme. In my observation, the perfection in a motif on Traditional Acehnese Houses is produced when the pattern drawn are clear, define, and fit for the form created. For example, the motif of the blooming flower should display the stalk, sepal, petals, and others. Only when it complete, then, a certain composition is considered perfect and beautiful.

Table 1.Ornamen and decorating sites on the ATH in Central Aceh

No	Local Name	Common Name	Category
1	Emun berangkat	Awak berarak	Nature
2	Pucuk rebung	Pucuk bambu	Flora
3	Ulen-ulen	Bulan	Nature
4	Mutik	Putik	Flora
5	Puter tali	Putar Tali	Nature

6	Bumge ni pertik	Bunga pepaya	Flora
7	Bunge kemang	Bunga mekar	Flora
8	Bintang	Bintang	Nature
9	Tapak seleman	Tapak Nabi Sulaiman	Nature
10	Mana ni itik	Mata itik	Fauna
11	Bunge matahari	Bunga matahari	Flora

Actually, motives on the Traditional Acehnese Houses within Central Aceh are very diverse and varied. We need more time and manpower to explore them. In this study, the carpenters (utoih), are most important in understanding of motif meaning so far. Flora's motifs on the houses mostly inspired from plants that growing around the society. In several houses, in order to look more artsy, we found that motifs are combined with the objects from nature. In addition, these motifs are also dominated by geometric patterns such as a triangle, rectangle, rectangular, hexagonal, and others.

Meaning of Symbolic Ornament
The diversity of ornaments found in Traditional Acehnese Houses in Central Aceh regency is very close to the combination of conditions from various elements of customs, religion, social culture, and geography. Ornaments in Traditional Acehnese Houses contained in Aceh Province are grouped into two groups, namely decorations that come from higland area and decoration from coastal area (Barbara, 1995). Various ornaments contained in Traditional Acehnese Houses almost all have a symbolic meaning that is informative, persuasive, and hope for a goal to be achieved. We need more investigation to understanding wether the art of ornament on the Traditional Acehnese Houses either it is intentional purposes or accidental.

From the research results we obtained data about symbolic values on ornaments on Traditional Acehnese Houses in Central Aceh:
1. Ornament of *Ulen-ulen*, is a series of unity of some motifs that are assembled into a unity in the form of a circle, *Ulen-ulen* motive in Gayo society is a symbol of strength that illuminates universe, and enlightenment including the man himself. Ornaments of *Ulen-ulen* is a model that is patterned by using almost all the existing motifs (*Ulen-ulen* ornament is a composition of ornamental Gayo). The ornaments used are not always sequentially by default. Geometric patterns are clearly illustrated by the use of straight lines and curves with a circular wand, thus *ulen* motifs have a geometric shape structure.
2. Ornament of Pucuk Rebung is a *stiliran* motif of "bamboo shoot" which is symbolized as coaching youth by old people and steadfast bond.
3. Ornaments *Tapak Seleman*. This ornament is a symbol of the public belief in the occult, splendor, power, justice and compassion in community. This motif is a representation of the legend of Suleman Prophet who always protect all beings on this earth,
4. Ornament Rope (*Puter Tali*) for Gayo society is a symbol of unity and unity, solidarity, mutual tolerance and feeling of togetherness that must always be fostered.
5. Ornament of *Emun Berangkat* is a symbol of unity and agreement, harmony, happiness and mutual cooperation. This ornament is a representation of clouds clumped and paraded in the sky, clouds are always moving together to follow where the wind blows.
6. Ornament *Mata ni itik* (Lady's duck eye). Duck eye has a meaning that the important people in determining for the life of Gayo community is judge, scholars and clever community.

Color Symbolism
The colors on traditional ornaments are always displayed artistically. There is a similarity in the symbolism of traditional colors covering in the arts of the archipelago. The color that appears in every art is the basic color of the color ornament *item* (black), while for the motive use a mixture of color *Ilang* (red), white (white), ijo (green) and *using* (yellow).

The following description or meaning of the colors used in the ornament on the Traditional Acehnese Houses: Black: the result of custom decisions, Red: as a daring sign (mersik) acts in truth, White: as a sacred sign in the act of birth and mind, Green: as a sign of glory and craft (lisik) in everyday life, Yellow: as a sign of caution (uric) in the act. Therefore, based on the description of the filigree colors, the Gayo Society is represented as a Mersik (brave), Lisik (diligent) and Urik (conscientious) people. Actually ornaments on the Traditional

Acehnese Houses in Central Aceh are very diverse and varied. We need more time and manpower to explore them.

CONCLUSION

1. Ornament on the Traditional Acehnese Houses in Central Aceh are dominated by elements from flora and nature as well as geometric patterns.
2. We found as many as eleven ornamen that consisting of five elements from nature and five elements from flora and one from fauna.
3. Islam is not allowed to drawing any living creation on the Traditional Acehnese Houses.
4. People who understand the meaning of motif is rare and carpenter in Aceh is one of the most understandings of the motifs so far.

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DESIGNING STRATEGY MAPS FOR PRIVATE ENGINEERING COLLEGE

Nanang Alamsyah[1], Larisang[2] and Muhammad Ansyar Bora[3]

[1,2,3]Department of Industrial Engineering, Sekolah Tinggi TeknikIbnuSinaBatam, Indonesia

ABSTRACT: This study aims to design a strategic map for a private engineering college using the balanced scorecard method. There are two objectives: Key Performance Indicator (KPI) identification and KPI weighting. CIPP model is used to complete this study with the input of the study in the form of corporate statement and institutional strategy. Interview method used to determine KPI then continued by filling Analytic Hierarchy Process questionnaire in weighting KPI. There are 22 KPIs selected with distribution: three KPIs in financial perspective with 3.87% weighted value; five KPIs in the perspective of the customer with 47.86% weighted value; 6 KPIs from the perspective of Internal Business Process with 29.46% weighted value; and 8 KPIs from Learning & Growth perspective with 18.8% weighted value. The results of this strategic map design can be used in communicating all strategies implemented by the institution to all stakeholders and as a validation tool in strategy formulation.

Keywords: Strategic Management, Balanced Scorecard, Strategy Map, Analytic Hierarchy Process, Private Engineering College

1. INTRODUCTION

In 1992 an article published by Harvard business review as The Balanced Scorecard - Measure that drive performance[1]. This article explains that for an organization to measure the performance of the organization not only uses the financial aspect but with other aspects that affect the organization as a whole. Previously before 1990 according to the book many organizations that take into account the performance of an organization still using the traditional system that is only by prioritizing the financial aspects, if the organization has more benefits than last year's profit means the organization including success. The drawback of the traditional method is the organizations only a short-term benefit for the financial aspect that has a major role is the top management. All decision making seeks to maximize profits so as to ignore other employee roles, such as a lack of initiative to decrease employee performance, and a lack of investment to employees so that employees can not have the necessary training to do the work that will affect the organization. To overcome this deficiency, then formed a new method that covers all aspects contained within an organization to measure the performance of the organization and can achieve the vision of the organization. Balanced Scorecard method formulated four aspects that have an important impact on the organization, namely: financial aspects, aspects of the customer, internal business aspects, aspects of learning and growth. By formulating these four aspects, an organization can achieve the desired vision.

In the balanced scorecard method, there is a stage called the strategy map. Definition of a strategy map is a visual presentation of the critical success factors of an organization and have a causal relationship[2]. Strategy Map depicts the diagram of four interrelated aspects, starting from the aspects of learning and growth, internal business aspects, customer aspects, financial aspects, so as to achieve the vision of the organization. Much organizational management uses a strategic map because the strategy map allows users to read their vision and mission by drawing important roles from each aspect and detailing the work that each department of the organization should do.

In this study, the author will use the balanced scorecard method to formulate a strategy map that can help the management to achieve the desired vision. The object of study is STT IbnuSinaBatam. STT IbnuSinaBatam is located in BatamLubuk Baja Teuku Umar, STT Ibnu Sina managed by Educational Foundation of Ibnu SinaBatam. STT Ibnu Sina was established on 28th September 2001. The study was undertaken because of the lack of knowledge of students about the vision, mission, and strategy of STT IbnuSinaBatam. By using the balanced scorecard method, the author can formulate the vision and mission STT Ibnu Sina in the form of diagrams that are easily understood and practiced to achieve a predetermined vision. In the diagram containing the position of STT Ibnu Sina, its objectives, and how to reach those goals.

2. LITERATURE REVIEW

2.1 Strategy Maps Definition

Tthe strategy map presents a reciprocal relationship between performance measures and strategy variables. The strategy map is a visual presentation of the critical success factors of an organization and has a causal relationship. The strategy map provides a consistent way to present the strategy, so objectives and measurements can be generated and executed [3].According to Neely and Bourne, the strategic map is a causality diagram derived from the company's strategy. Marr states the strategic map as a presentation that describes how an organization sees the organization itself[4].

From all the statements that have been quoted from the books on the strategic map, we can formulate that the strategic map is a diagram of an organization that has elements that have reciprocal relationships and have the end result to direct the organization toward the vision of the mission through a strategy that has been formulated.

In the book Using Strategy Map to Drive Performance, there are 6 steps in strategy map making[5].

Step 1: Define the Primary Objective. In the next few years, what does it take to succeed?The first step is crucial because it connects the strategy map to the initial step in creating and confirming a mission/ value/vision of the organization. This step should differentiate what the organization understands its main objectives and the strategies it wants to implement. A lot of confusion at this point. Many missions and visions are often considered to be fulfilled with satisfied customers, perfect service, best in their field. It is a critical and highly desirable outcome for all organizations. However, for organizations that want financial gain, the main objective should be economic.The main objective must be the first element in the strategy map. It must contain a financial target and time to reach it. The main objective example: Raise profit 6% in 3 years; Raise profit margins from 8% to 12%.

Step 2: Determine the desired value added.Companies that try to do everything will fail. Companies that provide unique value to selected customers can win prizes by becoming leaders in market share. To lead market share, companies must first differentiate market share in new and unusual ways, for example, what customer's value from a product or service? With this information, companies can focus on providing new value better than competitors. The second step in the strategy map is to determine the value that will help the organization in its market share.The three added values determined by Treacy and Wiersema provide perfect information in today's market share are Good operation; Leader in the product; &Close to customers.

Step 3: select a financial strategy. After creating added value, organizations must create plans and strategies in earnings and costs. Financial strategies can be categorized into three important areas:

Revenue growth; Productivity; &Use of assets. All organizations should give attention in each of these categories.Knowledge in value-added can help the organization to know which of the three categories can be dominated by financial strategy. Organizations seeking operational efficiency will focus on reaching their key objectives through productivity and asset usage strategies. Organizations that seek closeness to customers or product leaders will put a smaller focus on this efficiency strategy, rather than trying to supplement income through a unique product.

Step 4: select the customer strategy. After creating a financial strategy, the organization must make plans and strategies to win market share. In other words, the organization must create and formulate customer strategies clearly. Customer strategy can be categorized in three important areas: Keeping and adding customers; Increase the profitability of each customer; &reduce the cost of each customer. Organizations should pay attention to each of these strategies. However, the choice of added value once again dictates where the organization should focus its activities and efforts. Organizations looking for good operations will use competitive rates to keep and add to customers, plus by increasing the profitability of each customer. Rigorous process and supply chain management will help in reducing the cost of each customer.The product leader will offer cutting-edge technology including services to increase customer volume and profitability of each customer. To keep and add customers, organizations seeking customer closeness will use strategies such as promotions and loyalty programs. By offering the perfect solution and package, the company is trying to increase the profitability of each customer. Like a product leader, a strategic plan should balance expenses and benefits.

Step 5: Implement through an internal perspective strategy. After making financial and customer strategies, organizations must take important action that can realize strategies to win market share.Internal perspective is how to choose and implement the right business processes to achieve customer strategy and financial trust organizations can generate the creation of the main objective.This perspective covers Good internal internationals; Innovation and Leader in market share; &Leader in customer's face.

Step 6: Plan your learning and growth strategies. After creating financial and customer strategies, and creating a workable plan. Organizations will be aware of the deficiencies in the knowledge, skills, and abilities required to execute the chosen strategy. In the final step of this strategy map, the company develops the right strategy for learning and growth.The learning and growth perspective is about identifying deficiencies that can limit an organization's ability to carry out important processes that have been identified in an internal

perspective. Learning and growth can be classified into three main areas: HR (Human Resources); Information; &Organization.

2.2 Strategy Map Function

The function of the strategy map is:
a. Clarify the course of the organization from non-financial success factors to financial results.
b. Clarify the organization's strategy to its employees by showing how their duties relate to all of the organization's final goals.
c. Can be used to connect business units and focus on the management process
d. Complete the missing link of strategy formulation and strategy execution
e. Tools to support performance measurement in an organization by highlighting important things in an organization.

3. RESEARCH METHODOLOGY

This study will go through three stages:
a. Identifying the vision, mission, values, culture, and corporate strategy.Before drawing up the Balanced Scorecard, first the identification of the vision, mission, values, culture, and corporate strategy. It is first necessary to analyze the company's current situation and study the factors involved. Based on this analysis, then conducted an analysis of the company's strategy.
b. Make a map of the strategy and to discuss the appropriate strategy objectives.This strategy map will illustrate the causal diagram of the relationship between the perspectives of the Balanced Scorecard. Then from the data and map of existing strategies, the goals will be discussed.
c. Weighting all Perspectives and KPIs. To know the priority scale of each perspective and KPI, the researchers used AHP method

4. DATA COLLECTION & ANALYSIS

All data are taken from the official document STT Ibnu Sina with permission of the highest leadership STT Ibn Sina[6].
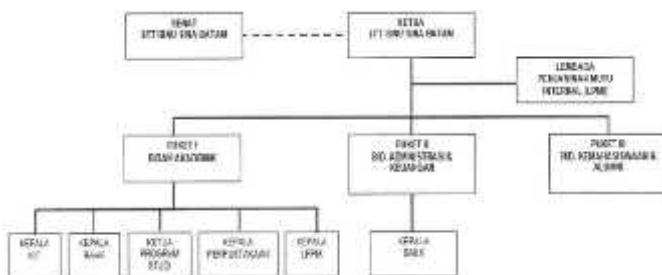
Figure 1. Structure of STT Ibnu Sina

4.2 Corporate Statement

4.2.1. Vision

In the Year 2019 became a national superior engineering school, a global competitiveness based on faith and taqwa

4.2.2 Mission

a. Organizing and developing the national standard quality education system in the field of engineering and relevant to the global development based on the values of faith and devotion.
b. Develop scientific engineering through research activities of national quality and global perspective.
c. Organizing and improving Community service activities in the field of technology that can provide solutions to problems faced by society, industry, and government.

4.3 Strategic Statement

4.3.1. Objectives and Goals

a. First objective: To produce graduates who are superior, virtuous, noble and globally competitive in engineering. Goals:
   - Excellent graduates
   - Graduates are virtuous and have a noble character
   - Global competitive in engineering
b. Second objective: Produce empirical, conceptual and technological knowledge for the benefit of scientific development through research results. Goals:
   - Increased number of research faculty and students
   - Improving the quality and relevance of lecturers' research
c. Third objective: Increase the knowledge and skills of the community from the results of counseling, training and community development in the field of technology. The goal
   - Increasing the amount of community service performed by lecturers and students
   - Increased community knowledge and skills

4.3.2 Strategy

a. Strategies for First Goals & Objectives a:
   - Advanced Study of Lecturers (S3)
   - Certification of Permanent Lecturer
   - Pekerti and AA training for permanent lecturers
   - Training Development of learning methods

- Training of Preparation of Learning materials/modules
- Training / English courses for permanent lecturers
- Recruitment of Permanent Lecturers
- Upgrading of Lecturer's Lecturer to Students
- Increased Anime prospective new students
- The selection process is tightened
- Facilitating students in academic activities
- Facilitating students in non-academic activities (arts and sports)
- Establish teaching load of lecturers in the field of science
- Coordinate lecture materials between parallel lecturers or lecturers team (team teaching)
- Develop e_learning learning support
- Monitoring and evaluation of lectures
- Assessment of lecturing process by students
- Increasing the number of lecturers using English language teaching materials
- Increase in the number of bilingual classes in the lecture
- Improved learning methods
- Improve GPA of graduates
- Reduce Waiting period graduates get jobs
- Include employees in education and training programs in accordance with their field of work
- Increased work productivity
- Increasing the number and capacity of facilities and infrastructure Teaching and learning process
- Increasing the number of classroom and laboratory facilities
- Increasing the number of PBM facilities
- Computer: Classroom & Laboratory
- LCD / Projector: Classroom, Seminar Room & Laboratory
- Internet Connection
- Developing academic and nonacademic information system application: Finance, Inventory, Student, Study Plan Card (KRS), Course Schedule, Course Value, Academic Transcript, Graduate, Lecturer and Staff, Library

b. Strategies for Objectives 1 & Goals b:
- Applying the value of discipline, honesty, and decency in the lecture process
- No complaints regarding the morality and ethics of graduates in the graduate user feedback
- Consultation and academic guidance also foster psychological and moral problems
- 90% of students pass the religion and citizenship courses at least B

c. Strategy for Objectives 1 & Objectives c:
- Evaluate and restructure the Competency-Based Curriculum by Incorporating the Core Curriculum according to the field of expertise of each study program
- Conduct evaluation of GBPP, syllabus, lecture contract, RPKPS, module and teaching materials
- Improving the quality and quantity as well as evaluating the module/teaching materials
- Collect feedback from graduates and graduate users about the curriculum
- Benchmarking with other universities that have the same study program
- Improving the quality of the final project
- Evaluate the Final Writing Handbook
- Monitoring, evaluation, and follow-up mentoring
- Accelerate the completion of the final project
- Providing technical skill training courses according to each study program
- Foreign language training/courses
- 11.Test TOEFL / IELTS with a minimum score of 450 / 5,5 to follow thesis trial
- Require to follow scientific skill training of certified informatics technique as a requirement of thesis trial
- Image enhancement
- Increasing the value of accreditation institutions and Prodi
- Cooperate with various agencies
- Internal quality assurance

d. Strategies for Second Goals & Goals a:
- Each lecturer keeps conducting research at least 1 time per year
- Require and facilitate lecturers to conduct research
- Include lecturers in research seminars or workshops
- Include students in research activities of lecturers
- Conducting research seminars or workshops
- Provide financing for research faculty and students
- Improvement of lecturers research whose source of financing comes from outside the institution
- Engage students in scientific activities/competitions
- Conducting training in research methodology and data analysis
- Rewrite the study manual

e. Strategies for Objectives 2 & Objectives b:
- Produce empirical, conceptual and technological research
- Registering intellectual property research
- Development of teaching materials based on research results
- Require to publish the results of research of permanent lecturers
- Making an online journal

- Publishing an online journal
f. Strategies for Objectives 3 & Goals a:
  - Require and facilitate lecturers to conduct PKM
  - 2.PKM is directed to the utilization of information technology work
  - Improvement of external financing of PKM
  - Provide PKM financing for lecturers and students
  - Include lecturers in PKM training/workshop activities
  - Involving students in PKM activities
g. Strategies for Objectives 3 & Objectives b:
  - Extension-counseling to the community in

the field of technology
- Conduct training on the use of information technology
- Coaching to the community (Village and SMEs) in the field of information technology

After all the data has been collected, the researcher tries to categorize the existing strategy according to the 4 balanced scorecard perspectives. But for the financial perspective, it was not found an adequate strategy. Furthermore, the researcher tried to conform to the management of STT Ibnu Sina to ascertain whether there is a strategy applied but not listed in the document. And it is true, there are strategies related to the financial perspective that has
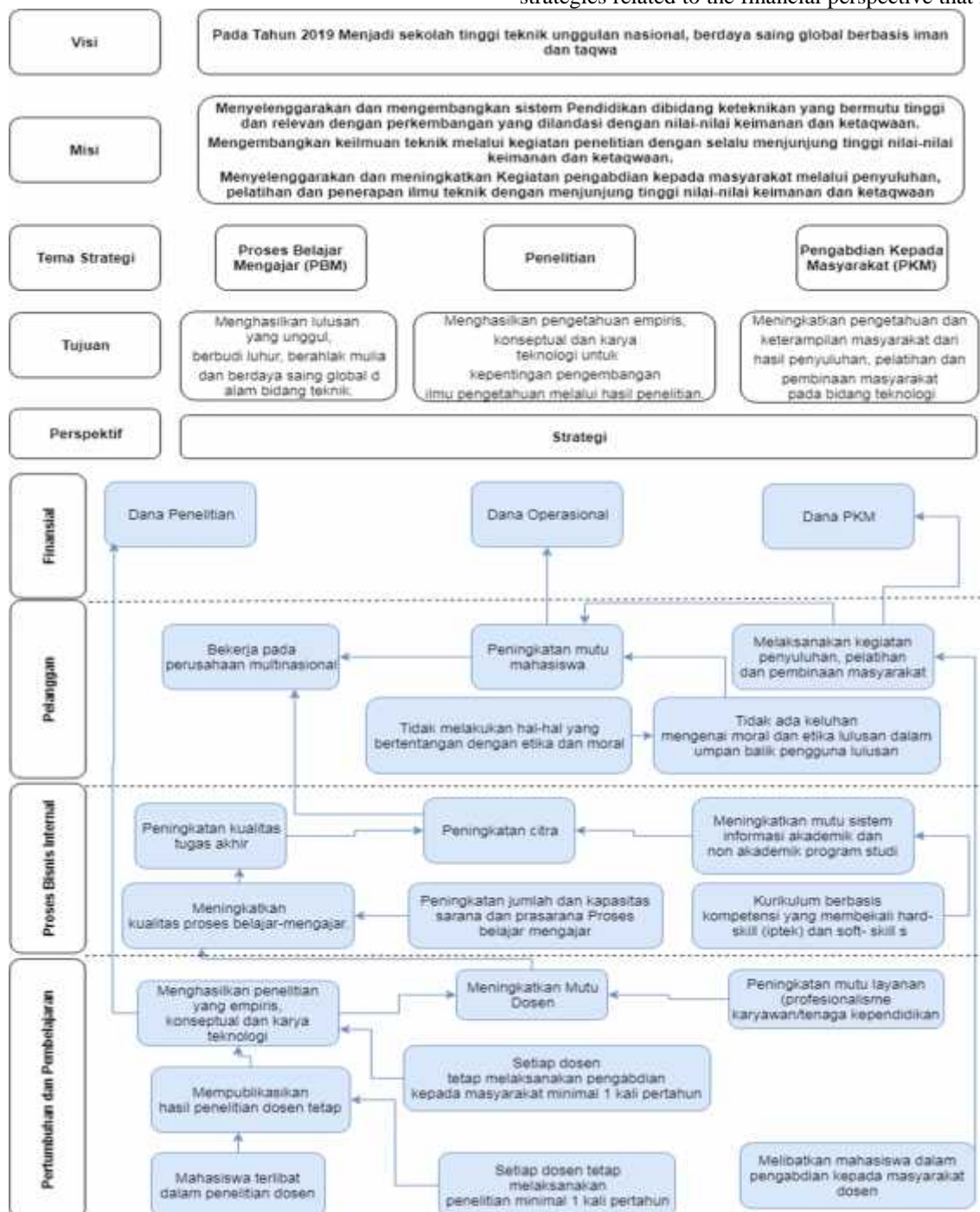
Figure 2. Strategy Maps of STT Ibnu Sina

been run but not listed in the document. At this stage, researchers believe that strategist map formation can validate the strategies implemented by the institution. Furthermore, the strategy map that has been formulated, can be seen in Figure 2.

4.3.3 Strategy Map Weighting

a. Determination of Weight Perspective

The weighting of the questionnaires was done by the head of STT IbnuSinaBatam.Balanced Scorecard as a performance measurement, there are four perspectives to consider, namely:

- F: Financial perspective
- C: Customer perspective
- I: Internal business process perspective, and
- G: Perspective of growth and learning

Comparison of the level of importance/influence relative between one perspective with another perspective.

Table1 Comparison of Alternative Perspectives

Alternative	F	C	I	G
F	1	1/9	1/8	1/7
C	9	1	2	3
I	8	1/2	1	2
G	7	1/3	1/2	1
CI	0.031			
CR	0.03			

Table2 Weight Perspective

Perspective	F	C	I	G
Weight	3.87%	47.86%	29.46%	18.8%

b. Determination Weight Initiative Strategy

1. Perspective finance

In perspective finance there three priority initiative strategy company that need to be considered, namely:

- F1: Operational Fund
- F2 : Research Funding
- F3 : Dana PKM

Comparison based on level interests/influence relatively between one initiative strategies with more.

Table 3 Comparison of Financial Perspective

Alternative	F1	F2	F3
F1	1	1	1
F2	1	1	1
F3	1	1	1
CI	0		
CR	0		

Table4 Financial Weights

Financial	F1	F2	F3
Weight	33.33%	33.33%	33.33%

2. Perspective customer

In perspective customer there two initiative strategy company need to be considered, namely:

- C1: Work on Multinational Corporations
- C2: Enhancement Quality College student
- C3: Doing Activities Counseling, Training and Coaching Society
- C4: No do things contrary to ethics and moral
- C5: No there is complaint the moral and ethics graduates in bait behind users graduates

Comparison based on level interests/influence relatively between one initiative strategy with others

Table5 Comparison of Customer Perspective

Alternative	C1	C2	C3	C4	C5
C1	1	1/7	1/6	1/8	1/8
C2	7	1	2	1/2	1/2
C3	6	0.5	1	1/3	1/3
C4	8	2	3	1	1
C5	8	2	3	1	1
CI	0.025				
CR	0.2				

Table6 Weights Perspective Customer

Customer	C1	C2	C3	C4	C5
Weight	3.23%	19.34%	12.46%	32.49%	32.49%

3. Internal business process perspective

In there are internal business process perspective three initiative strategy companies that need to be considered, namely:

- I1: Increased Quality Task End
- I2: Lift
- I3: Increase Quality System information Academic and non-academic courses
- I4: Meningkatkkan the quality of the learning process teach
- I5: Increased amount and capacity means and infrastructure and learning process teach
- I6: Curriculum-based competencies that equip the hard skills (science and technology) and soft skills

Comparison based on level interests/influence relatively between one initiative strategies with more.

Table7 Comparison Internal Business Process Perspective

Alternative	I1	I2	I3	I4	I5	I6
I1	1	1/8	1/9	1/9	1/7	1/8
I2	8	1	1/2	1/2	2	1
I3	9	2	1	1	3	2
I4	9	2	1	1	3	2
I5	7	1/2	1/3	1/3	1	1/2
I6	8	1	1/2	1/2	2	1
CI			0.054			
CR			0.04			

Table8 Weights Internal Business Processes

Internal Business Process	Weight
I1	2.31%
I2	16.04%
I3	27.8%
I4	27.8%
I5	10.02%
I6	16.04%

4. Perspective growth and learning

In perspective growth and learning there three initiative strategy Companies that need to be considered, namely:

- G1: Increase quality lecturer
- G2: Enhancement quality service (professionalism employee/labor education)
- G3: Produce Empirical research, conceptual and creation technology
- G4: Publish results research lecturer permanent
- G5: College student involved in research lecturer
- G6: Every lecturer permanent doing devotion to the community at least 1 time per year
- G7: Every lecturer permanent doing study at least 1 time per year
- G8: Engaging college student in devotion to community lecturer

Compare based on level interests/influence relatively between one initiative strategy with more.

Table9 Comparison Perspective Learning & Growth

Alternative	G1	G2	G3	G4	G5	G6	G7	G8
G1	1	1/8	1/8	1/7	1/7	1/7	1/8	1/8
G2	8	1	1	2	2	2	1	1
G3	8	1	1	2	2	2	1	1
G4	7	1/2	1/2	1	1	1	1/2	1/2
G5	7	1/2	1/2	1	1	1	1/2	1/2
G6	7	1/2	1/2	1	1	1	1/2	1/2
G7	8	1	1	2	2	2	1	1
G8	8	1	1	2	2	2	1	1
CI				0.209				
CR				0.15				

Table10 Weight Learning and Growth

Learning &Growth	Weight
G1	1.82%
G2	17.47%
G3	17.47%
G4	9.43%
G5	9.43%
G6	9.43%
G7	17.47%
G8	17.47%

Table 11Weight All Perspectives & KPIs

Perspective KPI	Finance	Customer	Internal Business Process	Learning & Growth
	3.87%	47.86%	29.46%	18.80%
1	1.29%	1.54%	0.68%	0.34%
2	1.29%	9.25%	4.73%	3.29%
3	1.29%	5.96%	8.19%	3.29%
4		15.55%	8.19%	1.77%
5		15.55%	2.95%	1.77%
6			4.73%	1.77%
7				3.29%
8				3.29%

5. CONCLUSION

We have created a strategic map with a total number of KPI 32, with division: the financial perspective of 3 KPI; Customer perspective 5 KPIs; Internal business process perspective of 6 KPIs; and 8 learning and growth perspective of KPI.

The weighting of all perspectives and KPIs have been calculated with the results:

No	Perspective / KPI	Weight
F	Financial Perspective	3.87%
F1	Operational Fund	1.29%
F2	Research funding	1.29%
F3	PKM Fund	1.29%
C	Customer Perspective	47.86%

C1	Working on Multinational Enterprises	1.54%
C2	Improved Student Quality	9.25%
C3	Conducting Extension Activities, Training, and Community Development	5.96%
C4	Not Doing things that are against ethics and morals	15.55%
C5	No complaints about the morale and ethics of graduates in the graduate user feedback	15.55%
I.	Internal Business Process Perspective	29.46%
I1	Improving the Quality of Final Project	0.68%
I2	Image Improvement with a weight of	4.73%
I3	Improve the Quality of Academic Information System and non-academic program of study	8.19%
I4	Improving the quality of teaching and learning process	8.19%
I5	Increasing the number and capacity of facilities and infrastructure of teaching and learning process	2.95%
I6	A competency-based curriculum that equips hard skills (science and technology) and soft skills	4.73%
G	Learning and growth perspective	18.8%
G1	Improve the quality of lecturers	0.34%
G2	Improved quality of service (professionalism of employees/education personnel)	3.29%
G3	Produce empirical, conceptual and technological research	3.29%
G4	Publish the results of research of permanent lecturers	1.77%
G5	Students are involved in lecturer's research	1.77%
G6	Each lecturer still performs dedication to the community at least 1 time per year	1.77%
G7	Each lecturer still conducting research at least 1 time per year	3.29%
G8	Involve students in devotion to the lecturer's community	3.29%

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DESIGN OF INTERACTIVE MEDIA INTERACTIVE EYE LESSONS FOR CLASS III SD N 04 BARINGIN PADANG CULTURAL CULTURAL FLOOR BASED ON MULTIMEDIA

Nelda Azhar, Putra Jaya, Asrul Huda, Etika Fahmidyah

Faculty of Engineering, Universitas Negeri Padang, Indonesia

ABSTRACT: In life we can not deny that what influences the attitude, mental, behavior, personality and intelligence of children is the education, experience and exercises given and experienced by learners since they were small. The results of the initial survey showed that SDN 04 Baringin is not available yet learning media of science that can be used by teachers for learning activities. This study aims to: Generate Interactive Media on Science Class III Multimedia Classroom. This research is a Research Development (Development and Development), by using Plomp design which consists of 5 stages: Analysis, Design, Development, Implementation, and Evaluation. At this stage just come to the design stage and product validation. Data in this research is processed by descriptive method. The results of this study are related to Interactive Media Design in Science Class III SDN 04 Baringin Padang. The results of this study are expected to improve learning outcomes in third grade students for science subjects.
Keywords: Interactive Media Design, Multimedia, Science Lesson

1. INTRODUCTION

In life we can not deny that what influences the attitude, mental, behavior, personality and intelligence of children is the education, experience and exercises given and experienced by learners since they were small. If allowed to quote a beautiful phrase or a word of wisdom put forward by Carla Rinaldi in 30 Creative Kids Creative Tips (2006: 5), "Success in early childhood education depends on whether the education can relate to the home and school learning environments . It is based on the interaction and communication between children, teachers and parents ". The above sentence I connect with the learning activities undertaken by the teacher.

A learning activity will be very meaningful for the learners, if the learning activity is prioritizing good interaction and communication between teachers and learners, meaning that the learning activities undertaken is a place for learners in developing the potential that exists within him, so that the goal of education to be achieved can be done. Age 6-8 years of child's brain is still in the development stage or experiencing a period of maturity. At the age of eight, normally the child is in the second grade or three elementary school which is still a golden age for the children, because the process of receiving and absorbing various forms of experience either from the teacher or the surrounding environment will be easily accepted. One of the most important components in the world of education is teachers, teachers are the spearhead of education. In this context, teachers have a very big and strategic role, because the teacher is in the front row in the implementation of education. Teachers directly dealing with learners in learning activities that include transferring activities of science and technology as well as planting positive values through guidance and also role models.

The proper use of media in the learning process can clarify students 'understanding of the subject matter and can streamline the students' absorption of the subject matter. The use of media in the learning process can overcome the limitations of the student sense apparatus and help overcome the different learning styles. Learning media can activate most of the senses of students, especially the sense of hearing, sight and can increase student learning interest. The use of learning media can also facilitate interaction and communication between students and teachers.

Teachers who are directly responsible for how to improve students' learning achievement, must be really creative in packaging and designing the learning process so that learning objectives can be achieved. This means that teachers can apply a variety of good ways as a stimulus for students to the lack of possessed by students who are considered Wundt as a disease can be cured in a way that teachers do. Based on the above problems, the researcher will try to apply the thematic teaching model in science lesson in class II elementary school. Because according to Kunandar in Professional Teachers (2007: 331) thematic learning model is a learning strategy that involves several subjects to provide a meaningful experience to students. learners should be developed as a thematically approach is a way to not limit the child in a subject in learning something. For example, while learning to sing a child learning the alphabet. Or while learning to know the animals he also studied coloring. When the learning process takes place, learners do not feel like they are studying a course. It is expected that learners can acquire various knowledge or skills in just one meeting.

For the purpose of the learning process can be achieved in accordance with the desired, then the previous teacher should really understand and

understand about the thematic learning model, understand how to apply thematic learning model, understand the concept of thematic, so that the application does not happen mistake so that the effect on the output " result "for learners.

According Kunandar (2007: 315), thematic learning model several advantages, namely: 1. Fun because depart from the interests and needs of learners. 2. Provide experience and teaching-learning activities relevant to the level of development and needs of learners. 3. Learning outcomes can last longer because they are more memorable and meaningful. 4. Developing the thinking skills of learners in accordance with the problems faced. 5. Growing social skills through cooperation. 6. Have the attitude of tolerance, communication, and responsive to the ideas of others. 7. Presenting activities that are real in accordance with the problems faced in the environment of learners.

Based on the description above, researchers intend to conduct research in class III SD Negeri 04 Barigin Koto Tangah Subdistrict Padang City. Research wants to do research with the title: How to Design Interactive Media In Science Subject Class III SD N 04 Baringin Balai Gadang Padang City Based Multimedia. One of the steps teachers use in elementary school to improve school performance and can improve student learning achievement, so that the elementary school gets a favorite predicate and can produce learners who really qualified and understand the teaching materials.

2. FORMULATION OF THE PROBLEM

Based on the introduction of the background of the above problems, then the formulation of the problem is: How to Design Interactive Media Build on Multimedia Class III Multimedia Learning.

3. LITERATURE REVIEW

Media comes from the word "Medium" which means "Intermediary" or "Introduction" is an intermediary or an introduction to the message source with the recipient of the message. According to Sadiman (2009: 7) suggests "Media is everything that can be used to channel the message from the sender to the recipient so that it can stimulate the thoughts, feelings and interests and attention of students in such a way that the learning process occurs". While Arsyad (2010: 4) suggests "Media is a tool that convey or deliver messages learning".

From the above understanding can authors conclude that the media are all objects used to convey messages or information to be received well by the recipient of the message. For example on learning, media in the form of books, jobsheet, powerpoint used to help educators convey messages in the learning.

Types of media used in the learning process quite a lot of variety, ranging from simple media to the media is quite complicated and sophisticated. One that can be used as a reference in the use of media is the classification proposed by Edgar Dale is known as the cone of experience (Cone Experience). The Dale experience cone classifies media based on direct learning experiences, learning experiences that can be achieved through abstract images and learning experiences.

In addition that can be used as a reference in the utilization of media is based on technology used from low technology media (low technology) to the media that use technology I (high technologi). If media classification is viewed from the technology used, then its classification is strongly influenced by technological developments (Hamzah and Nina Lamatenggo, 2011: 122).

At present the development of computer technology is now more lead to the visual display (multimedia). For example we often use text-based chat facility. Now the application is able to display the visual form by using webcame and voice. The example is a small part of the development of multimedia technology (Ariyus, 2009: 1).

According Ariyus (2009: 2) Multimedia comes from two words, namely multi and media. Multi means a lot and ordinary media means a tool for conveying or making something, a medium, a medium of instruction, a form of communication such as a newspaper, magazine, or television. When associated with computer pemposesan, multimedia is considered as a tool that displays text, images, graphics, sound, music, and so forth.

In line with this (Munir, 2008: 233) defines multimedia as a system that combines video images, animation, sound interactively. Meanwhile, according to Ariyus (2009: 2) Multimedia System is meant here is a technology that combines various media sources such as text, graphics, sound, animation, video, and so forth, delivered and controlled by an interactive computer system. The combined system can be described as follows:
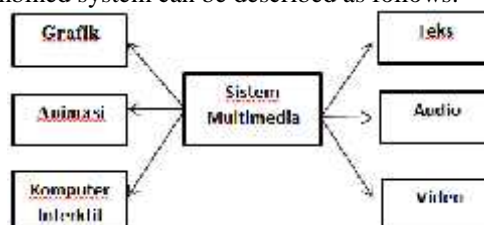
Figure 1. Multimedia System Components
Source: Ariyus (2009: 2)

Based on Figure 1 above can be explained that the components are arranged in a multimedia system, the text can be interpreted as a form of affirmation in an explanation, audio as an explanation in the form of sound, the video describes the explanation in the form of visual stories,

graphics as visualization on display, explanation in the form of simulation, as well as interactive computer as multimedia making medium itself. From the above explanation can the authors conclude that multimedia is a medium that combines two elements of media or more media consisting of text, graphics, images, photos, audio, video, and animation are integrated. By using multimedia delivery information becomes more interesting and easier for users in obtaining such information.

Multimedia is also an effective and efficient teaching and learning media based on its ability to touch the five senses: sight, touch, and touch of Munir (2008: 232).

From the above definition can be concluded that as other educational media, multimedia still serves as a tool, methods and approaches used to establish communication between teachers and students during the learning process. Multimedia capabilities provide individual teaching through personal tutor systems because of the multimedia capabilities in repeating information. If students are less aware of the material presented, they can view multimedia programs repeatedly until they understand them.

Suyanto (2003: 19) suggests "Multimedia components are elements contained in a multimedia system consisting of text, images, animation, audio and video combined two or more of them, to form a result of a combination called multimedia". Here are the elements - elements in a multimedia system, namely:

a. Text

Text is the earliest and simplest element in multimedia, usually referring to words, sentences and paragraphs or anything written or aired. Most multimedia uses text because it is so effective at conveying ideas and guides to users. Text is the most easily stored and recognizable form of multimedia data, and text files are simple structures.

b. Picture

The image is still or not moving. Picture is one of the important components in multimedia because it can summarize and present complex data and able to deliver a thousand words. Images in multimedia publications are more interesting and can reduce boredom compared with the text because humans are always oriented towards the visual.

Image file format used in multimedia there are eight that is (http://infoilmu-komputer.blogspot.co.id):

1) PICT: Macintosh file format capable to create objects that are bitmapped or vector drawn.
2) BMP: Windows default file format.
3) JPEG (Joint Photographic Experts Group): Compressed graphic format, used in photo and still images, can control color depth and has a relatively small size.

4) GIF (Grafic Interchange File): a compressed file format developed by CompuServe.
5) TIFF (Tagged Interchange File Format): a compressed file format used in desktop publishing packages.
6) EPS (Encapsulated Post Script): the file format used in photoshop can load both vector and graphic images.
7) PNG (Portable Network Graphics): a compressed file format for displaying images on the World Wide Web (WEB), has the ability to display 24 bit images and produce backgrounds transparently.
8) PSD: file format used photoshop to save files created and manipulated.

c. Animation

Animation is a composition of a dead image created effect so that it seems to move. Differences movie with animation is the process of the event whereas the movie is the result of the process. Animation techniques in the flash there are two namely (http://widhyarmawan.blogspot.co.id):

1) Motion: flash animation used to move the object from one point to another without changing shape.
2) Shape: flash animation used to change or change a form with another form.

d. Audio

A multimedia application without sounds is simply called unimedia, not multimedia. Sound can be added in multimedia production through sound, music and sound effects. Sound in the computer can be stored in various formats.

These audio file formats inside (https://afwandi123.wordpress.com) include:

1) MP3 (MPEG Audio Player 3): audio file used by a codec to encoding and decoding a music recording, with extension * .mp3.
2) MIDI (Musical Instrument Digital Interface): An audio file used to store music instruments with the extension * .mid.
3) DAT (Digital Audio Tape): a file format that uses a head that is played similar to a Video Tape Recorder (VTR).
4) WAV (Waveform Audio): audio file format in the form of digital, can be manipulated with multimedia PC software.
5) AAC (Advanced Audio Coding): an audio format using lossy compression (data compression can not be returned to the data before it is compressed perfectly, because there is missing data.

e. Video

Videos are part of sequential images called frames with a standard frame of 24 frames or second (FPS = Frame Per Second), the images are then projected over layers added with text or

animated objects. There are five audio file formats (https://afwandi123.wordpress.com):

1) Audio Video Interleave (AVI): video and animation format used for video and windows interact.
2) Motion Overlay Video (MOV): video and animation format used for Macintosh and windows.
3) Motion Picture Expert Group (MPEG): compression scheme and specification of digital video file format.
4) Shockwave: format of Adobe Flash with extension .swf, developed by Adobe Format Shockwave.
5) Real Video: has extensions as well as developed by real media.

Instructional Design Model

The process in designing structure and planning in a learning is called by the term of instructional system design or instructional system design. In constructing an instructional design, it is necessary to understand and consider the competencies to be achieved by the students as well as the goals to be achieved in learning, so that by executing the appropriate instructional design will be able to achieve the objectives of the learning.

The selection of an instructional design model in the effort of instructional design development should take into consideration the assumptions used as a basis for the use of the instructional design model.

One model of learning system design that shows the basic stages of the learning system is simple and easy to learn is the ADDIE model. In practice there are several different types of adaptations of the ADDIE model, but generally consist of five cyclical phases: Analysis, Design, Development, Implementation, and Evaluation (Lee and Owens (2004: 161).

The five phases in the ADDIE medel need to be done systematically. Model design of ADDIE learning system with its stages can be described in the following figure:
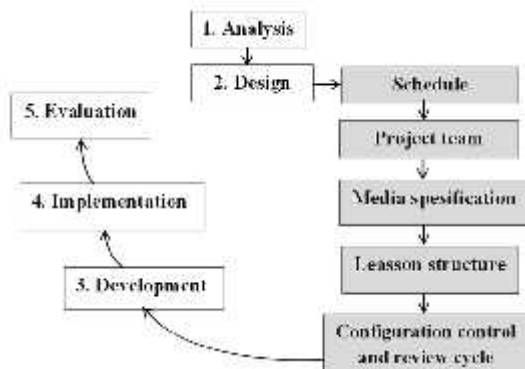
Figure 2. Multimedia model of ADDIE instruction design
Source: Lee and Owens (2004: 93)

Activities undertaken at each of the following stages (Togala, 2013):

a. Analysis: In the analysis phase, defining instructional problems, instructional objectives, and learning objectives. This phase also identifies the learning environment, knowledge and skills currently held by the students. This phase is done to answer questions related to the following: Who is the audience (audience), what they need to learn, what the budget is, what options are available to deliver the material (delivery), what constraints are there, when the project should finished, and what students should do to know their competence.

b. Design: design phase associated with targeting, assessment instruments, exercises, content, and analysis related to learning materials, lesson plans and media selection. The design phase is systematic and specific. Activities undertaken at the design stage typically include selection of the most appropriate learning environment by studying the types of cognitive skills needed to achieve instructional goals, writing instructional goals, choosing the overall approach, the shape and appearance of the program: outline units, learning and modules, designing course materials specifically for use on interactive electronic media.

c. Development (development): in this phase made the creation and incorporation of content assets that have been designed in the design phase. In this phase made storyboard, writing content and graphic design as needed. If it involves e-learning, programmers will work to integrate the necessary technology. Activities undertaken in this phase include the creation or collection of necessary media, using the power of the internet or electronic media to present information in various multimedia formats so as to satisfy students' wishes, and define appropriate interactions, which must be in the form of creative, innovative, and encouraging students to be hooked to learn more.

d. Implementation: in this phase, procedures for training of trainees and their instructors / facilitators are developed. Training for facilitators includes curriculum materials, expected learning outcomes, delivery methods and testing procedures. Other activities to do in this phase include copying and distribution of materials, handouts and other support materials, as well as preparation in case of technical problems and discussing alternative plans with students.

e. Evaluation: evaluation phase consists of two parts, namely formative and sumatif. Formative evaluation occurs at each stage of the ADDIE process. The summative evaluation consists of tests designed for domains that relate to certain

criteria and provide feedback opportunities from users.

4. RESEARCH METHODS

The selection of multimedia instructional design models in the effort of instructional design development should take into account the assumptions used as the basis for the use of the instructional design model. The design of flash-based interactive media for android is developed by using the ADDIE model which is one of the design instructional design model that becomes the basis of Instructional System Design (ISD) system which shows the basic stages of learning system which is simple and easy to learn. This ADDIE model consists of 5 phases: Analysis, Design, Development, Implementation, and Evaluation. The five phases or stages in the ADDIE model need to be done systematically. In this article we just came to the design stage.

Model of ADDIE learning system design with its components can be seen from the following flowchatt:
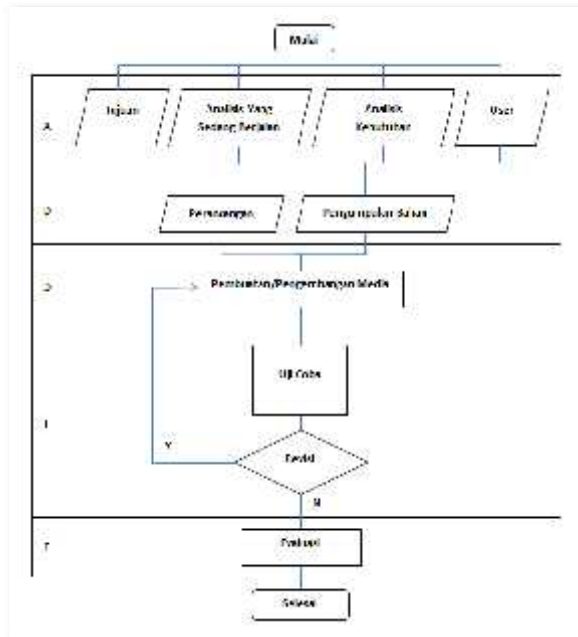
Figure 3. Flowchart Model Development of interactive ADDIE media

Figure 3 above it is explained that the flow of interactive media development using ADDIE development starts from the analysis phase, where at this stage there are 4 parts that enter at the analysis stage, that is: objectives, ongoing analysis, needs analysis, and user / user, then enter at the design / design stage, where interactive media is started to be designed and the developers to collect materials or materials to be combined in the making of this interactive media. The next stage of entry at the stage of development / development is doing the

making or development of interactive learning media is based on the materials that have been collected and the concept of design. Furthermore, in the implmentation / testing phase, this interactive media will be tested temporarily. If this media undergoes a revision it will return to the stage of making or developing media, if the media does not undergo revision then the media will go directly to the evaluation stage. At the stage of media evaluation that has been completed will be published or disseminated.

Interactive Media Structure Design

The design of Multimedia Interactive application structure in learning media Computer Device Maintenance is design with multimedia structure hierarchy or like tree that have many menu can be seen in the following picture:

Figure 4. Multimedia Structure Hierarchy

Based on the structure design in the picture above, it appears that after the intro view will appear to the Main Menu page that has a button to be able to link to some other pages. The pages related to this main menu are material pages, simulated video pages, Training Problem pages, Picture Dictionary, about pages, Help pages and Exit program exit buttons.

5. RESULTS DESIGN AND DISCUSSION

Based on the results of interactive media design that has been designed then generated an interactive media like the following picture:

Figure 5. Results of Interactive IP Screen Welcome Screen Design

Figure 6. Results of Interactive CD Main Menu Plan

Based on the picture above can be seen that the media is designed to facilitate teachers and students in following the process of learning Natural Science. On the menu we can see that there are 4 main menu that we can activate in using this media, including: syllabus, material, quiz and profile.
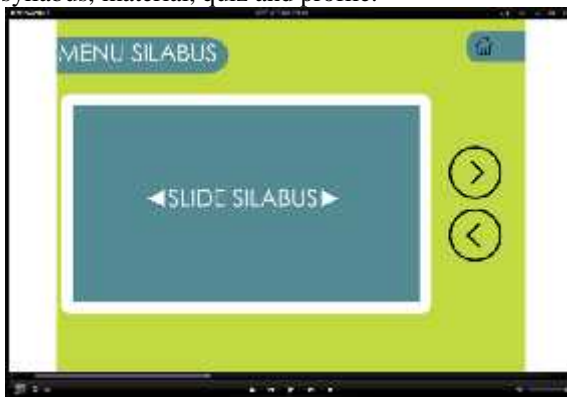
Figure 7. Design of the Syllabus Menu

Based on the picture above can be seen that the syllabus menu later aka slide tone to explain the existing syllabus of science learning Class III SD this.
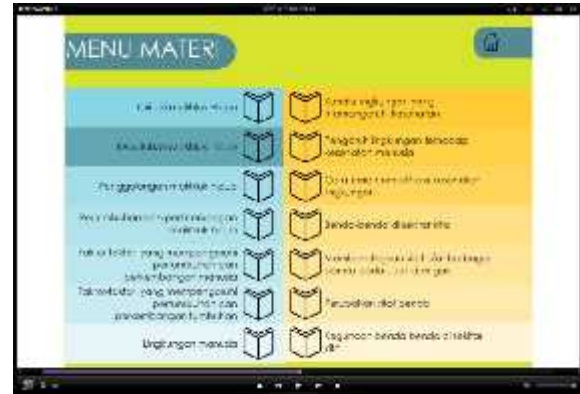
Figure 8. Result of Material Menu Design

Based on the picture above can be seen that in the material menu later we will make the material for all meetings that exist for one semester which later can be explained at the time of learning in accordance with Competency Standards (SK) and Basic Competence (KD).

Figure 9. Quiz Menu Design Results

Based on the picture above can be seen that the Menu Quiz will be followed by students who will try to follow the quiz by entering the name and nis they have.

6. **CONCLUSION**

a. Designing Interactive Media Learning Class III IPA using ADDIE development procedure.
b. Interactive Media Design Results In Class III Science Subjects will be used during the experiment.

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DEVELOPMENT OF MALAY FRUIT ORNAMENT

Netty Juliana

S3 doctoral students of Vocational Technology Education Padang State University

ABSTRACT: This community service aimed at creating new creations decorative fern Kaluk Malay, but is not to eliminate its original shape. Ornament Kaluk Pakis Malay is usually found on Malay traditional house carvings. In addition to the development of the ornament Kaluk Pakis Modetrends applied handicraft Malay household linen Prodak, especially in wall hangings. Application Prodak Kaluk remote craft wall hangings of background Melayu concept created, outgoing by: 1) determine the themes or ideas ideas; 2) preparation of materials and equipment which contribute to the production of products; 3) make a sketch of decorative drawings; 4) Preparation of Prodak Kriya; and 5) Finish. This activity is carried out through the use of a lecture, question and answer about Pakis Kaluk crafts wall hangings Malay, process demonstrations, as well as direct and consulting practices to manufacture new craft wall hangings Prodak Kaluk Pakis Malay.

Keywords: Wall decoration, Fern, Malay

1. INTRODUCTION

Decorative diversity is the result of culture since prehistory and into the present. Ornament has a general sense of decorating human longing objects - objects around it, which is the source of wealth forming the ornament of the past, which developed into the palace of the King - the King and Duke, both in the West and the United Nations East.

Another concept in terms of decoration is diversity. Variety according to Big Indonesian Dictionary means "pattern" or "style", while the pattern means flowers or images (Hasan Shadly, 1980: 593). Almost the same understanding with decoration is a variety of decoration and ornament. Variety decoration is a pattern or a kind of armor as an expression of the human soul expression of the beauty or the fulfillment of other needs were revealed which are budaya.Orname essentially a picture of the "rhythm" in line or field. Ornaments represent the science of decoration

Geometrical ornamentation, is the oldest motif in the ornament, since it is known since time immemorial. The first geometric shape uses the basic elements such as dots and lines are abstract. Points and lines, the repetitions thus experience the emergence of new decorations such as circles, triangles, meander, piral, gyre and tumpal Sunaryo 2009: 19-22 of TM quotes Rita Istari, 2015. The geometric motif has three different functions, namely: the edges or edges to decorate an object as a filler panel and as part of an independent (Toekio 2000: 38).

Decorative flora, this decorative variety appears in Indonesia along with the influences of Indian culture and is a major part of the ornamentation in Indonesia, especially in the archaeological remains of the Hindu Buddhist period.

Decorative animals / animal world, ornament of animals is a representation of animals of very many kinds, which roughly can be divided into 4 types, namely:1) Animals living on land, including reptiles. 2) Animals living in the water. (3) Animals living in air or winged animals. 4) Fantasy animal.

The representation of animals in the temple reliefs serves as part of the narrative with regard to a doctrine, fairy tale narrative, symbolism or aesthetic decoration. Fable contains morality, ethics and education, while the symbolism of the animals is that the importance of strength, heroism, fertility, vehicle (Old Javanian: Vehicle) will contain as God, and repugnant crimes. The animals are presented in different shades, some are realistic, decorative stylizations and in an imaginary form (Sunaryo, 2009: 122).

Decorative variety The combination, ornament, is a combination of geometric forms, plants and animals, which are found on the exterior walls of the Hindu and Buddhist temples. Geometrically combined with plants in the form of leaves, flowers and tendrils carved vertically or horizontally on the entire building of the temple. The combination of plants and animals describes the form of a distilled animal with tendrils. Forms of this combination for example a lion with a tail distillation tendrils, shell water animals (Old Javanese: Sangkha) have wings, and so on.

Ornament is usually applied to the engraving custom home building, equipment area weapons (such as kris, spears, machetes, etc.), as well as ornaments are also applied to the textile craft. For the textile factory of the archipelago there are many different types of motifs and patterns that vary with different symbols of meaning and importance in each region. Kriya tekstil Nusantara has two types of design, which is structural design

and surface design. These two types of designs have different textile characteristics and properties, starting with materials, techniques and manufacturing processes. However, these two types of designs produce traditional fabrics that have a unique and ethnic beauty. The beauty of traditional fabrics must now be developed and preserved by the younger generation, so that the art of Indonesian culture is not extinct due to the development of the era and the ever more advanced technology.

Development carried out at this IPTEKS is the development of decorative ornaments from carved art of the Malay traditional house. Engraving ornaments in traditional houses are applied to the craft in the form of sequin craftsmanship on the surface of simple fabric. Then the sequins craftsmanship applied to household appliances, one of them prodak malay wall decoration. The use of sequins is developed by the use of sequins in wall decoration products, which have an ethnic value and have a sales value. The idea of aesthetics

2. METHODOLOGY

The material used in the manufacture of household laundry products in the form of typical Malay wall decoration is:

1. Japanese Payet in the form of a sequin 1) payet bowl; 2) sequined sandals; and 3) sequin plates
2. Woven base made of satin blue sea
3. Rectangular wood stamp (rectangular)
4. Yellow sea blue sewing thread
5. Hand needle

2.1 The Process of Manufacturing Craft Products

The process of manufacturing craftsmanship Memayet on malay wall decoration typical: Define the idea idea as the theme of the wall decoration craft. The idea initiated by the decorative carvings of malay traditional home, ornamentation

1. Malaysian crescent. This decoration comes from the Malay region in North Sumatra. Pakis Kaluk ornament malay dikreasikan paper on the drawing to form a composition, based on the principles of design.
2. According to the ornament Kaluk Pakis dikreasikan drawing on paper, then the motif printed on the surface of the base material using a satin cloth or table Portable tracer tracing tracing and pencil.
3. Before the front of the fabric adheres sequin passage, first from a layer of newspaper or a coating material on the back of the fabric. In addition, first painted the process of sequins to paste the fabric. Sequin pelekatkan process using

techniques stapling or hook between the surface of the fabric with sequin hole and measured at regular intervals following the line patterns were painted on satin weaving.

4. Once all the attached sequins motif, then the edge of the cloth to the seams and braided lace, leaving no loose thread at the edge of the fabric.
5. Finishing and substances that are ready for under the dipayet as you wish.

3. RESULTS AND DISCUSSION

Illustration 1
Malay Fresco Wall Art Creations

Figure 2
Wood carvings Kaluk Pakis Malay

Figure 1, the development of the decorative variety of ornaments Malay Pakuk on the craft of wall decoration 55 X 55 cm measure. This creation product, which comes from the idea of wooden carving of typical customs house typical Malaysian. The wooden carving motif is called Kaluk Paki's ornament. Decorative decorative cake is a fern-shaped plant of the leaves, which propagate in the Riau-Malay region. The above wall decoration

product is 55x55 cm, which is enclosed in golden yellow and covered with glass. This wall decoration product is located in the living room to complement the beauty of the interior. The fern fern variety was also developed by applying to a piece of Riau malay tissue. the development of kaluk decorative fern on science and technology activities over the course of fashion Unimed has however been developed by the application of Pakis Kaluk ornaments on a decorative sequin. The beauty of the decorative Kaluk Pakis above apply a lot of sequins and bowl-shaped sequins from sand like a grain.

Figure 2, is an original form of ornamental wood carvings typical of Malay Pakis. The Malaysian Pakis cultivation cans are in the form of a stylized form of fern fern. Ornamentics in the Malayan areas tend to be rather based on appreciation of art berlandasakan's Islamic principle that only berunsurkan wood carving ornaments are used by plants, geometric and calligraphy.

In general, the use of plant stylization can be divided into three groups, namely: fern-keluk groups, flower groups, and shoots.

Frizzy fern group has two main motifs: leaf motifs and root motifs. Leaf shaped ornaments include leaf stack motifs, single leaves, and leaf leaves. While the ornaments in the form of roots comprise fern fern motifs, rattawrops and root chasing, the flowering groups include Kundur stylization, jasmine blossoms, mangoblumes, carnation blossoms, flower flowers, Chinese flowers and forest flowers.

This ornament is found in traditional houses or homes in the Malayan areas, especially on the wall above the ceiling approaching the roof of the house on the outside often. Kaluk fern carving is at the window shutters and the exterior door. Thus the view of the traditional house is in general a unique and luxurious impression.

3.1 A visual aesthetic value approach

The visual perception of aesthetic value requires appreciation and knowledge of the object of design or art. If someone has trained his / her recognition, one is interested not only in the use of a working function, but also in the physical elements, are also interested in the production process and the quality of the ingredients. Then interested in the shape of the decoration, began to assess the color, texture, variety of decoration, the overall design of the craft objects. From the acknowledged experience, it is trained to live the role of lines, shapes, colors, textures and overall design. (Wiyoso, 1983: 161)

Based on observations typically Malayan ornamentation has the characteristic gold yellow color as well as ferns or diamond motif Kaluk Middle- and telingkai shoots. This motif is typically used for the woven fabric motif Songket typical malay. Yellow symbolizes power, this color is usually used for the king's family clothing. As well as other colors is often used by the people in Malay, the color white is a sign of purity, red as a sign of fraternity and courage, the color yellow as a symbol of power, the color blue as a symbol of power in the sea, the green Color menlambangkan Fertility and prosperity symbolizes black color strength, color golden as a symbol of power and glory.

Variety malay motifs and falsafaf mean that the nature of the origin of each source relate, combined with faith and cultural values, the noble values of Islam. Custom Resam governs its use and placement. The wisdom of ancient Malay people who listen to the natural environment offers a variety of motifs that are so much. In the past, every carver or web trader and others had to understand the meaning and philosophy that is contained in every motif. This requirement means that they are personally able to absorb and to live the values in question, spread by teaching, put the traces patutnya.

Kaluk fern ornament symbolizes the expression "know with perinya, white, sit upright to know the groove with patutnya", which is reflected in the variety of motifs full moon, kaluk ferns, clouds larat with all its variations. Then kaluk decorative fern-shaped mouth elbow bat, roots become a reflection of nature intertwine responsible for the malays in their lives. The purpose of the motif is "before others are corrected, let us first look in ourselves."

Prodak wall hangings Kaluk Pakis is a craft product design that is identical with the beauty of ornament shapes and colors. The product design of the handicraft wall decoration is designed by an aesthetic approach, which represents the approach of art elements and approach to the principles of the design. Wall hanging products are designed according to the principles of design:

1. Balance, on the craft of the wall decoration Kaluk Pakis is designed with the balance intact. This can be seen in the composition of the ferns, which face each other and form an equilateral triangle, which is geometrical. There is therefore no empty space, which is not uniformly distributed, when one looks at the other decoration from the distance from the decoration.

2. Unit, the Pakis Kaluk wall decoration products formed a unitary whole of the unity of shapes and colors that complement each other and mutually complement the background field measurement 50x50 cm. There is thus no visible projection of the art element or (shape and color). This product is the unit because of the design formed in harmony, rhythm is balanced in shape, rhythm of color and design features.

3. Harmony, the handicraft products Kaluk fernwandbehänge are a mixture between a thick line on the shank far with thin lines on a branch ferns, as well as a mixture of large and small leaf sheet. To show the form of a harmonious composition and to strengthen the unity of the overall form.

4. The lead, the wall-hanging Kaluk remote found in the center, the decorative parent Kaluk Ferns around the size of the decorative kaluk small ferns. For the decoration of the mother of Kaluk Pakis to the main center of the eye view, it is supported by the surrounding decorations which appear smaller. Moreover, the lead of craft products can be seen from the red, green, yellow, white and in the form of metallic (glitter sequin material). The projection shows the Prodak unique and luxuriously impressed.

4. CONCLUSION

Based on the results of non-profit work that has been done, it can be concluded that:

1. Development of Craftmanship Creativity on Kaluk Wall Decoration Fern was carried out on students of fashion successfully, especially in the field of art science craft.

2. Aesthetics on Prodak crafts wall hangings Kaluk Ferns worth of ethnic and elegant. This results in the elements of fine art and art systematically ordering principle, starting from an idea initiated, planning concept, drawings, material selection of materials sketched, to the final processing Prodak.

Activities Prodak crafts wall hangings Kaluk Pakis have a positive impact on the students of fashion, which is bertambahannya science in the field of arts and crafts archipelago, students have the skills to more skilled Prodak crafts Nusatara continue to grow in public, and Students are able to develop a decorative traditional Malay while creating more creative and innovative.

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THE CONTRIBUTIONS OF DISCIPLINE AND ENVIRONMENTAL KNOWLEDGE ON CLEAN BEHAVIOR OF STUDENTS IN PUBLIC ELEMENTARY SCHOOL KAMPUNG BARU PARIAMAN, WEST SUMATERA

Nurhasan Syah[1], Sanny Edinov[2]

[1,2] Fakultas Teknik Universitas Negeri Padang

ABSTRACT. This study aims to obtain a description of the contribution of discipline and environmental knowledge to the clean behavior of students in public elementary school of 19 Kampung Baru, Pariaman. A quantitative approach was used in this research. The sample of this research were the students in grade I-VI at public elementary school and taken by a simple random sampling of 81 students. The data were collected by asked to fill in the questionnaires. Results showed that: (1) There was a contribution of discipline (X_1) to students' clean behavior (Y) equal to 27.70%, (2) There was a contribution of environmental knowledge (X_2) to students' clean behavior (Y) equal to 53.00% And (3) There was a contribution of discipline (X_1) and environmental knowledge (X_2) to the students' clean behavior (Y) of 54.20%. The results suggest that the discipline (X_1) and environmental knowledge (X_2), either individually or jointly contributes to students' clean behavior (Y). This provides some explanation as to why principals and teachers in school should monitor the students' discipline and environmental knowledge. This knowledge can support the clean behavior of the surrounding environment. On the other hand, it is also advisable for students to always improve their own discipline and environmental knowledge.

Keywords: behavior, clean, elementary students

PRELIMINARY

The school aims to prepare the students for the values and competencies that might be needed in the form of knowledge, attitudes, and skills. Schools as educational institutions play an important role in train the character early on, during childhood phase. However, the school can also be the place of disease transmission if not appropriately managed.

Children in the school age tend to get a various disease. The emergence of different disease that often affects children in the school age associated with clean behavior. Hence, teaching the children about clean behavior in school is an absolute necessity.

A good character must be built in everyone so that they will have responsibility for their behavior. The school has an important role in the development of children personality, for example in their way of thinking, acting and behaving. Clean behavior is one of the awareness that owned by individuals, families, and groups to the personal and environmental hygiene.

Clean living habits that taught since earlier in life indeed accompanied by a disciplined character that owned by the students. Discipline will help the students to build their behavior, develops their attitude of responsibility that includes increasing awareness which is useful for improving the quality of themselves. Individuals who are disciplined will perform a task with orderly and organized manners and follow the applicable rules. Apparently, it will give a positive impact because it can make their lives well-organized.

According Purbantara (2013) behavior is a form of real action. The theory states that behavior is a given action or response to a stimulus to achieve a goal or to survive their life.

Skinner, a behavioral expert, in Putra (2002), distinguishes the behavior becomes natural behavior (innate behavior) and operant behavior. Natural behavior is a behavior that brought since the organism was born, in the form of reflexes and instincts, whereas operant behavior is a behavior that is formed through the learning process.

In the development of behavior, it is influenced by internal and external factors. According to Soekidjo (2003) the internal factors that affect the development of behavior are the knowledge, intelligence, perception, emotion, and motivation, whereas the external factors are both physical and nonphysical include climatic, human, socio-economic, and cultural.

Roger in Soekidjo (2003) revealed that before people acquire new behavior, there was an on-going process that happens to the people. Awareness was the first thing that arises in the process, where the person is aware towards the upcoming stimulus, then their interest will focus toward the stimulus. Next, evaluation, the people will evaluate whether the forthcoming stimulus was good for them, then try to do things according to the stimulus, and finally adopt the new behavior following the knowledge, awareness, and his attitude toward the stimulus.

Torndike in Razali (2007) explains that the stimulus will cause a particular response. The intensity of the relationship between the stimulus and response can be induced through repeated practice.

Thus, something that learned later (transfer of training) will influence subsequent behavior.

Environmental factors are the most significant factor in determining health status. Therefore, the environmental knowledge is important. Environmental education can increase understanding and awareness of society in the search for solutions and prevention of environmental problems. Some good habits regarding the clean behavior (i.e., taking out the trash to its place, using the toilet and cleaning it after use, etc.) are important to train as early as possible because they will implement this behavior into later in life.

SD Negeri 19, Kampung Baru, which is in Pariaman, a city in West Sumatera. This school is one of the favorite elementary schools which has obtained an A level in the accreditation status. As one of the institutions of formal education, this school is very influential on students' formation. The total of class in this school are 13 class, where the total students in the academic year 2016/2017 as many as 408 people.

Green Open Space such as trees, plants, living pharmacy, composter, and the trash bin is environmentally friendly infrastructure that is already available in this school. The intensity of using the facilities as well as their environmental knowledge can encourage and improve their behavior to have a cleaner life.

The behavior is essentially goal-oriented. Behavior is motivated by a desire to obtain a particular purpose. Some people with a high motivation to act can achieve certain goals that they want.

Individuals who have the knowledge, skills and positive attitude towards environment usually have the intention to have a responsible behavior. The clean behavior that taught since they were young could help them to have a better response to improving their health.

The development of thinking and behavior are critical in the age of 6-12 years old. Children at 6-7 years old usually entering the elementary school and then the school environment will be full of children that in their developmental process (i.e., physic, social and emotional)

School-aged, especially elementary school, usually called as the time when the intellectual is start to develop. This school-aged time is the right time to teach them about the clean behavior because children will be easier to train at this school-aged time.

According to Heriyatni (2013), cleanliness is a human endeavor to maintained a healthy environment sustainably. We will never reach the cleanliness without an awareness of every individual, society, and community to maintain cleanliness.

The Ministry of Health of the Republic of Indonesia explained that the definition of clean behavior is a set of behaviors that practiced based on consciousness as a result of learning that makes a person able to help themselves, which aims to realize a clean conduct public health. Clean behavior is part of a program that has been launched by the government, which is "Perilaku Hidup Bersih dan Sehat (PHBS)" or clean and healthy behaviors.

According to Wibowo (2013), the clean behavior is a series of various forms of behaviors/ actions towards the waste management. For example, behavior that pollutes the environments as an irresponsible action or actions to maintain the environment as the responsible one.

Clean behavior can be expressed as an act or respond to an environmentally responsible behavior in order to be maintained the environment. Individuals who have the knowledge, skills, positive attitude towards the environment and towards pro-environmental behavior, typically tend to have responsible behavior.

People did not realize that they are part of this universe so that the environmental crisis is not yet a common concern. Indeed, humans are part of the environment. Both interact in an ecosystem.

Discipline does not happen by itself, but it must be generated from the actions of the people. Thus, it is important to train or teach people about the discipline, so they can regulate and control himself in order to do something that is socially acceptable to the environment and avoiding behavior that could damage the environment.

The emergence of self-consciousness in environmental disciplines related to the integration of environmental education that began at early age. Correspondingly, Filisyamala Martsiswati and Suryono (2016) finds that the discipline needs to be taught as early as possible to the students, so they will be able to behave by the rules in the community.

According to Perkins in Yanuarita (2011), discipline is a responsibility of a person to organize, manage, and control their behavior and attitude, so that their existence does not harm others and oneself. According to Masruroh (2015), the discipline is obedient to the commands and rules in which individuals can develop the ability to discipline ourselves as one of the characteristics of individual maturity.

According to Soegeng Prijodarminto in Prasetyo (2008), the discipline can be considered as conditions that created and developed through a series of behaviors that indicate the values of obedience, loyalty, and regularity that have become a part of behavior in life. Behavior was created through a process that guided by the family, education, and experience.

Discipline can be expressed as a conscious behavior of an organism to be obedient, submissive, and accountable to the rule of order. In the application of discipline, it needed to make rules and regulations. Discipline is one of the supporting factors in improving the quality of education/school.

According to Von Glaserfeld in Kumurur (2008), knowledge is a collection of facts, and it was

considered as a process of formation (construction) that is evolving and changing. Our knowledge is a construction of our thinking. He emphasized that knowledge is not an imitation of reality.

According to Syamsuri Razali (2007), knowledge is an object that belongs to a science. Hamilton in Razali (2007) states that the domain knowledge is essential for the formation of a person's actions.

Knowledge is not a description of the world, but the knowledge is always the result of a cognitive construction of reality through one's activities. Knowledge about the world is a human creation that is constructed from experience.

According to Jumadil (2015), environmental knowledge is already integrated into education curriculum that implements Adiwiyata program in their school. Environmental Education is the way to improve the knowledge, awareness, and skills of the communities in sustaining the environment.

Most of the knowledge gained through the eyes and ears. One's knowledge has different intensity and level. Soekidjo (2003) argues that knowledge or cognitive domain is important for the formation of a person's behavior. In the cognitive domain, there is six level of knowledge, namely knowledge, comprehension, application, analysis, synthesis, and evaluation.

According to Indonesian's Law No. 32 in 2009, The environment is the unity of objects, powers, condition, and human including their behavior that will influence the situation itself and other living creatures. Thus, environmental knowledge can be defined as everything that is associated with the environment after the direct contact with nature through the instrumentality of the senses and lead to an immediate impression in people's mind.

An effort to maintain and develop clean and healthy habits carried out in an integrated manner through educational programs and services at the school implemented with the School Health Unit. The School Health Unit purpose to improve the quality of education and learning achievement of learners to develop hygienic behavior and healthy life. According to Afandi (2013) the common goal of environmental education by UNESCO in Tbilisi conference in 1997 is as follows:

1. To help explain the problem of awareness and concern about the interrelationship between economic, social, political, and ecology in urban and rural areas
2. To give a chance to everyone to develop the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment
3. To create a new pattern of behavior in individuals, groups, and society towards the environment.

Hiswari (2007) suggests that the level of understanding of the environmental knowledge is the results of an environmental learning process to the students' attitudes toward the environment. Environmental education is expected to be embedded and transformed on the students.

Discipline and environmental knowledge of the students are two factors that influence the success of the school in creating and maintaining the environment to keep it clean.

The current study is the contribution of discipline and environmental knowledge toward the clean behavior of students in the elementary school in Pariaman.

The problem statement from the current study is how much the contribution of discipline and environmental knowledge toward the clean behavior of students in SD Negeri 19 Kampung Baru, Pariaman.

METHOD

This research was conducted with a quantitative approach that belongs to the type of survey research.

As a causative research, this study was aimed to reveal their relationship and the contribution of variables that exist. As these variables include the clean behavior of students (Y), discipline (X1), and knowledge of the environment (X2). In this research, as well as interviews to sharpen the results that have been obtained using a questionnaire instrument.

The population was students in SD Negeri 19 Kampung Baru, Pariaman. Proportional random sampling was used to gather the sample of the study and as a result, there were 81 students that participated in this study.

To obtain the data from the variables, the researchers used questionnaires in the form of multiple choice where validity and reliability of the tools already met. A correlation and ANOVA were conducted to analyze the data using the SPSS for Windows Version 23.00. interview method was also conducted in order to get the deeper result and these results were reported in a descriptive or qualitative form.

DISCUSSION

Based on the results of the normality test, a significant probability of students' clean behavior(Y), discipline (X_1), and environmental knowledge (X_2), for 0.200, 0.181 and 0.056, respectively. These results suggesting that the distribution of data is normal (as seen in Table 1).

As shown in Table 2, The first hypothesis was analyzed by simple regression correlation analysis. The results showed that the correlation coefficient between discipline (X_1) and students' clean behavior (Y) was significantly correlated [rxy = .526,

$p < .0001$]. Thus, there was a significant correlation between students' clean behavior and discipline with .277 coefficient determination (27.70% of contribution).

Table 1.
Normality Test Results Summary

Variables	Significance	α (Alpha)	Information
Behavior Clean (Y)	.200	0.05	Normal
Discipline (X_1)	.181	0.05	Normal
Environmental Sciences (X_2)	0.056	0.05	Normal

Table 2.
Correlation Test Results Summary The relationship between X_1 with Y

Correlation	Correlation Coefficient	Probability Significance	Coefficient of Determination	Relationship X_1 to Y
X_1 with Y	0,526	0,000	0.277	There Relations

These results suggest that the discipline remained significantly related to the variable Y, means that improvement of the students' discipline will improve their clean behavior as well.

The second hypothesis analysis was shown in Table 3. The results showed that the correlation between environmental knowledge (X_2) and students' clean behavior (Y) was significantly correlated [$rxy = .728$, $p < .00$]. Thus, there was a highly significant correlation between variable X_2 and Y with .530 (53% of contribution) toward the students' clean behavior.

This suggests that environmental knowledge remained significantly related to the variable Y. The increasing of environmental knowledge will increase the students' clean behavior.

Table 3.
Correlation Test Results Summary The relationship between X_2 with Y

Correlation	Correlation Coefficient	Probability Significance	Coefficient of Determination	Relationship X_1 to Y
X_2 with Y	0.728	0,000	0.530	There is a relationship

The third hypothesis results were presented in Table 4. The correlation between discipline and environmental knowledge was highly significantly correlated [$rxy=.737$, $p =.0001$]. Therefore, there was a significant correlation between discipline and knowledge of the environment together with a coefficient of determination .542 (54.20% of contribution) towards the clean behavior of students.

Table 4.
Multiple Correlation Test Results Summary

Correlation	Correlation Coefficient	Probability Significance	Coefficient of Determination	Contributions X1 to Y
X_1 and X_2 with Y	0.737	0,000	0.542	Significant

Table 5.
Test Results Summary F

Model	Sum of Squares	Df	Mean Square	F	Significance
Regression	8515.196	2	4257.598	46.234	0,000
Residual	7182.828	78	92.088		
Total	15698.025	80			

Based on the results of the F test, F (2,80) = 46.234, $p < .0001$. Thus, the multiple linear regression equations were significant and could be used to express the magnitude of the relationship between independent variables and the dependent variable in this study.

The results of interviews revealed that the disciplinary of the students in keeping the environment clean is already good enough. It can be seen from the observations of the cleanliness of the school, as there was not much trash scattered or deliberately discarded by the students are not in place, and the cleaning schedule goes according to the plan, Friday cleaning day is held every week by the school.

However, to develop the students' disciplinary behavior is not easy. Students should be familiar and care for the environment.

The formation of students' disciplinary was influenced by the existence of the rules at school. The interviews result suggesting that students are happy to undergo the existing regulations, especially regarding the cleanliness. There were many obstacles that students' experience while developing the disciplinary. Thus, the principals may create solutions to make punishments or penalties for the students who are coming late or break the rules. Rewards and Punishments can be a motivation for the students to implement the disciplinary.

To achieve the implementation of discipline in the students' behavior, the awareness of the students is necessary. The support and cooperation from school to facilitate the implementation of current knowledge that owned by the students. Teaching and guiding the students to care about the environment should be a priority.

The students expressed their complaint through the interview about the lack of facilities and infrastructure in the school environment also become obstacles to maintain the sanitary condition. For example, the lack of waste management and the lack of toilet hygiene because there was not enough water.

In connection with the above findings, the need for particular attention to all parties to improve student disciplinary in order to enhance the students' clean behavior. With the increase of discipline, the students will develop better response on the social environment that will ultimately impact on the comfort and safety of the school environment.

Furthermore, the results of interviews conducted with the students also revealed that the environmental knowledge of the students in maintaining the environment cleanliness was excellent. Students have a good understanding of the environment because the school has been integrating the environmental education in teaching materials.

Theories related environmental knowledge that gained since childhood will help in increasing the awareness of the importance of a clean environment because it is also closely related to the health of students in the school. Behavior that is based on understanding will be last longer compared to behavior that is not based on knowledge.

A good knowledge about the environment will improve student awareness of the importance of environmental hygiene so that a clean environment can be maintained. A Cleanliness environment leads to a healthy life of the students. Health, in this case, cannot refer to aspects of treatment but instead refers to the prevention aspect, so it needs to be appropriately addressed so as not harmful to health.

Students' knowledge in environmental hygiene would be useful in waste management. For example, separate the garbage (organic and inorganic), maintaining the cleanliness of the bathrooms and clean water usage. With the increased knowledge of the environment, the behavior of students will be better for the environment that will ultimately impact on the comfort and safety of the school environment.

The student's behavior should be controlled in order to achieve a clean environment. The role of schools in helping the implementation of the clean behavior of students is crucial so that when the children are in school, teachers need to pay more considerable attention to them, either directly through teaching them in the class or by the application.

CONCLUSIONS, SUGGESTIONS, AND IMPLICATIONS

Based on the above results it can be concluded as follows:

1. There was a positive and significant contribution to the discipline with the clean behavior of students. Student discipline was one of the factors that influence the clean behavior of students. Based on the results, students have a pretty good control to keep the environment clean. Students are still under the supervision of teachers so that they're disciplinary of clean behavior were not optimal yet.

2. There was a significant and positive contribution to clean behavior and environmental knowledge with students. Environmental understanding of student was one of the factors that influence the clean behavior. Based on the results, the students have a good experience in protecting the environment to keep it clean. The integration of environmental knowledge in the teaching material given by the teacher adds confidence the students to behave in a clean environment.

3. There was a positive and significant contribution to discipline and knowledge of the environment with the clean behavior of students. Increased discipline and knowledge about the environment can improve the behavior of students towards a clean environment so that the environment can be protected and have a positive impact on health.

Based on the results, here are some suggestions.

1. For teachers can be used as study materials to improve hygiene behavior of students with attention to discipline and knowledge of the environment.

2. For principals and teachers to continually monitor the environment of discipline and knowledge of the students because it can support clean their behavior towards the environment.

3. For students to be able to improve discipline and knowledge possessed environment continually.

4. For further research to conduct another investigation with other variables, so the variables that affect the behavior of the students can be identified clearer.

As the theoretical implication, the discipline and environmental knowledge can be used as a benchmark to improve the clean behavior of students. Student awareness as the leading actor in maintaining the cleanliness of the school should be supported and facilitated in order to train the students to become more aware.

The implications of this study indicate that the discipline and knowledge of clean environment affect the behavior of students. To improve the clean behavior, students need to maintaining discipline and knowledge possessed environment.

The practical implications of this research were students, try always to keep the environment clean, reminding each other of the importance of a clean conduct to be applied, as well as the students have new experiences to broaden their environment.

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ANALYSIS OF VOLUME AND STRONG CONCRETE IMPROVEMENT ON NON-SAND CONCRETE MIXED WITH ADDITION BAKING POWDER

Nurmaidah

Faculty of Engineering, Universitas Medan Area, Sumatera Utara, Indonesia

ABSTRACT: In the process of building construction, efficient use of concrete, economical and workability is the most common. For that sought alternative environmentally friendly concrete manufacture that is by reducing the use of sand. This product from known as Non-Sand Concrete. The researcher tried to apply the use of non-sand concrete mixture with the addition of baking powder and a more enlarged cement water factor of 0.5. In this research Baking Powder (Sodium Bicarbonate) mixed with concrete dough with variation 0%, 0,5%, 1%, and 1,5%. Furthermore, a non-sand concrete mixture of baking powder will be tested by compressive strength and volume increase. After the research and testing of the concrete obtained the result is a decrease in compressive strength if the mixture material is enlarged percentage.

Keywords: Concrete, Non-sand concrete, Strong press, Baking powder

1. INTRODUCTION

Concrete is one of the most widely used construction materials in the implementation of modern building structures. Along with the rapid development in Indonesia, where aspects of the environment must be considered with good sustainability, including in the case of the use of sand which is also a natural resource that should be limited use. Modern concrete technology today allows the use of materials derived from nature to be limited, and on the other hand, additive substances can be utilized optimally for the basic ingredients of a concrete formation. Therefore we need a material to reduce the use of natural materials. One of the basic ingredients used to reduce natural materials is by using a mixture of non-sand concrete as with baking powder.

Baking powder is a dry substance raising specialist, a blend of a carbonate or bicarbonate and a frail corrosive and is utilized for expanding the volume and helping the surface of heated merchandise. Preparing powder works by discharging carbon dioxide gas into a player or batter through a corrosive base response, making rises in the wet blend extend and along these lines raising the blend.

Most economically accessible heating powders are comprised of sodium bicarbonate (otherwise called preparing pop or bicarbonate of pop) and at least one corrosive salts. Run of the mill plans (by weight) call for 30% sodium bicarbonate, 5-12% monocalcium phosphate, and 21-26% sodium aluminum sulfate. The last two fixings are acidic: they join with the sodium bicarbonate and water to deliver the vaporous carbon dioxide. The utilization of two acidic parts is the premise of the expression "twofold acting." Another regular corrosive in such definitions is cream of tartar, a subordinate of tartaric corrosive. Heating powders likewise incorporate segments to help with the consistency and strength of the blend

The limit of this research conducted are as follows:
a. Characteristics studied were the increase in volume and compressive strength of concrete.
b. The concrete studied was non-sand concrete with a mixture of baking powder (sodium bicarbonate).
c. The percentage of baking powder usage is varied in several percentages ie 0%, 0.5%, 1%, 1.5%.
d. Testing of concrete compressive strength is done with cube test object as much as 10 specimens.
e. The baking powder used is obtained from cake supply shop

2. RESEARCH OBJECTIVES

Non-sand concrete with additional ingredients baking powder aims to find out how much influence the addition of baking powder to increase volume and compressive strength of concrete. It is also to know the amount of addition of baking powder to the concrete mixture that can produce the maximum load of concrete compressive strength and how big the increase of concrete volume

3. LITERATURE REVIEW

3.1 Characteristics of Baking Powder (Sodium Bicarbonate)

Sodium bicarbonate is a chemical compound with the formula $NaHCO3$. In the mention of it is often shortened to picnic. This compound belongs to the salt group and has been used for a long time. This

compound is also called baking powder (powder cake), Sodium bicarbonate, sodium hydrogen carbonate, and others. These compounds are crystals that are often present in powder form. Sodium bicarbonate is soluble in water. This compound is used in bread or cake because it reacts with other materials to form carbon dioxide gas, which causes bread to "expand". (Wikipedia, 2014).

Baking Powder is classified as an acid salt, which is formed by combining acids (carbonate) and base (sodium hydroxide) and reacts with other chemicals as a mild alkali. At temperatures above 300 degrees Fahrenheit (149 degrees Celsius), baking powder decomposes into sodium carbonate (more stable substances), water, and carbon dioxide (Purwanto, 2012).

Characteristics of Baking Powder (Sodium Bicarbonate)
a. Has a high melting point.
b. Is an ionic compound with a strong bond.
c. In the form of fused or solution can conduct electricity.
d. The nature of the solution may be acidic, alkaline or neutral. This property depends on the type of acid / strong base forming (Pitriajuliani, 2012).

3.2 Benefits of Baking Powder (Sodium Bicarbonate)

This compound is used in bread or cake because it reacts with other materials to form carbon dioxide gas, which causes bread to "expand". This compound is also used as an antacid drug (ulcer disease or peptic ulcer). Because alkaloid, this compound is also used as an acid neutralizing agent for patients with Acidosis Rubular Renal acidosis (ATR) or Renal Tubular Acidosis (RTA). In addition, sodium bicarbonate can also be used to reduce uric acid levels (Wikipedia, 2014).

3.3 Chemical Reaction

$NaHCO_3$ is generally produced by the Solvay process, which requires sodium chloride, ammonia, and carbon dioxide reactions in water. NaHCO3 is produced as much as 100 000 tons/year (2001). Baking powder is also commercially produced from ash powder (obtained by trona ore mining, dissolved in water and then reacted with carbon dioxide.Then NaHCO3 precipitates according to the following equation: $Na_2CO_3 + CO_2 + H_2O \rightarrow 2\ NaHCO_3$ (Wikipedia, 2014). Na_2HCO_3 can be obtained by reaction between carbon dioxide and sodium hydroxide solution. The initial reaction produces sodium carbonate: $CO_2 + 2NaOH \rightarrow Na_2CO_3 + H_2O$

Furthermore, the addition of carbon dioxide produces sodium bicarbonate, which at a sufficiently high concentration will precipitate the solution: $Na_2CO_3 + CO_2 + H_2O \rightarrow 2NaHCO_3$ (Purwanto, 2012).

3.4 Concrete

Concrete is the bonding of concrete forming materials, which consists of aggregate mixtures (coarse and fine), cement, water, and added with certain mixtures when deemed necessary. The water and cement materials are combined to form a cement paste that serves as a binder, while fine aggregates and coarse aggregates as fillers. (Paul Nugraha & Antoni, 2007).

Table 1 Concrete element

Aggregate (rough + smooth)	60 % - 80%
Semen	7% - 15%
Air	14% - 21%
Udara	1% - 8%

Source: Nugraha, 2007

3.5 Advantages and Disadvantages of Concrete

3.5.1. Advantages

a. Concrete is able to withstand compressive forces well and has the properties of corrosion resistance and decay by conditions
b. Fresh concrete can be easily printed as you wish. Mold can also be used repeatedly so it is more economical.
c. Fresh concrete can be sprayed on old cracked concrete surfaces and can be loaded into concrete cracks in the repair process.
d. Fresh concrete can be pumped so as to allow it to be poured in places where it is difficult.
e. Concrete wear resistant and fireproof, so the treatment is cheaper.

3.5.2 Disadvantages

a. Concrete is considered unable to withstand tensile force, making it easy to crack. Therefore it is necessary to give reinforcing steel as a drag pull barrier.
b. Hard concrete shrinks and expands when temperature changes occur, so expansion joints are required to prevent cracking due to temperature changes.
c. To get perfectly impermeable concrete, it must be done with the careful workmanship.
d. Concrete is brittle (not daktail) so it must be calculated and studied carefully so that after composite with steel reinforcement become ductile, especially at earthquake resistant structure

3.6 Concrete Material

3.6.1 Cement

Cement is defined as an adhesive material that has the properties of binding solid materials into a single unit that is compact and strong. (Bonardo Pangaribuan, Holcim). Cement is the result of a highly complex industry, with different mixtures and arrangements. Semen can be divided into two groups, namely: 1). Non-hydraulic cement, and 2). Hydraulic Cement.

3.6.2 Agregat

Aggregates are collections of broken stone, gravel, sand, or other minerals either in the form of natural or artificial products (SNI No: 1737-1989-F). Aggregates are granular materials such as sand, gravel, the crushed stone used together with a binder to form a hydraulic cement concrete or a mortar.

3.6.3 Water

Water used is clean water that can be drunk, water is needed in the manufacture of concrete to trigger the chemical process of cement, moistens aggregate and gives ease in concrete workmanship. Cement cannot be a paste without water. Water must always exist in liquid concrete, not only for the cement hydration but also to convert it into a paste so that the concrete is workable.

4. RESEARCH METHODS

Research methodology includes data collection (sample), survey, raw material supply, raw material testing, mix design, manufacture of the test specimen (cubes), maintenance, and compressive strength testing in the concrete laboratory.

The object of this research is non-sand concrete with additional sodium bicarbonate (Baking Powder) with mixed variation 0%, 0,5%, 1%, 1,5%. While the compressive strength test and analysis of the increase in the volume of concrete made after the concrete were 28 days old.

In general, the sequence of research phases include:
a. Supply of concrete materials,
b. Examination of concrete materials,
c. Planning of Mix design
d. Preparation of specimens and specific gravity of fresh concrete,
e. Treatment of test specimens,
f. Measurement of increase in the volume of concrete,

g. Testing of compressive strength of 28 days old concrete.

5. RESULT

5.1 Testing of Increase of Concrete Volume

Testing Increase in the volume of concrete is done after 24 hours of casting is intended to get the result of increasing the volume of concrete by using Sodium Bicarbonate added materials. Testing results of the increase of concrete cube volume can be seen in the following table:

Table 2 Test Result Increase Volume Percentage Mix 0%

No. of test objects	Weight (gram)	High start (cm)	High end (cm)	Difference (cm)
1	5661	11,5	11,5	0
2	5598	11,5	11,5	0
3	5704	11,5	11,5	0
4	5689	11,5	11,5	0
5	5700	11,5	11,5	0
Average	5670,4	11,5	11,5	0

Table 3 Test Result Increase Volume Percentage Mix 0,5%

No. of test objects	Weight (gram)	High start (cm)	High end (cm)	Difference (cm)
1	5742	11,5	11,5	0
2	5698	11,5	11,5	0
3	5700	11,5	11,5	0
4	5650	11,5	11,5	0
5	5452	11,5	11,5	0
Average	5648,4	11,5	11,5	0

Table 4 Test Result Increase Volume Percentage Mix 1%

No. of test objects	Weight (gram)	High start (cm)	High end (cm)	Difference (cm)
1	5604	11,5	11,5	0
2	5709	11,5	11,5	0
3	5689	11,5	11,5	0
4	5599	11,5	11,5	0
5	5712	11,5	11,5	0
Average	5662,6	11,5	11,5	0

Table 5 Test Result Increase Volume Percentage Mix 1,5%

No. of test objects	Weight (gram)	High start (cm)	High end (cm)	Difference (cm)
1	5714	11,5	11,5	0

2	5689	11,5	11,5	0
3	5709	11,5	11,5	0
4	5659	11,5	11,5	0
5	5622	11,5	11,5	0
Average	5678,6	11,5	11,5	0

From the test result, the increase of cube volume did not change any volume on the concrete in line with the addition of baking powder (sodium bicarbonate) with the variation of 0.5%, 1%, and 1.5%. This is because the percentage of the addition of baking powder is too small. The decrease of compressive strength of concrete in this research occurred because of the influence of Sodium Bicarbonate (Baking Powder).
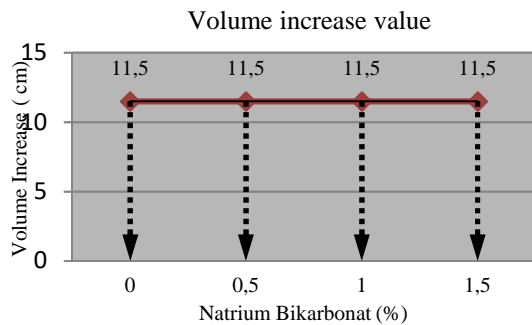
Fig.1 Graph of relation of volume increase to addition of sodium bicarbonate

4.2 Strong Testing of Concrete Cube Press

Testing of concrete compressive strength done at age 28 days is intended to get the result of the increased compressive strength of concrete by using Sodium Bicarbonate added material and the result is compared with normal concrete. The following is presented in the test results of concrete press cube strength

Table 6 Strong Concrete Pressure Percentage Mixed Results 0%

No.of test objects	Weight (kg)	Avg Weight (kg)	Strong Press (kg/m^3)	Strong Press average
1	7595		174,54	
2	7605		179,05	
3	7580		172,60	
4	7593		169,87	
5	7610	7594,5	175,02	174,81
6	7605		176,50	
7	7590		174,32	
8	7622		169,78	
9	7570		177,60	
10	7575		178,89	

Table 7 Strong Concrete Pressure Percentage Mixed Results 0,5%

No.of test objects	Weight (kg)	Avg Weight (kg)	Strong Press (kg/m^3)	Strong Press average
1	7635		159,20	
2	7598		161,05	
3	7550		160,60	
4	7615		161,70	
5	7631	7594,5	160,09	159,76
6	7620		161,00	
7	7601		160,54	
8	7588		157,30	
9	7635		157,40	
10	7610		158,80	

Table 8 Strong Concrete Pressure Percentage Mixed Results 1%

No.of test objects	Weight (kg)	Avg Weight (kg)	Strong Press (kg/m^3)	Strong Press average
1	7650		150,20	
2	7587		148,05	
3	7640		149,60	
4	7530		146,70	
5	7489	7601,3	141,09	146,17
6	7630		143,10	
7	7545		144,54	
8	7750		142,30	
9	7587		146,40	
10	7605		149,80	

Table 9 Strong Concrete Pressure Percentage Mixed Results 1,5%

No.of test objects	Weight (kg)	Avg Weight (kg)	Strong Press (kg/m^3)	Strong Press average
1	7704		130,20	
2	7532		131,05	
3	7623		135,60	
4	7587		139,70	
5	7497	7585	135,09	135,66
6	7589		131,00	
7	7615		138,54	
8	7643		138,30	
9	7490		137,40	
10	7570		139,80	

From the results of the compressive strength testing of cubes at the age of 28 days, there was a significant decrease of concrete compressive strength in line with the addition of Sodium Bicarbonate with variations of 0.5%, 1%, 1.5%. While in the normal concrete decline that occurred at 8.6%, 16.38%, 22.39%.

The decrease of concrete compressive strength in this research is due to the moisture content and the effect of large Sodium Bicarbonate reaction to the concrete mixture chemical process.
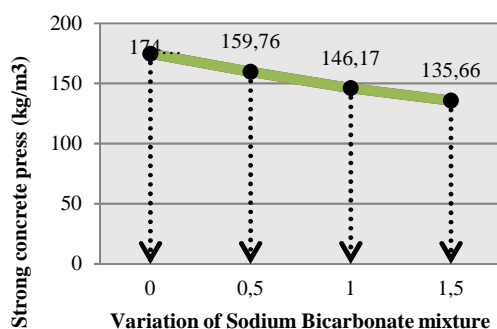
6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

a. Decrease in compressive strength of concrete due to the excessive influence of carbon dioxide release, and also because sodium bicarbonate is corrosive acid for concrete

b. The chemical bond reaction between Cement + Water + Sodium Bicarbonate causes clumping. The clumping at the time of hydration arises because the cement absorbs moisture and CO2 in sufficient quantities resulting in clumping. The cement that agglomerates the quality will decrease due to the increase of Loss On Ignition (LOI) and the decrease in specific gravity so that the cement strength decreases, the binding time and the hardening are longer, and the occurrence of a false set.

c. From the test results increase in volume does not change any volume in line with the addition of percentage variation of sodium bicarbonate powder (Baking powder) due to the percentage of the addition is too small.

d. With the addition of baking powder on 10 samples of test specimen where the variation of an addition of 0.5%, 1%, 1.5%. The highest compressive strength is in the mixture of baking powder with a content of 0.5%, ie 159.76 kg/cm3, and the highest weight of concrete content lies in the baking powder mixture of 1.5% ie 2099.04 kg/m3 and the lowest at 0,5% ie 2094,87 kg/m3.

6.2 Recommendations

a. Required a standard way or method in making mix design for non-sand concrete.

b. For the manufacture of non-sand concrete, cement water factor should be more attention. It is suggested that the cement water factor used is 0.4, although it will form a porous concrete.

c. It is not recommended to add Baking Powder powder as an additional addictive ingredient because Sodium Bicarbonate (Baking Powder) is corrosive to concrete.

d. For further research is expected to look for addictive substances that can raise the volume of concrete but also not damage the quality of the concrete itself.

7. ACKNOWLEDGMENTS

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BRACING CROSS SECTION EFFECT TO DISSIPATION ENERGY BY NUMERICAL ANALYSIS

Prima Zola[1],Rahmat[2] ,Fitra Rifwan[3]

[1]Engineering Faculty, Universitas Negeri Padang, Indonesia
[2]Engineering Faculty, Universitas Bung Hatta Padang, Indonesia
[3]Engineering Faculty, Universitas Negeri Padang, Indonesia

ABSTRACT: Indonesia is located in the earthquake-prone area. In the planning of earthquake-resisted structures, ductility, stiffness, and amount of structural dissipation energy are very important factors. Experts in the field of structural engineering try to find a structural system that can minimize structural damage due to earthquake loads. The structure system must be able to dissipate the energy due to earthquake load. Earthquake resistant buildings made of steel can have advantages in terms of strength, weight, and ductility compared to reinforced concrete buildings when properly planned. Known earthquake-resistant structures include two types of portal systems: a moment of resisting frame (MRF) and portals with stiffening elements or Braced Frame (BF). The portal system with the stiffening element or the Braced Frame (BF) is divided into two subsystems: Concentrically Braced Frame (CBF) and eccentrically bracedFrame(EBF)

Among the three earthquake-resistant structural buildings on top, the structure of Concentrically Braced Frame (CBF) type X.has a higher rigidity. Because the diagonal shape will mechanically have a more rigid nature of the quadrilateral. The absorption of the energy of a concentric mined steel frame earthquake is done through melting and post bending of the stiffening element.

This paper presents numeric study output on ductility, stiffness, and dissipation energy on Concentrically Braced Frames type X as consequence of different structural bracing cross-sectional installation position. The numeric study output by using MSC/Nastran software with conducted five modeling of single-story Concentrically Braced Frames type X (CBF-X) which measures 4m x 6m with the different installation position of the cross-section of bracing and gusset plate. Based on the results of numerical analysis of cyclic and push -over analysis, we get the load curve (P) vs displacement (δ) which explains the energy dissipation behavior of the five structures and analyzing the behavior of the five structures studied in this numerical study due to the monotonic and cyclic loading so as to obtain a clear picture of the structure of CBF- X is best used. The different bracing cross-sectional installation position affects ductility, stiffness, and amount of dissipation energy on Concentrically Braced Frames type-X. It is closely related to a difference of the first yielding location occurring on structures.

The bracing capability to perceive a large inelastic deformation is affected by bracing stability on buckling without the loss of strength and stiffness. Total gusset plates used in Concentrically Braced Frames type-X affects ductility and stiffness values. This numeric study output shows that CBF-X structure is the best for use as earthquake-resisted structures with the position of web bracing cross-sectional stay in one field with web column and beam position and make use a gusset plate where structural first yielding occurred in 2t area at a gusset plate.

Keywords: ductility, stiffness, dissipation energy, Concentrically Braced Frames type X, gusset plate.

1. INTRODUCTION

Earthquake resistant buildings made of steel have advantages in terms of strength, weight, and ductility compared to reinforced concrete buildings when properly planned.

Earthquake-resistant structures include two types of portal systems: moment resistant portals or Resisting Frame Moments (MRF) and portals with Braced Frame (BF). The portal system with a stiffening element or Braced Frame (BF) is divided into two subsystems: Concentrically Braced Frame (CBF) and Eccentrically Braced Frame (EBF).

This study will discuss the steel structure of Concentrically Braced Frames type X. Among the three earthquake-resistant structural buildings on top, the framework of steel structure Concentrically Braced Frames type X has a higher stiffness, because the diagonal shape will mechanically have a more stiffness

compare of the quadrilateral. The absorption of the earthquake energy of Concentrically Braced Frames earthquake is carried out through melting and post-bending of the stiffening element.

Some earlier researchers have examined the inelastic behavior of bracing elements against cyclic loading. The slimness and compactness of bracing cross sections are important parameters that influence the bracing behavior so that in the design of the structure with the stiffener is required limitation of these parameters in order for the structure to have ducktail.

This study aims to study the effect of changing the position of mounting of bringing cross-section to stiffness and ductility on Concentrically Braced Frame type X structures on the behavior of earthquake dissipation energy.

For simplified analysis, some limitations are taken, such as:

1. A numerical study was conducted on different bunded sectional mounting positions on two single-layer X-type concentrated steel frame structures with the different installation of buhul plates. Used knot plate with welding for bracing connection to column-beam. Welding problems were not addressed in this study.
2. The cross-column and bracing elements used are section I, regardless of imperfections of the material.
3. The steel stress-strain curve relationship is modeled by the ability of strain hardening to reach a breaking state (bilinear elasto-plastic with strain-hardening). This material behavior is uniform across the cross-section and along the elements.
4. The loading conditions of the structure are static monotonic and cyclic displacement

2. HEADINGS

2.1. Concentrically Braced Frames type X

The Concentrically Braced Frames type X (CBF-X) is a steel building frame that holds lateral load through the axial rigidity of each element. The hallmark of this system lies in the diagonal confession on each frame. This diagonal shape will mechanically have a more rigid nature of the quadrilateral. The main purpose of adding a stiffening element is to nail the structure in such a way that its deviation is still eligible. The absorption of earthquake energy of bracing element is done through melting and post-bending of the stiffening element. The buckling element of the cyclic loading causes the load capacity to decrease drastically, so the higher the cycle of the pinching cyclic load will be more clearly visible on the energy dissipation curve of the P- structure.

The value of ductility of the structure can be obtained as a comparison between total deformation and deformation when melting. In this study, the value of yield stress deformation used is the first yield stress when the shift occurs in structures that can be obtained from the analysis of MSC / Nastran. For the total deformation, the value used is the value of displacement when the ultimate load is reached.

2.2. Plastic Analysis

Plasticity-based designs have several advantages including more efficient in the use of structural profile sizes than elastic designs, can make more accurate estimates of maximum structural load calculations so as to make safety factors more accurate than elastic designs, and more easily applied for more complex structures compared to elastic designs. In steel structures with perfectly elastic-plastic strain conditions, the structural parts having yield stress cannot withstand additional stress. The structure will melt to an additional load or the stress will be transferred to another part of the structure that has not reached the melting, which is still in the elastic region and is able to withstand the additional voltage. In this case, the plasticity will balance the stress in case of overload. The stress-strain diagram is assumed to have an ideal shape such as figure II.4. The melting point and

proportional limit are assumed to be at the same point for steel, and the stress-strain diagram is assumed to be straight in the plateau region. Outside the plateau area, there is a strain hardening area. In this area theoretically, the steel can withstand additional stress with a very large strain.

3. TABLES, FIGURES, AND EQUATIONS

In general, this research is done with the following stages:
1. Study the literature to inventory the parameters that affect the ductility and energy absorption that have been done by previous researchers.
2. With the help of MSC / Nastran software, perform two modeling of a single floor type CBF- X structure measuring 4 m x 6 m with different bracing cross-sectional position and gusset plate.
3. Based on the results of numerical analysis of cyclic and push -over analysis, we get the load curve (P) vs. displacement ( ) which explains the behavior of energy dissipation of both structures.
4. Analyzing the behavior of the two structures studied in this numerical study due to monotonic and cyclic loading to obtain a clear picture of the best structure of Concentrically Braced Frame type X is used.

The portal system under consideration is the longitudinal direction (4 x 6) m
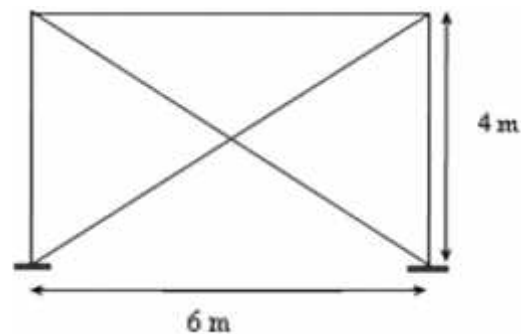
Fig 3.1. CBF-X structure reviewed

Reference Planning

Planning of this type of concentric steel frame structure X is based on the provisions of Seismic Provision for Structural Buildings in 2002 and Procedures for Planning Steel Structure for Building in 2002.

Building Data

- The location of the structure is in region 3 with hard soil type with the price of Ca and Cv = 0.18 and 0.23
- The important factor of structure (I) for the office is 1
- Ratification modification factor (R) for CBF-X portal system retrieved = 6.0

Material Quality

Ñ f_y **⊢** = 250 MPa

Ñ   E   = 200000 Mpa

Material Modeling
In this study used steel materials with parameter values for modeling in MSC / Nastran as follows:

The mechanical properties of the Magnitude Symbol
Modulus of elasticity (E) = 200000 MPa
Poisson ratio   = 0.3
fy = 375 Mpa
fu = 508 MPa

Element Modeling
The structural form analyzed is the CBF type X structure. The profile used for the beam, column, and bring components is profiled I. The structural elements are modeled as elements up to the QUAD4 plate with meshing elements such as the drawing.
The condition of the structure placement is the perfect fixed by reining in all the displacements and rotations that occur on all three Cartesian axes. In the panel, zone area is given a diagonal bracing to prevent buckling in the panel zone area.
The distribution of the element meshing in the area of the bushel plate, bearing, and bracing is sufficiently small to allow the deformation and stress-strain distribution occurring in the structure as well as on its elements to be well visualized. The meshing division is intended to speed up the execution time and minimize the running memory in cyclic loading.
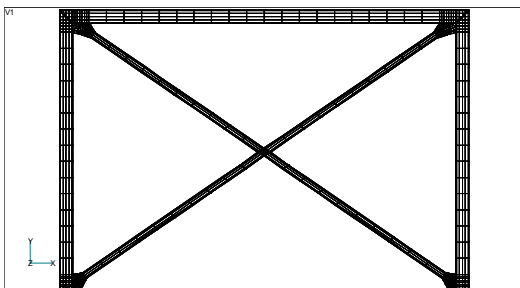
Fig. 3.2. Modeling Elements on CBF-X
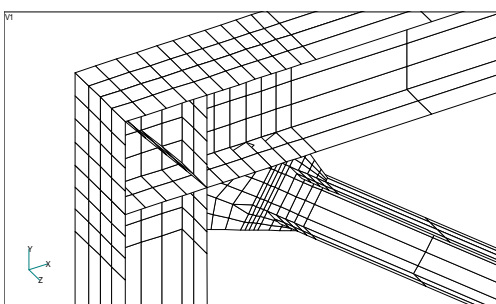
Fig. 3.3 Modeling Element in the panel zone area

Structured Modeling
This numerical study modeled five centrifugal structured steel frame structures of type X (CBF-X) with different beveled cross-sectional and plate mounting positions. For the purpose of explaining the positioning of the dressing cross-sectional positioning on the five structures, the figure shows the thickness of the plate elements. However, in modeling MSC / Nastran structural elements are QUAD4 plate elements.

The Position of Bracing On Structure
In this position, the dressing is placed with the position of the body in one field with the position of the column body and the beam is mounted parallel to the portal plane, as shown in the figure
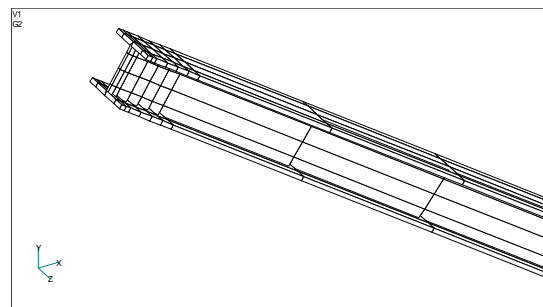
Fig.3.4 Installation Position

Modeling the Structure
The CBF - X structure was studied using profiles I for beams and columns of the following size:
B = 100 mm, h = 100 mm, tw = 6 mm, tf = 8 mm

Fig. 3.5. Profile Size I for beams and columns

A. Structure I
The structure I use is in the form of profile I with size 100.100.6.8 mm. Bring is mounted in an I

mounting position and mounted on a 20mm thick plate of buhul plate welded on bring wings, columns, and beams. The modeling is as shown in the figure
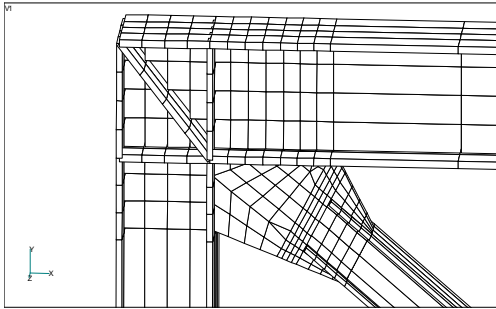
Fig 3.6. Modeling on Structure I
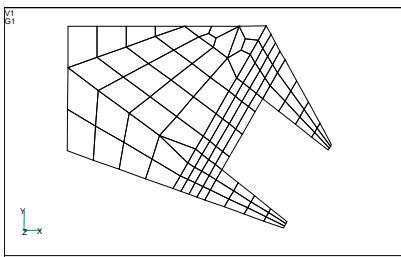
Fig. 3.7. Detailing gusset plate on structure I

The structure is designed for the first melting position to occur in the 2t area (2 x thick gusset plates) on the gusset plate. In the 2t region, meshing elements are made more tightly to be able to clearly see the first melting position and the tension on the elements and the position of the plastic joints formed in the 2t region.

B. Structure II

Structure II using being in the form of profile I with size 100.100.6.8 mm. Bring is mounted with an I mounting position on two 10 mm thick gusset plates that are welded on both wing bracing, column wings, and beams. The modeling is as shown in the figure.
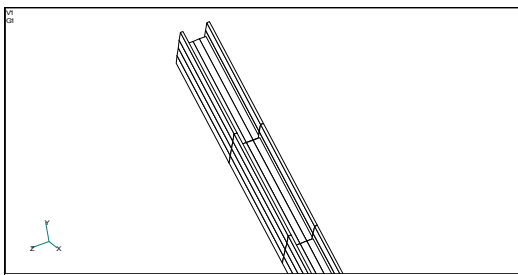
Figure 3.8. Modeling on Structure II
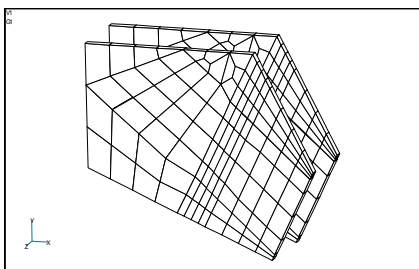
Figure 3.9 Detailing gusset plate on structure II

Detailing Gusset Plate

Connection gusset plate and bracing is designed as pins bearing so that rotation can occur at the end of bracing and on the plate buhul plastic joints occur. To ensure rotation can occur at the bracing ends then the connection detailing must meet the following requirements: A.End of bracing parallel to melting line of gusset plate

B. The axis of the line of the gusset plate is perpendicular to the axis of bracing.

C. The distance from the end of bracing to the melting line of the gusset plate is 2 times the thickness of the gusset plate.

The loading is monotonic loading and cyclic loading by providing a horizontal load centered on the nodal in the panel zone. The method used in the calculation is the displacement control method. In this method, the load is in the form of a displacement load. The load is given gradually with the increase of the load arranged in such a way by controlling it at each stage of loading.
Monotonic loading is given to obtain the first yield stress (y) in the structure. The cyclic loading is applied to the structure to obtain the load-displacement hysteretic loop so that energy dissipation can be calculated as the area of the hysteretic closed curve.

4. CONCLUSION

The result of the monotonic loading of structure I am shown below:
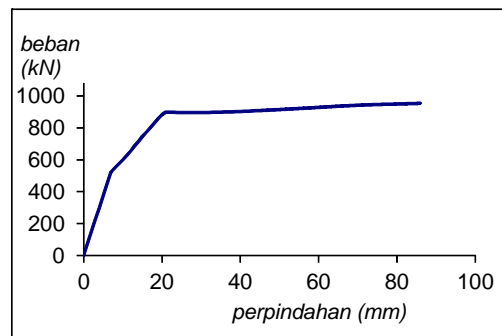
Figure 4.1.Load curve vs displacement monotonic in structure I
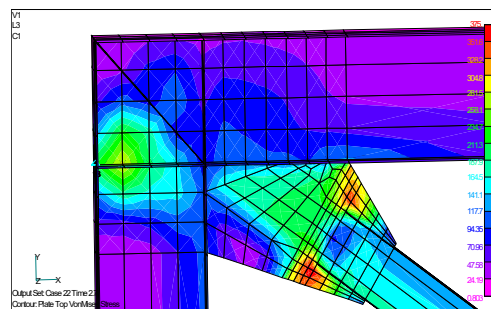
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Figure 4.2. Load curve vs displacement monotonic in structure I
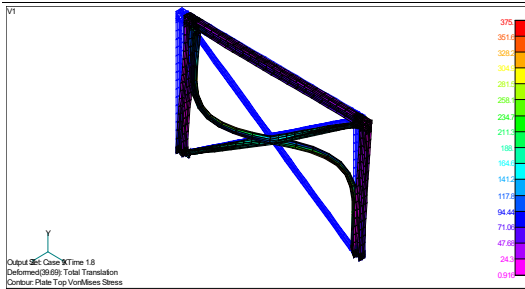
Figure 4.3. Contour of structural stress at 9 mm displacement load(Isometric direction)
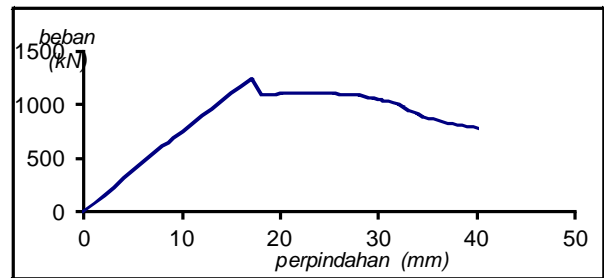
Figure 4.5. .Load curve vs displacement monotonic in structure II
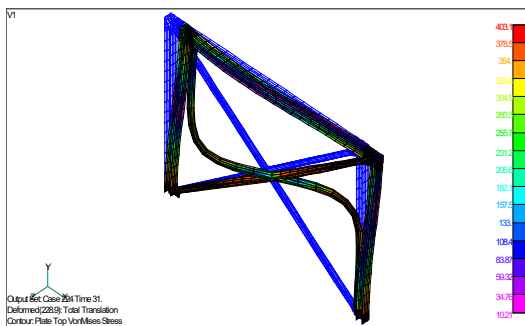
Figure 4.4. Contour of structural stress at 86 mm displacement loa(Isometric direction)

From the curve above can be explained the behavior of the structure of each load increase. The first melt occurred on the 8 mm displacement with a load value of 548.8 KN at 2t area on the buhul plate on press brewing. Before melting occurs, the structure is still elastic in that each load increase will be followed by the displacement of the structure which is still linear, so that the elasticity value (k1) is high because the displacement value of the structure is still small with a considerable load increase. After the first meeting in the 2t region on the buhul plate in being press, the structure enters the inelastic region. Melting process will occur in all directions, both in the direction of being cross-section and other outer fiber parts. In the area of 2t on the gusset plate will occur plastic joints. In this condition, the elastic stiffness value (k2) becomes less than k1. After buckling on being press, the displacement of 21 mm tensile bring began melting. The melt in this tensile stretch will cause a large deformed structure with a fairly small increase in load, where the stiffness value (k3) is close to zero. As the load increases, the bottom column begins to melt. Then at the 86 mm displacement with a load of 953.2 KN of the lower wing area on the starting blocks yielding. At 87 mm displacement, the structure is not able to withstand load because the beam is getting yielded until the collapse occurs.

Load curve vs displacement monotonic structure II

Figure 4.6 Contour of structural stress at displacement load 40 mm (XY direction)
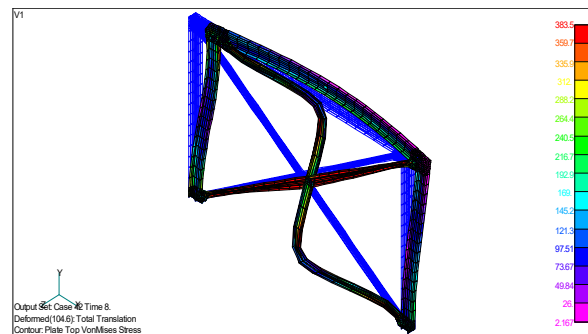
Fig 4.7 Contour of structural stress at displacement load 40 mm (isometric direction)

From the curve above can be explained how the behavior of structure II due to monotonic loading. At a displacement load of 14 mm, the structure melts first in the wing area on the press bracing with a load of 1036.9 KN. As a result, press bracing bends toward the weak axis of the cross-section or into the field of the portal. As the load increases, melting occurs in all parts of the press bracing. In this condition, the structure is in inelastic condition so that it can deform with a considerable load burden. But on the displacement load 18 mm, press bracing tap more bend in the direction of the field of the portal resulting in significant load decrease.

After press bracing bend in the field of the portal, with

increasing load, tensile being starts to melt with a not too large load increase. At a displacement value of 23.5 mm, the magnitude of the load begins to fall again due to the occurrence of melting on the wing of the beam. As a result, the load will decrease as the value of structural displacement due to bending on mm displacement load (Isometric direction)

From the curve above can be explained the behavior of the structure of each load increase. The first melt occurred on the 8 mm displacement with a load value of 548.8 KN at 2t area on the buhul plate on press brewing. Before melting occurs, the structure is still elastic in that each load increase will be followed by the displacement of the structure which is still linear, so that the elasticity value (k1) is high because the displacement value of the structure is still small with a considerable load increase. After the first melting in the 2t region on the bushel plate in being press, the structure enters the inelastic region. Melting process will occur in all directions, both in the direction of being cross-section and other outer fiber parts. In the area of 2t on the plate, but will occur plastic joints. In this condition, the elastic stiffness value(k2) becomes less than k1. After buckling on being press, the displacement of 21 mm tensile bracing began melting. The melt in this tensile stretch will cause a large deformed structure with a fairly small increase in load, where the stiffness value (k3) is close to zero. As the load increases, the bottom column begins to melt. Then at the 86 mm displacement with a load of 953.2 KN of the lower wing area on the starting blocks melting (figure IV.1c). At 87 mm displacement, the structure is not able to withstand load because the beam is getting melted until the collapse occurs.

As a result, press bracing bends toward the weak axis of the cross-section or into the field of the portal. As the load increases, melting occurs in all parts of the press bracing. In this condition, the structure is in inelastic condition so that it can deform with a considerable load burden. But on the displacement load of 18 mm press bracing tap more bend in the direction of the field of the portal resulting in significant load decrease.

After press bracing bend in the field of the portal, with increasing load, tensile being starts to melt with a not too large load increase. At a displacement value of 23.5 mm, the magnitude of the load begins to fall again due to the occurrence of melting on the wing of the beam. As a result, the load will decrease along with the increase of the displacement value of the structure due to buckling on the press being and the larger beam so that the structure can no longer withstand the load.

Cyclic Loading

The result of cyclic loading in structure I am shown in Figure 4.8
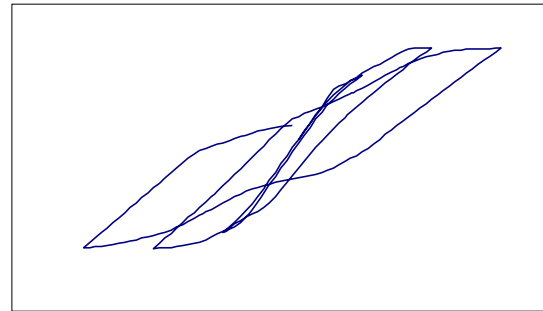
Figure 4.8. The cyclic load-displacement curve of structure I

The cyclic loading of structure I am carried out over three cycles of 1.5 yield, 3 yield, and 4 yield. The first cycle is provided with a maximum displacement load of 12mm(1.5 yield).
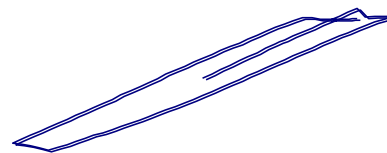
Fig. 4.9 The cyclic load-displacement curve of structure

In structure, I with one gusset plate, the first melt of the structure occurs in the area of 2t on the gusset plate with an 8 mm displacement value and a load of 538.1 kN. Whereas in structure III with two plates of the first yield stress of structure occurs in the wing area on the press being with a displacement value of 14 mm and the weight of 1036.9 KN. It appears that structure III has a better ability to increase the stiffness of the structure due to lateral loads, where the first yield stress of structure II occurs at load values and displacements that are almost twice as large as that of structure I. However, the first melt in structure II occurs in the press wing bracing area, not as expected in the design of the CBF-X steel frame structure where in the plastic joint is not formed in the 2t region of the gusset plate. As the load increases, the press bracing further bends the weaker axis and there is a significant drop in load. This is due to the position of the installation of bracing cross sections that cause the slimness value of bracing in the direction of weak axis increases because both ends of the wing bracing welded to the gusset plate resulting in the condition of the ends of bracing clamped rigidly. Unlike structure I where the plastic joints are formed in the 2t region of the knot plate so that the conditions of the breeding tips in the case of bending to the weak axis of the bracing are closer to the joints.

The position of bracing cross-sections affects the stiffness and ductility of the structure. The structure with the position of mounting of bracing cross section like structure I will more ductile compared to the position of installation of structure II. . This is due to the position of

mounting of bracing cross section on structure II causing the slimness value of bracing in the weaker axis direction is bigger because both ends of the wing bracing section are welded to the gusset plate causing the condition of the brass ends to be clamped rigidly, so the structure II is more rigid. A bracing such as structure II provides a yield displacement load value 1.5 times larger than the position of the bracing cross-section of structure I. But the ductility value of the structure is smaller than structure   I

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DEVELOPMENT OF MODEL OF PROPELLER-CROSS FLOW WATER TURBINE FOR PICO HYDRO POWER GENERATORTITLE

Purwantono[1], Refdinal[2], Hendri[3], and Syahrul[4]

Fakultas Teknik, Universitas Negeri Padang, Padang,Indonesia

[*]Corresponding author:purwantonomsn@gmail.com

ABSTRACT: According to literature survey, the most suitable water turbines for power generator at low debit and water head is a cross-flow turbine. The objective of this research is to develop a cross-flow turbine combined to a propeller as a Pico hydro power generator. The water in cross-flow turbine exhausts system still keeps kinetic energy that can be reused as propeller propulsion. Caplan-type propellers mounted on the bottom of the turbine. The intermediate medium connecting the two turbine models is the conductive blades, which are installer between cross flow and Kaplan turbines. These blades serve to guide the water out of the cross-flow turbine to the Kaplan turbine. The parameters to be analyzed in the study are the water head, flow rate, and water velocity. The results showed that the energy absorption level of cross-flow exhaust water depending on debit water velocity.

Keywords: Pico hydro, cross flow, propeller.

1. INTRODUCTION

Electricity needs for remote villages with low electricity consumption levels require relatively small generating capacity. This can be fulfilled by exploiting the potential of hydro power available and located around them [1].The micro hydro power plant is a small-scale power plant that uses hydropower as its driving force such as irrigation channels, rivers or natural waterfalls by utilizing head and the amount of water discharge [2].Recently, micro hydro become attractive because of its clean energy sources, renewable and has a good future development [3]. Recently, small hydropower attracts attention because of its clean, renewable and abundant energy resources to develop [4].Nowadays in the 21st century most popular is small-scale hydropower i.e. micro hydro power [5].

The potential of hydro power in Indonesia reaches 75,620 MW, while the newly built 3,530 MW in 2006 or only 4.7% of available energy, it is still not included on small energy scale such as pico-hydro or micro hydro [6].Micro hydro energy scale is very much scattered in the hills or mountains in the countryside, especially the area of West Sumatra which is geographically located in the Bukit Barisan.The potential of micro hydro power plant that can be utilized to become electrical energy for West Sumatera Province consists of:(1) Liki Solok 60 kilowatt, (3) Lubuk Gadang Solok 103 Kilowatt, (4) Agam 238 kilowatts, (5) Sigiran Malalak Agam 99 kilowatt, (6) Pariaman Pariaman 185 kilowatts, and many other areas that have potential sources of water that can be utilized by using a micro hydro power plant [7]. Small hydro offers today one of the most promising energy resources for long-term sustainable development in rural areas of many of the world's poorer countries [8].

The principal working principle of the micro hydro power plant is to make the most of water energy that can be captured by its main equipment called turbine or waterwheel [9].
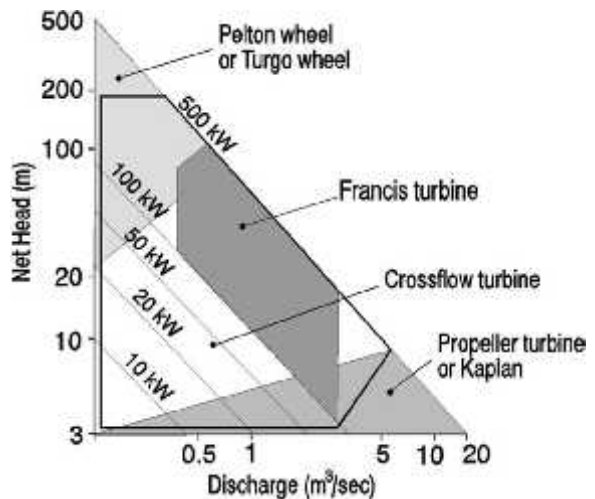
Fig. 1: Head-flow ranges of hydro turbine [10]

Tabel 1. Impulse and reaction turbines [8]

Turbine type	Head classification		
	High (> 50 m)	Medium (10-50 m)	Low (L<10 m)
Impulse	Pelton Turgo Multi-jet pelton	Crossflow Turgo Multi-jet pelton	crossflow
Reaction		Francis (spiral case)	Francis (open-flume) Propeller Kaplan

From fig 1. and table 1, type of turbine category of the micro hydro power plant is turbine crossflow and propeller turbine.This study aims to develop microhydro power plants by combining two types of turbines into a multilevel (crossflow with propeller).The basic concept used in a multilevel

system is to utilize the remaining energy from water coming out of the cross flow turbine to drive the propeller turbine.

2. METHOD

The micro hydro power plant model developed in this research is by building test apparatus. This test apparatus consists of a water pump, reservoir, measuring tools such as rotation, torque, head and flow meter and so on.The type of turbine used is a cross flow turbine and propeller, with the specification adjusted to theoretical planning.

The test method is done by controlling some test parameters, where as turbine power input is a head parameter with flow discharge.The turbine output after the water passes through the turbine is rotation, torque, effective power, and flow velocity. Once the water crossed the crossflow turbine then the water will continue to flow downwards.The flow of water that has crossed this turbine is used to turn turbines on the second level of propeller turbines. So the flow at this second level can be utilized to rotate the turbine propeller runner.This residual energy flow becomes the combination of cross flow turbine and propeller.

The model of multi-story turbines (crossflow and propeller) developed can be seen in figure 2.

Fig. 2: Model turbin bertingkat yang dikembangkan

This turbine performance test uses the hydraulic bench as the main component of testing. The hydraulic bench is equipped with a water reservoir and centrifugal pump.This hydraulic bench uses a piping system that connects the turbine to a valve and measuring tools.Measuring tools used such as digital tacho meter in units of rpm (rotation per minute).Measurement of flow rate of water flow using flow meter in units of LPM (liter per minute).Measurement of flow height or Head using a pressure gauge that can be converted into the head. Torque measurement using the braking system. Braking system uses a brake belt that is directly related to the main cross flow turbine shaft.

On this turbine shaft is equipped with a brake belt tromol that is connected directly to the spring balance.In the event of braking on the axle shaft then the spring balance will be attracted and depressed.Spring balance installed two pieces with the same capacity.When braking spring balance will experience drag and press.The difference between the two tensile readings and press is the direct readable braking force. Braking force multiplied by the radius of the brake drum is the size of the torque. By converting torque with other parameters is obtained the amount of effective power turbine generated.

3. RESULT

The result of turbine model performance test developed is presented in table 2.

Table 2. Turbine Testing Results

	Crossflow turbine						Propeller turbine	
Head (m)	Rated speed of turbine (r.p.m)	Brake force (N)	Discharge (m³)	Turbine Output in Theory (w)	Affective of turbine output (w)	Efficiency	Rated speed of turbine (r.p.m)	Affective of turbine output (w)
7	700	40	0.00167	114.68	91	0.8	250	20
6	700	35	0.00167	98.3	73	0.74	250	15
5	700	32	0.00167	82	62	0.76	250	15

4. DISCUSSION

The data of this crossflow turbine model test shows that the average torque test shown as effective power and theoretical power produces this turbine efficiency in the range of 65% to 80%. The flow of water after crossing the turbine flow turbine at the first level is fed to the propeller turbine.The test results show that the power generated from this propeller turbine ranges from 10% - 15% of the remaining hydro power. The total of theoretical water power is about 114 watts. The effective power produced on the first cross flow turbine is 91 watts and the power generated from the level of two 20 watt propeller turbines.This condition at head 7 m and water debit 0.00167 m³ / s. The total power generated from both turbines becomes (91 + 20 = 111 watts).If the total power produced is theoretically 114 watts. At the first level, crossflow di turbin means there is additional power in the turbine propeller. In the head of 6 meters to produce power ranges 74 watts and the head 5 meters to produce power ranges 68 watts.

Head or height of the water is a parameter that affects the power generated by the turbine.The distance between the cross flow turbine and propeller shafts is also a decisive parameter against the power generated from the propeller turbine. Theoretically, the greater the distance is proportional to the effective power generated. The flow discharge and dimensions of the propeller turbine must also be carefully calculated.This condition causes the amount of water out of cross flow turbine is not accommodated by turbine propeller then water will overflow.

5. CONCLUSION

The result of the model of turbine development model that has been done can be concluded that the remaining flow of water released by crossflow turbine can be utilized again to make turbine propeller.Combination of two types of the turbine can optimize the potential of existing water to be utilized in generating electrical energy.From the results of empirical testing using a multilevel turbine model (crossflow and propeller) that has been done can be concluded the distance between crossflow turbine axis with propeller turbine axis influences the discharge and water pressure in moving the turbine propeller.

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THE POTENTIAL OF RENEWABLE ENERGY (STUDY CASE IN TOMUANHOLBUNG VILLAGE, ASAHAN REGENCY OF SUMATERA UTARA PROVINCE)

[1] Rahmaniar[2]AgusJunaidi

[1] Department of Electrical Engineering Faculty of Engineering, Universitas Pembangunan Pancabudi (UNPAB)

[1], [2] Doctoral Education Program, Faculty of Engineering, Universitas Negeri Padang (UNP)

[2] Department of Electrical Engineering Faculty of Engineering, Universitas Negeri Medan (UNIMED)

ABSTRACT: The Electric energy is primary energy requirement that drives the economic system of a nation.The currently generated electricity still depends on the fossil energy source (Oil and Gas).Thecontinuedexploitationoffossil energy sources resulting in the crisis of oil and gas reserves is an issue that continues to talk around the world.The crisis of oil and gas reserves has an impact on the electric energy crisis so that various alternative energy sources are assessed to meet the needs of electric energy.In Indonesia, this crisis began to be perceived from the number of areas that have not received the benefits of electricity, one of which is Tomuan hole bung village Bandar Pasir Mandore-Asahan.Based on the results survey through direct investigation and interviews, empirical data show that from nine sub-villages, only one hamlet has received electricity, while DesaTomuanholbunghas alternative energy sources through the potential of Watershed for power generation.This issue is interesting to examine and examine through the measurement and analysis of potential watersheds.From the research results, the potential of the Tomuan holbung village watershed has a potential of 4.7MW of electricity.

Keywords: Tomuan Holbung Village, Potential Watershed, Alternative Energy Sources, Energy Conversion

1.INTRODUCTION

Energy resources are being studied all over the world. Currently, renewable energy resources are expected to replace fossil fuels. Renewable energy resources that are cost-effective and pollution-free and environmentally friendly. Renewable energy generates useful electricity with for the needs of electric energy users. Complete system design model and practical implementation of mini water power systems. The system has 12 turbine gratings connected to the central axle of the motor dc gear machine used to generate the voltage. The output voltage is directly proportional to the angular spin   of the mechanical system. The experimental results show that the amount of energy produced is very useful in generating electricity from the design model of the design system [1].

The existence of forest in the catchment area above it can increase. The government has developed micro-hydro through the MandiriEnergi (DME) program since 2007 as one of the efforts to provide renewable energy based energy. The DME program is intended as an entry point in rural economic activities in the form of providing energy with technology that can be operated by the local community. Development of Micro Hydro Power Plant is very important in helping the government to overcome the current energy crisis, especially to increase the ratio of electricity to areas that can not reach the power grid of PLN (Perusahaan ListrikNegara). Utilization of alternative energy with a hydro energy source in the flow area OngkakMongondow river in Muntoi village of BolaangMongondow district for the micro hydropower plant is examined to obtain the ability of hydroelectric power in generating the electricity obtained in the year. Collection by direct observation in the field. The results of the studies that have been obtained indicate the capability of hydropower of 19.5 kW is the installed power or electric power generated by a hydroelectric power plant. The total energy obtained in 1 year is 170,829 [8].Microhydro Power Plant is a small-scale power plant (less than 100 kW) utilizing the height difference and the amount of discharge per second available in irrigation channel water flow, river or waterfalls. This stream will rotate the turbine shaft to produce mechanical energy. This energy then drives generators and generators to generate electricity. The water discharge is the amount of water flowing through a certain cross-section of a river per unit of time. In order to obtain the capacity of PLTMH, cannot be separated from the calculation of how much water can be relied upon to generate PLTMH. The design debit or discharge of a PLTMH that is ideal is 1.2 or with a percentage of 120% of the minimum discharge of a river. [2]. The problem of studying the potential of renewable energy in the village of

TomuanHolbungDesamandoge is related to (1) How is the analysis of the determination of the potential of water resources as renewable energy in Tomuanholbung village Bandar PasirMandoge Sub-district of Asahan Regency of North Sumatra, and (2) How   record and identify potential impacts of micro-hydro development on the level of understanding, awareness and participation of communities to the impact of PLTMH [4].

2. PRINCIPLES OF CONVERSION OF WATER ENERGY

Water is one of the natural resources that have a very important function for the life and life of all living things, including humans. Water is the origin of all forms of life on this planet earth. From water begins life and because water civilization grows and develops. Without water, various life processes cannot take place, so the supply of raw water for domestic needs, irrigation and industry become a major concern and priority. Therefore the United Nations declares that water is a human right; that is, every human being on this earth has the same basic rights to water usage. In Indonesia, people's right to water use is guaranteed through the Law – The 1945 Constitution of the State of the Republic of Indonesia, and Law no. 7 The year 2004 on Water Resources In its development, water is rapidly becoming an increasingly scarce resource and relatively no source of a successor.

Hydropower is currently the largest source of renewable energy. A hydro scheme requires two things: water discharge and falling altitude (commonly called ‘ head ’) to generate useful power. It is a power conversion system, absorbs power from altitude and flow forms, and delivers power in the form of electrical power or mechanical hilt. There is no power conversion system that can send as much as absorbed minus some power lost by the system itself in the form of friction, heat, sound and so on. The conversion equation is: Input power = Outgoing power + Loss (Loss); or Output power = Incoming power & times; Conversion efficiency Power potential calculations are performed on a net-head and debit basis.

Potential water power (hydraulic) can be expressed as [6]:

$$Pg = 9,8 \times Q \times hg$$

where:

Pg = Power potential (kW)
Q = Water flow discharge (m3 / sec)
hg = Dirty head (moon fall) (m)
9,8= Gravitational constant.

Potential power supply:

$$Pel = 9,8x \ Eff \ x \ Q \ xhn$$

Formula Description:

Pel = The power out of the generator (kW)

3. RESEARCH METHODS

3.1. Place and location Research

From preliminary observation of water discharge waterfall, aekTomuan findings have great potential as an alternative source of alternative energy (figure 1),

Fig.1.Aek Tomuan Waterfall (source: Initial Observation Results)

Location of B.P. Mandoge is in upper Asahan, where astronomy lies at line 2046'08.32", North Latitude and 99020'30.36", East longitude. Bandar PasirMandoge Sub-district is one of 25 sub-districts in Asahan Regency whose borders are: - Northside with Ujung Padang Sub-district (Simalungun Regency) - South by Bandar Pulo, Rahuning, AekSongsongan, Raja, and Kab. Tobasa - East with Buntu Pane Subdistrict - Westside with HatonduhanSubdistrict (Simalungun Regency), There are 2 (two) villages in Bandar PasirMandogeSubdistrict whose territory is State forest area HutaBagasan and TomuanHolbung Village (District Statistics Bandar PasirMandoge 2016), Statistics of Total Rainfall in District BP Mandoge Year 2015 Based on the Climatology Station of PTPN IV Mandoge Sand Farm Unit, the rainy day in B.P.Mandoge sub-district is on average in a year in the range of 108-136 days with average rainfall in a year in the range of 2,569-4,428 mm. Mainland surface elevation of B.P. Mandoge varies greatly in the range 85-1.374 m asl.

The highest number of rainfall occurred in November around 437mm and in May around 315 mm, while the lowest rainfall occurred in February about 106 mm and July about 120 mm.In 2006 TomuanHolbung Village formed from the splitting of Huta Padang Village, and in 2008 DesaGottingSidodadi formed from the splitting of Silau Village Jawa. Administratively Bandar PasirMandogeSubdistrict is divided into 8 villages and in accordance with Local Regulation Number 10 Year 2008 Village in Kec. BP.Mandoge into 9 villages resulting from the division of the village of Silau Java, each village led by 1 village head, 1 secretary of the village and assisted by some heads

of affairs (kaur). Then each village is divided into several hamlets, with a total of 92 hamlets.

Fig2. Map Location of Tomuanholbung village, kec. Bandar PasirMandoge, Asahan district.

3.2. Research methods

This research method used survey and nonsurvey approach. The research stages include: 1) Literature Review 2) Observation of location, 3) Measurement of object and, 4) Analysis of potential of renewable energy source as alternative environment Micro Hydro Power Plant (PLTMH).

3.2.1.The Literary Study

The main purpose of doing literature review is 1) find the variables to be studied. 2) differentiate the things that have been done and determine the things that need to be done, 3) synthesize and gain new perspectives, 4) determine the meaning and relationship between variables.

3.2.2.Observation of location

The discovery of science always begins with observation and returns to the observation to prove the truth of the science, the method of data collection through direct observation or review carefully and directly in the field or research location. In this case, the researcher based on the research design needs to visit the research location to observe the various things or conditions in the field.

3.2.3. Observation Objectives

By observation we can get a picture of social life that is difficult to know by other methods. Observation is done to explore so that exploitation function. From the observation we will get a clear picture of the problem and perhaps the instructions on how to solve it.

Fig3. Direct observation of the turbo waterfall research center located in the village tomuanholbugmandoge district

3.3. Measurement Object

The object of research is the goal to get a certain goal about a thing that will be proven objectively. Understanding the object of research according is: "Research Object is an attribute or the nature or value of people, objects or activities that have certain variables set for study and conclusions drawn"[5]. The object of the research to be measured is the potential of turbo waterfall located in the village tomuanholbugmandogedistrictThe identification of potential watersheds in TomuanHolbung Village of Bandar sand Mandogesubdistrict is conducted to measure the potential of water debit, waterfall height and potential of DAS for Micro Hydro Power Plant (PLTMH). With the measurement equipment as shown in the following figure:

1. Water Velocity discharge gauge (Water Flow Speed)
2. GPS
3. Distance gauge / River depth gauge (meters)

Fig4. Measurement of water discharge at turbo waterfall

Requirements for debit measurement location by considering factors, as follows:

1. Be right or around the postal location of the water guess, where there is no noticeable change in cross-sectional shape or discharge.
2. The river flow should be straight at least 3 times the width of the river at the highest flood/water level.
3. The distribution of flow is evenly distributed and there is no rotating flow.
4. The flow is not disturbed waste or water plants and not disturbed by the existence of other water buildings (eg bridge pillars), not affected water level raising, tidal and lava flow.
5. The cross-sectional measurement is attempted perpendicular to the river channel.
6. Depth measurement of at least 3 to 5 times the diameter of the current measuring device vane.
7. When done in a bending location, it should be carried out downstream or upstream at a location where there is no effect of the (backflow) strike.

GPS.

The type of GPS used is the Garmin brand GPSMAP76CSx. the GPS receiver will automatically collect satellite data and location directions. GPSMAP76CSx has been equipped with an automatic track search mode to ensure proper recognition. This device has an important role in viewing the geographic condition of the watershed position, the height position of the turbo waterfall in TomuanHolbung village as well as knowing the slope of the waterfall level against the watershed surface, detail shown in the following
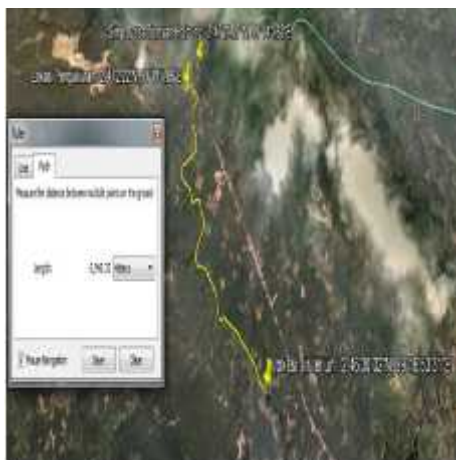
figure 5:

Fig5. Measurement of Satellite Length of River Flow from Location of Debit Measurement up to Waterfall Location

River distance meter (Meter)

These meters are used to identify into river streams used to find out how deep the watershed is from the bottom of the river to the surface of the water.

Fig6. Distance measuring tool

4. ANALYSIS

Result Measurement Potential Watershed Turbo waterfall in TomuanHolbung village.

Fig7.Photo Location Waterfall coordinates: 2°46'30.02"N, 99°16'53.31"
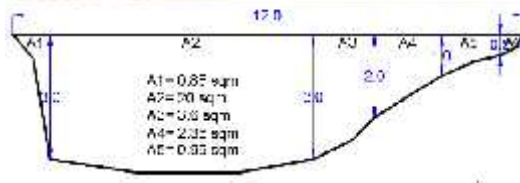
Figure 8. Place for Measurement of Water Debit

From the calculation in the field obtained data as follows:

Maximum water flow = 1,7 m/s

Flow water Minimum= 1,3 m/s

Cross-sectional area= 12 m^2

So, the water discharge in can :

Water discharge= Flow Air x Cross-sectional area

= (1,7 + 1,3)/2 m/s   x   12 m^2

=   18 m^3/s

Then in Power Generating Capacity:

$P = Q \times H \times G \times eff.$

Where :

P   = Power rises in Watt

Q   = Water discharge in liters / sec

H   = Height (meters)

G   = Grafitasi 9,81 m/detik

Eff   = 0,54 – 0,8

Then:

P   = Q x H x G x eff.

=   18 m^3/s x 9,8 x 42 m x 0,8

=   4741,632 KW

=   4,7 MW

So in the potential of water in the village tomuanholbug Bandar sand mandoge is as big :**4,7 MW.**

5. CONCLUSION

From the result of observation can be concluded

1. Tomuanholbung village mandoge sand village which has 8 hamlets only 1 hamlet.

2. that get electricity from mini hydro generator built by self-help by village apparatus, there are still 7 hamlets that have not get electricity (interview result) empirically when observation is done.

3. Village tomuanholbung district Bandar sand mandoge has a very large waterfall, referred to as turbo waterfall that has the potential of tourism and potential power plants.

4. From the results of direct measurements in the Watershed with Turbo waterfall in Tomuanholbung Village has excellent potential for planning development of electric power plant with generating capacity minimum reaches 4.7 MW.

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VIRTUAL LAB IMPLEMENTATION QOS METAROUTER ON COMPUTER NETWORK LEARNING

Raimon Efendi

Universitas Negeri Padang, Padang,Indonesia

ABSTRACT: This study describes the use of virtual learning lab on computer networks. especially on QoS Simulation materials in Computer Network Learning, the convenience of creating a bandwidth management lab will be very much in tandem with MetaROUTER's ability to run virtual Web Servers. The resulting prototype is expected to be useful in improving the understanding of learning in Computer Network course. This study aims to improve students' ability in simulating bandwidth management configuration. The process of practicum is often limited by the availability of the number of physical routers that are not proportional to the number of students, so the material is not owned and the learning outcomes are not achieved well then with the learning media Virtual MetaROUTER expected to increase interest and competence of students in studying computer networks, so that the expected learning outcomes is maximized.

Keywords: Computer Network, Virtual Lab, MetaROUTER, Learning

1. INTRODUCTION

According to (Tanner & Tanner, 2007) that the curriculum is a process of teaching and learning all knowledge and experience, systematically trained under learning in schools or universities, to provide opportunities for students to improve knowledge and understanding, foster skills and change attitudes, interests, and values taught in school. The curriculum contains several designs, in various forms of writing and scope, which outline the ideals of a learning experience (Drake & Burns, 2004a). This means that the curriculum in the educational system implemented, designed by the university to guide students to get the learning outcomes determined.

Computer Network Curriculum on Vocational Education Informatics Engineering FIK Undhari developed based on the mastery of knowledge, skills, and application of attitude. The curriculum focuses on learning networking concepts, routing and network management systems. The goal is to give birth to students who have knowledge and skills in the field of computer networks and able to apply the knowledge and skills are based on scientific concepts and pure values to make decisions and solve problems on computer network systems and support learning on vocational Informatics Engineering.

A computer network is one of the important science today. APTIKOM (Association of Informatics and Computer Universities), authorized to develop core curriculum based on Minister of National Education Decree No. 232 / U / 2002 and No. 045 / U / 2002, entering the field of the network becomes one of the expertise that must be possessed by Informatics graduates. The IEEE (Institute of Electrical and Electronics Engineers) Computing Curricula documents referred to by APTIKOM illustrate the importance of today's computer network. In the study program Informatics Engineering UNDHARI, the computer network in addition to the core course also became one of the areas of interest. Computer networks are not only taught in the form of theory, but also in the form of practice.

2. RESEARCH METHODOLOGY

2.1 Design Research

The method used in this research is the method of experimental research, whereas the research design used is quasi-experimental design. A form of quasi-experimental design used is nonequivalent control group design. Design nonequivalent control group design is almost the same as the pretest-posttest control group design in true experimental design.(Sugiyono, 2010).

2.2 Population and Sample

The population is the generalization region consisting of objects or subjects that have certain qualities and characteristics defined by the researchers to learn and then drawn conclusions (Sarjono, Haryadi, & Julianita, 2013). The population in this study were all students of Semester 6 Department of Informatics University Dharmas Indonesia who get teaching materials Practical Computer Network.

The sample is part of the number and characteristics possessed by this population (Sugiyono, 2010). Sampling was conducted using purposive sampling technique. Sampling technique is purposive sampling technique with certain

considerations. In this study, consideration is carried out by taking classes who have the same number of students a lot. The selected sample is a student 7 Semester students of class A and class B.

2.3 Research Variables

The variable is an attribute or the nature or value of a person, object or activity which may have certain variations defined by the researchers to learn and then drawn conclusions (Sugiyono, 2010). The research variables in the study Variables include the model of learning virtualization using MetaRouter and the dependent variable, in this study is the result of learning students Semester 7 University Dharmas Indonesia on subjects Practical Computer Network on the material routing.

2.4 Data Collection Methods

Data Collection Methods in the study include the test method is a barrage of questions or exercises and other tools used to measure the skills, knowledge, intelligence, ability or talent possessed by individuals or groups (Suharsimi, 2013).The tests used in this study to measure learning outcomes in the experimental class and control class before and after getting treatment. The test was given to both classes which include the initial test and final test.

In this study also used observation method that aims to determine student results based on aspects of psychomotor and affective aspects. These observations were made during the learning process. Observations on the affective aspects include attendance, responsibility, activeness, and honesty of students. While observations on psychomotor aspects include students' ability to operate the computer, using software MetaRouter Mikrotik Os, configure routing network, demonstrating the results of the experiment and after the learning activities. The results of observation and then analyzed to determine which class the better.

2.5 Instrument Research

A research instrument is a tool or facility used by the researcher to obtain the expected data to make the work easier and the result is better, in a more accurate, precise, complete, and systematic way easier to process (Suharsimi, 2013). Before the data collection tool the test is used for data retrieval, trials first. The test results are analyzed to determine whether they qualify as a data taker or not.

2.6 Data Analysis Methods

Analysis of the data in the study includes the initial data analysis and data analysis research results. Analysis of preliminary data was conducted to determine whether the initial ability of students of the experimental class and control class equivalent or not. In the early stages of analysis will be the normality test, homogeneity test and t-test against replay value data on previous material. Analysis of research data in the form of data from the value pretest and posttest experimental class and control class. The data analysis research conducted to answer the research hypothesis (Sugiyono, 2010).

These results include data analysis Normality Test Data Test data normality was conducted to determine whether the pretest and posttest data of normal distribution or not. The data analysis to test for normality is taken from the value pretest and posttest results of the experimental class and a control class, then do Homogeneity test is performed to determine whether the sample group have the same variance or not. The data used in this analysis is the result of pretest and posttest students. Furthermore, the Hypothesis test (t-test) were conducted to determine learning outcomes which is better between classes using model virtualize MetaRouter with classes using lecture method. For t-test, the data were tested namely pretest results data and data posttest results in both classes.

3. RESULTS AND DISCUSSION

3.1 Research result

The experiment was conducted on students of the Faculty of the Information Technology Semester 7 Dharmas University of Indonesia, in the subject of Practical Computer Network. Research that has been done is a kind of experimen research. While the research design used in this study is quasi-experimental design. A form of quasi-experimental design is used ie nonequivalent control group design. Design divides the sample into two groups: the experimental group and the control group. Learning in the experimental group using virtualization MetaRouter learning model of learning while the control group using the lecture method. The sample used in the study of class A as an experimental class and class B as the control class.

The study begins with a test of equality of both classes by analyzing the ability of the initial experimental class and control class. The analysis used is normality test, homogeneity test, and t-test. The data used in the analysis of the initial capabilities, the test results on the previous material. Based on preliminary analysis showed that both classes of a normal distribution is homogeneous, and has the ability to average the same initial. So we can conclude that research can be done on these samples.

After testing is then performed pretest equivalence (initial test), which aims to determine the initial value of the second sample before getting

treatment. After pretest results are analyzed, the next step is to give treatment to both classes. Experimental class by learning model MetaRouter virtualization and control class by learning to use the lecture method. After the samples are subjected to the evaluation test is then performed or posttest. The final step is to analyze and compare data pretest and posttest results of the experimental class and the control class to the conclusion of the hypotheses that have been made previously.

3.2 Discussion and Material Testing Routing

3.2.1 Design Creative Computer Networks

In this study, the test mastery of the material performed on the material routing, according to the learning outcomes set out in Unit Class event, the next stage of designing the testing materials that will serve as a research object of study. The design of specified materials includes understanding and basic configuration MetaRouter and OSPF configuration (multi-area).

Virtualization is a technique for creating a virtual version (not physical) of computer operating systems, computer networks and boast power storage device. In order to streamline the network resources, can be built router virtual, virtual switches, virtual servers and virtual technology. Virtual network devices that may be located on a single physical device. In the MikroTik router can be configured through virtualization techniques many virtual routers with only have a few a RouterBoard.

Gains in implementing virtualization in the network infrastructure very much at all. The main advantage is the savings and cost cuts network infrastructure. For example, bias imaginable for routing configurations that require a lot of physical routers, Labor had to buy eight units router, when in fact it's good for the configuration of the lab and the real configuration, routers can be held in a router board. In addition, the network operating costs will also be in pieces. Operational electricity can be cut because it only runs 8 (eight) units last router in one (1) physical router.

MetaROUTER itself is its own new features in v3.21 and Router OS Router OS 4.0 beta 1 (Power PC). Of course, to the latest version, RouterOS MetaROUTER support already available. Q23 For writing this book, which is used is MetaROUTER on RouterOS v6.27.Untuk see if RouterBoard MetaRouter already supports the application, can be viewed using the menus on Winbox as shown in Figure 1.
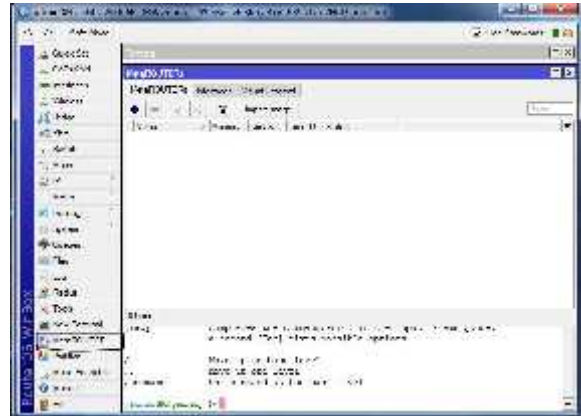
Figure 1 Menu MetaRouter on WinBox

3.2.2 Implementation MetaROUTER on Virtual Lab Qos

MikroTik Router is able to do the job of classification packet very thoroughly so as to make bandwidth management can also be applied in great detail. In computer network learning One thing that has always been a hot conversation around the use of MikroTik Router is the problem of application of bandwidth management (Quality of Service). one of the advantages of MikroTik Router is the ability to perform bandwidth management with great care. The ability of MikroTik Router capable of bandwidth management on various types of traffic even able to perform bandwidth management of certain file extensions that are fondly downloaded by network users.

To be able to perform the application of sharpening the bandwidth correctly and efficiently, the students certainly need to do the exercises as well as the simulation configuration. Generally, this simulation is done before applied to real conditions in the field. However, that always becomes a problem is how to do the simulation. Students can read hundreds of bandwidth management configurations that exist on the Internet, but of course, students will be confused at the time will test these configurations. Confusion will increase if it turns out the University does not have the MikroTik Router laboratory facilities, especially the bandwidth management lab.

In addition to implementing routing and bandwidth management techniques, Mikrotik routers are also widely used to implement Load Balancing techniques. This Load Balancing technique can be applied if the Network has multiple ISP links, either from the same ISP or from different ISPs.

Load Balancing techniques are used to distribute (distribute) network loads to some of the ISP's links. The final result of this load balancing technique is to increase throughput. reducing response time and avoiding excessive traffic buildup. In practice in the field, common load balancing techniques are applied with fail over

techniques. The fail over technique aims at securing local network connection to the Internet whenever one of the ISP links is problematic, To apply load balancing. MikroTik routers must be connected to several ISP links, as shown in the following figure.
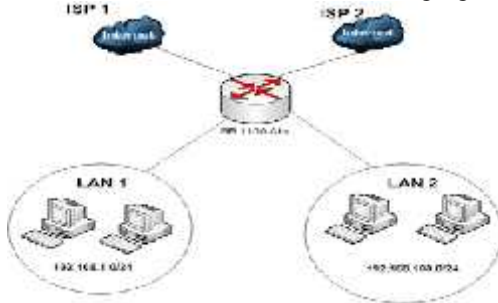
Figure 2, GW router connected via some ISP links

3.2.3 Virtual Lab Untuk Simulasi QOS

The convenience of creating a bandwidth management laboratory will be greatly coupled to MetaROUTER's ability to run the Linux operating system (OpenWRT). So, in addition to presenting a virtual MikroTik Router, MetaROUTER is also capable of presenting virtual Web Server. With the presence of a virtual Web Server in a student bandwidth management laboratory, testing the configuration of bandwidth management will be easier and more varied. Is not the bandwidth management configuration testing generally done by performing download and upload activities to Web Server engine or other servers?

Conducting a bandwidth management configuration simulation will always dwell on how to share the allocated bandwidth obtained from the Internet Service Provider (ISP). Bandwidth allocation is always cultivated to be enjoyed fairly (rationally) by several client computers in local network. So to do the simulation of bandwidth management configuration required a qualified Internet connection.

QOS Testing On MetaRouter Network Simulation

From testing done using meta-router for load balance successfully can be seen through Traffic from each interface that runs every Client performing Browsing, Downloading and Uploading Activities.

Figure 3. Results of QOS Simulation Test

4. CONCLUSION

Results "Implementation **QoS MetaROUTER On Computer Network Learning** " can be concluded:

a. Practical Learning Network requires creativity and innovation of teaching by utilizing applications with features such as virtual Mikrotik Mikrotik MetaRouter if hardware resources provided by educational institutions cannot meet the needs according to the number of students there.

b. Implementation Metarouter proxy generally can reduce the burden of the cost of procurement of computer networking devices are quite expensive, without reducing the weight of the materials provided to the students. Even for some of the cases are complex and difficult to be presented in the form of a conventional lab, through virtual simulation meta-router these problems can be solved.

c. This study proves that the media router Mikrotik with MetaRouter features utilized in the process of learning about Routing material related to student learning outcomes. It means also that media MetaRouter virtualization can help the student needs to achieve optimal learning results.

d. Further development of alternative models of this lab is necessary, the authors suggest that further research and innovation in the form of project-based learning model, in which students are expected to be more active and have competence in accordance with the existing technological development.

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BLASTING DESIGN DEVELOPMENT AREA DECLINE CIBITUNG AND CIKONENG UNDERGROUND MINE PT CIBALIUNG SUMBERDAYA BANTEN

RaimonKopa[1], Afdhal Husnuzan[1], Bambang Heriyadi[1]

[1]Department of Mining Engineering, Faculty of Engineering,UniversitasNegeri Padang

E-mail: raimon_unp@yahoo.co.id

ABSTRACT

The purpose of this research is to design blasting pattern and improve the blasting parameters. There are two problems that caused unoptimum blasting result parameters for the III class of development rock mass in the underground gold mine PT CibaliungSumberdaya. First, there is no blasting design specified for the III class of development rock mass. Second, bad implementation of blasthole drilling activity. The actual blasting activity result parameters are unoptimal blasting advance (79,34%), high powder factor/PF (1.43 kg/ton), fine fragmentation (P80 = 20 cm) and high overbreak percentage (33%). The blasting design used for this research was calculated by Jimeno, et al, 1995: 217-230. The enhanced parameters are 93.10% blasting advance, 0.81 kg/ton of PF, coarser fragmentation (P80 = 24 cm) and smaller overbreak percentage (8.20%).

Keywords: Blasting design, development, Jimeno, rock constant

1. INTRODUCTION

Standard drilling and blasting patterns for development areas have been established by the Quality Control Department of PT CSD. However, the standard is made in the absence of blasting design and is not adapted to a specific rock mass classification, so it is intended for application to the overall mass of the rock. Because the mass of the development area has unequal classes at each point, it is necessary to design the blast according to the class and rock mass characteristics in order to make the blasting more efficient.

In addition, the implementation of poor heading development drilling activities resulted in less drilling geometry and less optimal blasting results. The drilling points are made only on the basis of the estimates and experience of the drill carrier operator without the measurement or the creation of auxiliary lines first. The absence of geometric measurements of the drilling points in the development area influences the success indicators of blasting, including progress, powder factor (PF), fragmentation of blasting and overbreak.

Based on observations and field measurements, the blasting progress resulting from actual blasting activity was 79.33%. This figure has not reached the standard of progress set by the company, 90% of the burrowing hole depth. While the resulting PF is 1.45 kg / ton with a small fragmentation percentage (<4.4 cm) is 32.16% and the optimum fragmentation percentage (25-50 cm) is only 9.85%.

Small fragmentation is associated with too large a PF value. According to Dessureault (2004: 82), the higher PF will result in subtle fragmentation. While the lower PF will result in a more violent fragmentation. The standard PF set by the company for blasting development decline is 0.6 kg / ton. Based on the curve of the relationship between the width of the heading and the diameter of the explosive hole (Jimeno, 1995: 225), the PF value for the development area is about 0.79 kg / ton. In addition, based on graph of the relationship between rock constant and RMR (Febry, 2012: 55), for RMR 46,29 obtained rock constant 0,82 kg / ton.

Based on field observations, the dimensions generated from the blasting

development activities have different sizes compared to the planned dimensions of the design. Generally, the resulting dimensions are larger (overbreak). This can be caused by several things, such as drilling deviation, rock geological factors on the heading and overfilling of explosive materials at the contour burst pits.

This research has several main objectives, among others, to know the actual drilling and blasting pattern applied to the blasting activity of the development area, to know the blasting design in accordance with the class III rock mass in order to increase the parameters of the successful detonation of CBT DC and CKN DC areas, and to know the blasting results of the design blasting made against explosive success indicators.

2. Method

The research focused on Cibitung decline (CBT DC) development site and Cikoneng decline (CKN DC) lower gold mine PT CSD land with class III rock mass based on the classification developed by Bieniawski in 1989.

The research method applied is experimental where the control of certain variables to determine the relationship between variables in the study.

The initial phase of the study began with a literature study of blasting activities and the calculation of underground mine drilling designs. Then followed by field observation that aims to find out the drilling and blasting activities applied and the actual blasting parameters, ie blasting progress, PF, fragmentation and overbreak. The next stage is the evaluation of the actual blasting parameter and then the blast design calculation. After testing the blasting design, a blasting parameter analysis was performed by comparing the results of the blasting test experiment with actual blasting results. In addition, the blasting test I design aims to validate one of the important parameters in the calculation, ie the rock constant.

The results of the comparison analysis of the actual blasting parameters with the blast design test results will determine whether the rock constant used for the blasting II design will be raised or lowered. After the improvement of explosive blast I design parameters, the research stages are continued with blast II design trials so that the blasting success parameters can be optimized.

3. Result and Discussion
3.1 Actual Drilling Geometry

Drilling activity in heading development is done without measurement to mark the drilling points first. Therefore, there is a wide range of burden and space values that are considerably higher than the existing drilling standards. Burden and spaces range from 0.45 to 1.02 m. While the value of the burden and spacing in the drill pattern standard is constant at 0.84 cm. An example of the explosion slope results can be seen in Figure 1.

Figure1. Drilling PatternHeading CKN_DC (16-02-2015)

3.2 Blasting Design I

Based on the curve of the relationship between the RMR and the rock constant (c), the c value for the average RMR weight of 46.29 at the development sites of CBT_DC and CKN_DC is 0.82 kg / ton (Figure 2).

Febry, 2012: 55

Figure 2. Graph of Relation Between Rock Constants (c) with RMR

After doing some calculations using the formula that has been made based on the reference calculation in the book Drilling and Blaststing of Rocks (Jimeno, et al, 1995: 217 - 230), the blasting design I used for blasting test is made with the value c = 0.75 kg / ton. Detailed draft design and patterns can be seen in the following data:
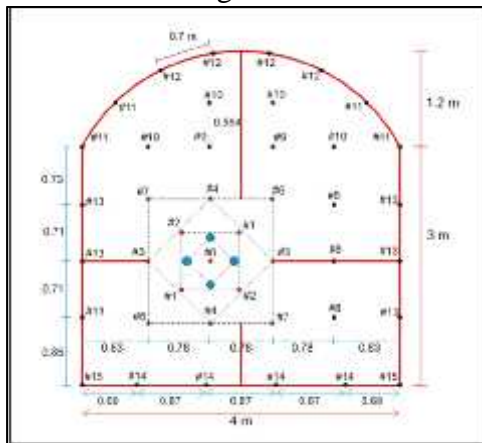
Figure 3. Blasting Geometry Peledakan *Development* (c = 0.75), *Jumbo drill*

Drilling Depth	=	2.7 m
Number of Drilling Hole	=	46 hole
Number of Empty Hole	=	4 hole
Number of Blasing Hole	=	42 hole
Diameter of Empty Hole	=	0.102 m
Diameter of Blasting Hole	=	0.051 m

The blasting test of I was conducted at CKN DC location on April 06, 2015. Rock masses at the blasting site were in Class III with a weight of RMR 47. The results of the trials showed an increase in blasting success

parameters. However, due to the influence of the discontinuity field or the weak plane in the heading resulted in great progress and overbreak, respectively 113.71% and 38.81%.

A large percentage of overbreaks indicates that the rock constant used is still not in accordance with the class III rock mass. Therefore, blast design is required with a lower c value.

3.3 Blasting Design II

The value of c used in the calculation of the blasting design II is 0.7 kg / ton. In contrast to the blasting plan I, the blasting II design is calculated with slight differences in the basic parameters of the calculation, namely:

Drilling Depth	=	1,8 m
Number of Drilling Hole	=	46 hole
Number of Empty Hole	=	4 hole
Number of Blasing Hole	=	42 hole
Diameter of Empty Hole	=	0.051 m
Diameter Blasting Hole	=	0.038 m
Dynamit ϕ 30 mm	=	50 kg
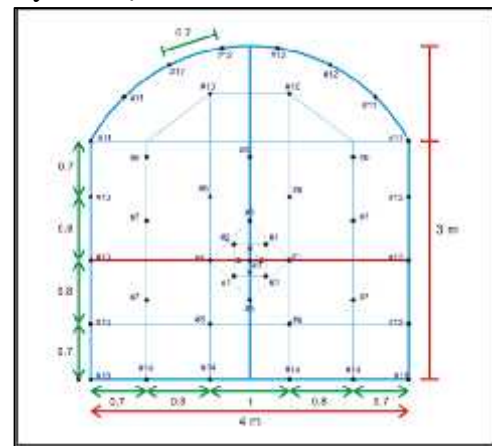
Figure 4. Blasting Geometry *Development* (c = 0.7), *Jack leg*

The experiment was carried out on the mass of development class III rock with the value of RMR 42 - 46.5. The results of blasting trials show that the parameters of blasting success can be increased from actual blasting activities.

3.4 Comparison of Blasting Test Results

After analyzing the explosive success parameters, the actual test

results and actual blasting results can be summarized in Table 1.

In the table it can be seen that the results of the blasting test design I showed a more optimum parameter increase of success. However, the

blasting design I produces a larger overbreak when compared to other blasts.

Tabel 1. Result of research

Indicator	Actual	Blasting Design I	Blasting Design II
Blasting Advance (%)	79,34	131,71	93,10
PF (kg/ton)	1.43	0.62	0.81
Fragmentatition, P80 (m)	0,20	0,34	0,24
Overbreak%	33	38.81	8.20
Underbreak%	18	-	32

While the design trial II produces open dimensions with smaller overbreak rates, 8.2% of the planned designs, and other parameters tend to be better than the actual blasting results.

However, in practice, there are several obstacles that cause blasting II design to produce underbreak. Based on field observations, underbreak on heading development decline can be caused by several things:

1) Dimensions of openings before the blasting activities are not sufficient dimensions 4 m x 4.2 m.
2) Explosive holes on the floor that cannot be filled with explosives. Of the 6 drilled floor holes in the blast II design experiment on the CBT XC8ACC heading held on April 23, 2015, only two floor holes were filled with explosives. Even the charging is also not maximal, can only be inserted a total of 4 kepgel. The non-filled hole is caused by the height of the water rising up to 80 cm due to mucking waste around the location undertaken at the bottom drilling. The high water discharge causes the floor

holes can not be cleaned from the waste material.
3) Arch lines to be lowered for subsequent blasting activities sometimes result in dimensions of openings for subsequent blasting activities to be reduced. High aperture is not full and the floor holes are not maximal in general will result in dimensions of the underbreak openings.

4. CONCLUTION
4.1 Conclution
a. Burden and spaces used in actual blasting activities have a less regular size with a range of values from 0.38 to 1.2 m. This is due to the determination of drill points that are not measured and not marked first. the actual blasting success parameters include: blasting advances 79.29%, PF 1.43 kg / ton,, minor fragmentation with 80% pass in 20 cm sieve, and 33% overbreak.
b. The blasting II design is more suitably applied with the class III rock mass. The design was calculated using rock constant parameters (c) 0.7 kg / ton, corrected rock constant (C) 0.75 kg / ton, explosion diameter

(D1) 38 mm diameter, 51 mm hole diameter (D2), drilling depth (L) 1.8 m, and produces burden and spacing with a range of values 0.7 - 1 m and 42 explosive holes.

c. The results of the blasting II experiments are known to increase the blasting success indicator by blasting 93.10% progress, PF 0.81 kg / ton, 80% fragmentation of blasting results increased from 20 cm to 24 cm, and overbreak can be lowered from 33% to 8.2 %.

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ANALYSIS OF LEARNING COMPETENCY ENGINEERING STUDENTS VOCATION D 3 FT UNP

Ramli[1], Febri Prasetya[2]

[12]Faculty of Engineering, Universitas Negeri Padang, Indonesia

ABSTRACT: This study aims to calculate the level of achievement: (1) the competence of D3 vocational students in the implementation of machining engineering learning, and (2) the difference in student learning achievement between expectations and reality. The research method is descriptive quantitative. The population of this study is all students, vocational engineering engineer D3, as many as 281 people. The sample was chosen by a randul sampling of 120 people. Data were collected by questionnaire and documentation. Data analysis is done descriptively, and comparative. The result of the research shows: (1) the learning that is taking place now in the D3 program of the mechanical engineering vocational program of FT UNP is not suitable between student expectation, and (2)) there is the difference between student expectation with present lecture achievement.

Keywords: Analysis, learning competence, D3 student, vocation, machining technique

1. INTRODUCTION

The direction of vocational education policy in Indonesia according to Law No. 20 of 2003 on National Education System explained that vocational education is a higher education that prepares students to have a job with a particular applied skill maximal equivalent to a degree program. Vocational education should be developed toward a system in the national interest, and this encourages the Directorate General of Higher Education to formulate a series of higher education development policies. For this purpose, a long-term development framework for Higher Education was further developed to be a higher education long-term strategy (HELTS), in which the contents of a long-term strategic development plan aimed at placing a national higher education system, with all the limitations which is in the best position in the future in order to be able to respond effectively to the challenges faced. HELTS formulates three main strategies of developing higher education, namely nation's competitiveness, autonomy and decentralization (autonomy), and organizational health.

Furthermore, Government Regulation No. 19 of 2005 on National Education Standards article 26 paragraph 3 Competency Standards Graduates of a vocational secondary education aims to improve intelligence, knowledge, personality, noble character and skills of learners to live independently and follow further education in accordance with vocational programs.

In line with that, the competence of Vocational education graduates refers to the existing Indonesian Working Competency Standards (SKKNI) as a reference, to certain industry standards that become partner industries. This competency can be achieved with an educational and training approach that refers to the criteria of business skills/industries that are accomplished through training in the production process or using the production process as a vehicle for learning. This training can take place in the industry, through direct involvement of students in the production process, or in schools through the involvement of students in the process of productive learning and production processes in the school's production units.

Vocational Education, especially on productive programs that suit the field of expertise, ideally required to apply learning approaches that can provide learning experiences to learners in the mastery of competence in accordance with the demands of the business and industry. The learning approach consists of Competency Based Training, Production Based Training, and Industrial Based Training. By applying this learning approach is expected to provide a learning experience to learners in the mastery of all competencies that must be mastered in accordance with National Competency Standards so that they are able to compete in the world of work.

Renewal as an idea, idea, educational practice that is realized as a new idea that can be adopted by schools in the form of certain practices of an outcome of thinking and technology that is applied through learning stages are believed and intended to solve the problem of learning and improve a processes that occur in educational institutions. In the field of competency of machinery engineering, for example, to solve the problems faced by schools, many models of learning have been expressed in various fields such as CTL

(Contextual Teaching and Learning), CL (Cooperative Learning) DL, (Direct Learning) , PBL (Problem Based Learning) and active, creative, effective, and fun learning (Pakem). All of them are meant for renewal can be done and used for improvement and solving education problem in the country.

Efforts to improve reforms in the competence of machining techniques in accordance with Law No. 20 of 2003 on National Education System article 15, stated that vocational education is secondary education that prepares students primarily to work in a particular field. In particular the competing objectives of engineering expertise are to equip learners with the skills, knowledge, and attitudes to be competent: (1) to work either independently or to fill the existing job vacancies in the business world and the industrial world as middle-level workers in the field of machine tools Technology 2) choosing a career, competing, and developing a professional attitude in the field of Machine Tool Technology.

This goal will be achieved if SMK has developed a model of learning and mastering the field of education and technology that is integrated with the value of the character, as part of science and technology grow and develop. BNSP (2009) formulated that the Indonesian nation is required to develop human resources with the following competencies and expertise; (2) Ability to communicate and work effectively, (3) Ability to create and update (creative and innovative), (4) Ability to develop and utilize information and communication technology, and (5) Able to learn and adapt contextually with the environment.

Learning is meaningful, student-centered (Student-Centered Learning). The standard learning process is focused on exploratory learning, elaboration, confirmation, observation, questioning, processing, reasoning, presentation, summarizing, summarizing and creating. This direction can be an indication that the learning approach is student-centered (Student active learning).

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2.   LITERATURE REVIEW

Wena (2009) explains the learning strategies of laboratory training including group formation, material presentation, practice/practice, and practice/practice of real problems. Baillie and Hazel (2003) suggested forms of learning activities in the laboratory, namely: controlled exercises, investigations. Practical learning in this collaboration is aimed at the implementation of learning in accordance with the purpose of learning in the control of competence as written in the standard of competence that became the basis of curriculum preparation. Learning in the laboratory is a very important part of the learning process.

Learners will learn and always remember more information after practicum in the laboratory.

The main task of a teacher is to carry out the learning process, both in class, workshop and laboratory. Creative and innovative teachers will always create ideas in designing new learning models that enable learners to achieve their learning objectives with satisfaction. To obtain the new learning model is needed method of research and development of learning model. Learning model development methods produce products that are not too risky to targeted learners.

The inability of teachers in developing critical thinking skills in learning, because some teachers are not able to plan the learning process well. Planning learning is very important to implement because planning is a process and way of thinking that can help create the expected results (Sanjaya, 2008). The 2013 curriculum provides opportunities for teachers to apply the learning process that includes the selection of innovative models, methods, approaches. Currently, the developed curriculum is required to change teacher-centered learning into student-centered learning. This is in accordance with the demands of educational future that the child has critical thinking skills.

The design of learning model development can be analyzed from a series of functions of educators in carrying out their main tasks in learning that is from designing, implementing to evaluating. The learning model developed is broad, because the model consists of input, process and output components. Learning input components consist of the characteristics of learners, teacher characteristics, infrastructure and learning support tools. The process component focuses on strategies, models, and learning methods. The output component is the result and impact of learning.

The terminology of learning strategy (instructional strategy), learning approach, and model of learning is sometimes interpreted as a similar term. According to Joyce and Weil, (2009) Model of teaching can be interpreted as a model of learning, which is a long-term learning pattern that can improve student's capability, able to learn more easily, effectively and efficiently, so they can act as a reliable learner. Further described that the implementation of a model of learning will have a major impact on the development of the ability of learners in their own learning. Effective learners will be able to construct a variety of information and knowledge, have ideas, build creativity by utilizing various learning resources, including teacher policy in facilitating learners with effective and reliable learning patterns.

3.   METHODS

The type of research conducted is classified as descriptive quantitative. Population in this research

is all student of D3 vocational Department of Mechanical Engineering much 281 people. Samples are selected by random (random sampling). as many as 80 people.

The instrument used in this research is a questionnaire developed by the researcher, according to the current condition and the expected condition of D3 vocational graduates. Questionnaires that have been prepared are tested, namely the validity test and reliability test with the number of respondents as a trial as many as 30 people. Validity test is done by Product Moment Pearson correlation analysis and reliability test using Alpha Cronbach formula. In testing the validity, the real level is determined $\alpha = 0.05$. The statement item is declared valid if the coefficient of product moment correlation or r arithmetic is

greater than r table, according to the specified real level. The test results show that the reliability coefficient of 0.92. The criterion used to establish instrument reliability is if the reliability coefficient is large or equal to 0.50 (Gay, 1985).

Data analysis is done, that is descriptive analysis, used to explain score of learning process according to student opinion. Furthermore, to measure the difference between expectation and reality from learning process achievement used different test (T-test)

4. Results and Discussion

Based on the analysis result obtained competence of Machinery Engineering according to student opinion, as shown in table 1. 1.

Table 1. Student Attitudes In The Learning Process

Condition Now		Statement	Conditions of Hope	
Average	Category		Average	Category
3,36	Good	1. Student shows activity at the time of learning process	4,77	Very Good
3,22	Enough	2. Students show motivation in learning	4,64	Very Good
3,39	Good	3. Students seem to be very happy about learning	4,61	Very Good
3,37	Good	4. Students express opinions or ideas on the learning process	4,67	Very Good
3,13	Enough	5. Students respond to friends' opinions during the learning process	4,62	Very Good
3,36	Good	6. Students on time hand over learning tasks	4,67	Very Good
3,22	Enough	7. Students are able to solve problems (problem-solving) in group learning	4,56	Very Good
3,36	Good	8. Students are able to think creatively and innovatively in learning		Very Good
3,36	Good	9. Students take decisions (decision making) in learning	4,52	Very Good

Table 2. Knowledge Of Students In The Learning Process.

Condition Now		Statement	Conditions of Hope	
Average	Category		Average	Category
3,36	Good	1. I like the teaching materials are available in the form of modules according to the syllabus..	4,58	Very Good
3,47	Good	2. I love the learning process takes place using the method of demonstration.	4,55	Very Good
3,25	Enough	3. I love the ongoing lesson with situations that please the students.	4,46	Good
3,48	Good	4. I like learning with a variety	4,55	Very Good
3,25	Enough	5. I show creativity in learning	4,56	Very Good
3,53	Good	6. I love skills, techniques that vary in learning	4,60	Very Good
3,48	Good	7. I am indicated with consistent enthusiasm and high interest in teaching	4,55	Very Good
3,39	Enough	8. I get the tasks regularly	4,54	Good
3,56	Good	9. Have students been given the opportunity to be actively involved in the learning experience	4,56	Very Good
3,57	Good	10. I provide teacher-approved input, accepted, and if possible apply it to the lesson	4,56	Very Good
3,21	Enough	11. I use an inspirational analogy and help students in a timely manner.	4,64	Very Good

Table 3. Skills in the Learning Process.

Condition Now		Statement	Conditions of Hope	
Average	Category		Average	Category
3,36	Good	1. I am able to read Engineering drawings	4,58	Very Good
3,47	Good	2. I am capable of designing image of machine components (single) to the specification required.	4,48	Very Good
3,47	Good	3. I am capable of designing image of machine components assembly accordingly the specs are in need.	4,56	Very Good
3,48	Good	4. I am able to draw good machine components single or assembled according to the rules Engineering drawings	4,55	Very Good
3,25	Enough	5. I am able to calculate engine speed for each type of work within make workpiece.	4,56	Very Good
3,53	Good	6. I am able to choose tools in accordance with the Job Sheet provided.	4,60	Very Good
3,48	Good	7. I was able to install the tool on the machine as per the Standard Operational Procedure (SOP)	4,55	Very Good

Table 4. Learning Process In Higher Education According To Student Opinion

Test Statistics[b]

	Kondisi Harapan Kondisi Saat Ini	Kompetensi Harapan Kompetensi Saat Ini	Pembelajaran Harapan Pembelajaran Saat Ini	Sarana Harapan Sarana Saat Ini
Z	-6.510[a]	-6.392[a]	-6.495[a]	-6.458[a]
Asymp. Sig. (2-tailed)	.000	.000	.000	.000

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

Based on Table 1.4 it can be concluded that there is a significant difference between the expectations and current conditions, where the value of P <0.05. This means that there is a significant difference between the expectations condition and the current condition, the competence of expectations and the competencies of current achievement, learning expectations.

5. DISCUSSION

The paradigm of learning model analysis begins with the desire of the teacher to meet the needs of his students, along with rapid technological advances, the learning becomes more complex. Therefore, learning needs a design model that is appropriate and fits the needs of students. Various theories, methods, designs, and models of learning should be created to appreciate the increasingly diverse level of students' needs. This is the essence of learning itself, namely how teachers create a better life for learning that is able to absorb students' aspirations appropriately. Rustaman, (2001). explain learning is an activity of interaction between teacher-student, happened reciprocal communication which takes place in an educational situation to reach learning purpose The learning process, teacher and student are two component that can not be separated. Between the two components must be interacted with each other support for student learning outcomes can be achieved optimally.

Learning is a process that contains a series of learning implementation plans by teachers and students on the basis of reciprocal relationships that take place in educational situations to achieve learning objectives. Reciprocal interaction between teachers and students is a major requirement for the ongoing learning process. The reality that appears in schools, teachers are often too active in the learning process, while students are made passive, so the interaction between teachers and students in the learning process is not effective. If the learning process is more dominated by the teacher, then the effectiveness of learning will not be achieved. To create effective learning conditions, teachers are required to be able to manage the learning process

that provides stimulus to students so that they are willing and able to learn.

Learning can be interpreted as "all efforts or teaching and learning process in order to create an effective and efficient learning process" (Bafadal 2005, Winkel 1991). Learning occurs when the child responds to the stimulus provided by the teacher, in addition, to achieve effective learning of learners can also be guided by the Master from their previous knowledge which is stored in their memory and thought by using the appropriate method of learning. If that has not happened then the learning process will not be a competent student. Improving the quality of learning is one part that can be solved by performing a needs analysis to assess the gap between the competencies achieved by current students if compared with the expected competence based on student opinions. They also asked the opinion of students with regard to the implementation of learning process and training conducted in schools between the current state of now with their expectations.

Desertion between hope and the current situation is a problem that must be explored in order to improve the quality of graduates, at least close to the needs of the world of work. The world view of work on the competence of college graduates generally still not meet the expectations of the world of work. Therefore, this research tries to bridge the gap that is happening now, by recommending the analysis of learning as one effort to improve the competence of graduates.

Competence can be interpreted as the ability of individuals to show their work in accordance with the required standards. Another definition describes competence as the capacity, qualification or behavior that a person carries out to carry out his duties and functions effectively. Competence as a skill or ability is also proposed by Roe (2001) as follows: Competence is defined as the ability to adequately perform a task, duty or role. Competence integrates knowledge, skills, personal values, and attitudes. Competence can be described as the ability to perform a single task, role or task, the ability to integrate knowledge, skills, attitudes and personal values, and capability to build knowledge and skills based on experience and learning.

6. CONCLUSION

a. The learning process is all the efforts undertaken by teachers and students to share and process information, in the hope that knowledge, skills, and attitudes are useful in students and become a competency that has a sustainable

b. A good learning process will shape the intellectual ability, critical thinking and the emergence of creativity and behavioral or personal changes a person based on certain practices or experiences.

c. Generally, students are confident enough to operate various types of production machines, but they have not been much involved in production activities.

7. SUGGESTION

a. It is expected that there are better changes to achieve a positive improvement marked by changes in individual behavior in order to create an effective and efficient learning process.

b. Learning model based on production recommended for many dikonstruk by lecturers to be applied in the learning process.

8. THANK-YOU NOTE.

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FACTORS AFFECTING THE AUTOMOTIVE ENGINEERING STUDENTS' INTEREST ON TEACHING PROFESSION

Rasinov Chandra[1], Anggi Aprianto[2], Mawardi[3], Reza Rahmadani[4]

[1]Automotive Department, School of Engineering, Universitas Negeri Padang

ABSTRACT: This study aims to determine the strength of relationship among the student's perceptions, family environment, organizational activities, and learning achievement, to teacher profession interest. This survey research categorized as a correlational approach. This research confirms the four factors model, which are students perceptions, family environment, organization's activities, and learning achievement, as indicator variables, and teacher profession interest as a latent variable Data collected by questionnaire techniques, and analyzed using descriptive, partial correlation statistical technique, and confirmatory factor analysis. There are 425 students of Automotive Engineering Study Programs as the population. Using Slovin and Proportional Random Sampling Techniques, there are 81 students as research samples. The result of the research shows 1) There is no correlation between student perception to teaching profession, 2) There is significant relation of family environment with interest to teacher profession, 3) There is no relation of organizational activity with interest to teacher profession 4) There is no relationship of learning achievement with interest to teacher profession , and 5) There is a relationship between perception, family environment, organizational activity, and learning achievement together with an interest in the teacher profession. If a person's perception is positive about a profession it will affect his interest in the profession, the learning achievement does not guarantee high interest to become a teacher.

Keywords: Teacher Profession Interest, Students Perceptions, Family Environment, Organizational Activities, Learning Achievement

1. INTRODUCTION

Education is an important tool in life to cultivate the Human Resources (HR) that exist in each individual, to become a more qualified and intelligent figure in ensuring the survival and progress of a nation. The lace quality of human resources in Indonesia is a problem that is in the spotlight of many people who care about the quality of education. In addition to intelligence, a sense of pleasure and attention are also needed to achieve good performance because, without any fun and attention, all activities will be less effective and efficient. Likewise in running a profession that has been selected, it should also be based on the pleasure and attention of a person toward the chosen profession. A person's pleasure in the chosen profession will generate interest.

An interest in becoming a teacher is the centralization of one's thoughts, feelings, willingness and attention to the teaching profession. The interest of becoming a teacher can be arisen based on the positive self-response, experience and the existence of the teaching profession is viewed from the point of each individual. Based on a positive response, a sense of pleasure towards an object in which the interest of being a teacher can be arisen and influenced by several factors.

The interest to be a teacher of each individual varies according to his personal tendency to change. This is influenced by social economic status or family environment, talent, motivation, perception, learning achievement, organizational activeness, and experience or knowledge gained during vocational high school (SMK); therefore, it is needed to be equipped with information and knowledge about college. From the information obtained, there is only 38% of graduates who work as teachers. Not all graduates of automotive engineering education of FT UNP that working as a teacher. The low interest of automotive engineering students'of Education Study Program in the teaching profession. From the identified problems, this study is limited to factors affecting students' interest in the teaching profession.

Interest In Teaching Profession

Interest contains elements of cognition (familiar), assumptions (feelings), and conation (the will). Interest is a sedentary tendency in the subject to feel attracted to a particular field and feel happy to be involved in that field. Based on the above definition of interest, it is concluded that interest is a very basic psychological aspect of a person and occupies a very important role in all human activities in life. It can even be said that interest can color one's activity. [1]

Perception

Perception is to explain that the occurrence of perception process, the object generates a stimulus and the stimulus of the senses or receptors. This process is called the process of depth (physical). The stimulus received by the senses is continued by sensory nerves to the brain. This process is called physiological. Then, there is a process in the brain, so that the individual can realize what he receives with the receptor, as a result of the stimulus he received. The process that occurs in the brain or the center of consciousness is what is called the psychological process. From the description above perception definition then concluded as an interpretation, assessment, or opinion of a person about an object. If a person has a good perception of an object, then it will affect his interest in like the object. [2]

Family environment

Usually, people interpret the environment in a narrow as if the environment is just nature around outside of human/individual. The environment actually includes all the material and stimulus inside and outside the individual, either which are physical, psychological, and socio-cultural.

Psychologically, the environment includes all the stimulation that individuals receive from the concession from birth to death. Stimulation such as genes, interactions, tastes, desires, feelings of purpose, interests, needs, will, emotions, and intellectual capacity. From the description above, it can be concluded that the family environment is a small social group consisting of father, mother, and child who has relative social relationships remain due to blood ties, marriage and adoption with all the conditions that exist within the space occupied, and has a very important role for growth, development, mental and education of children. [3]

Organizational activity

The organization is the composition or unity of various parts of people, so it is a regular unity. Someone who is actively working in a particular organization is called an activist. The organization is a systematic way to integrate the interdependent parts into a unified whole where the authority, coordination, and supervision are trained to achieve a particular goal. Based on that opinion, it can be said that the organization is an organized unity to achieve organizational goals and as a vehicle for developing talent, interest, and potential for the activists within the organization. While the activity of the organization is an activity to participate in work and strive in an effort to achieve organizational goals. [4]

Learning achievement

Learning achievement is the success rate of learners to achieve the goals set in a program. This learning achievement is used to assess learning outcomes at the end of a certain level of education. To know the level of students' skills in learning can be assessed from the learning or learning achievement. Learning achievements obtained through tests or evaluations that provide a more general picture of the progress of activities in an educational institution. Achievements can be used to determine the learning difficulties and to know the success of students/students in the learning process.

Learning outcomes consist of 4 groups namely; knowledge, in the form of information materials, facts, ideas, beliefs, procedures, laws, rules, standards and other concepts; ability, in the form of ability to analyze, reproduce, create, organize, summarize, generalize, think rationally and customize; habits and skills, that is in the form of behavioral habits and skills in using all abilities; attitude, that is in the form of appreciation, interest, consideration, and taste. From the above opinions, it can be concluded that the learning achievement is the result of the learners' efforts that can be achieved with knowledge, skills, habits and skills and attitudes after following the learning process that is shown with the test results. Learning achievement is required to know the ability gained from a learning activity. [5]

2. RESEARCH METHODS

This research is done with quantitative approach. The symptoms or phenomena encountered in the field are measured using a questionnaire and the results are quantified into numerical data/numbers. This research includes correlational correlation research group of product moment, and partial correlation, then calculate the power of influence between factors as indicator variable with teacher profession interest variable as variable Y. Then, this research data continued with analysis using partial correlation technique to analyze influence between the independent variable and dependent, in which one of the independent variables is fixed/controlled. So, partial correlation is a number that indicates the direction and strength of the relationship to or more variables, after one variable that is expected to affect the variable relationship is fixed/controlled. In this study, data in the analysis using partial correlation is done with the help of SPPS 20 Program.

3. RESULTS AND DISCUSSION

The research data consist of four independent variables that are student's perception variable (X1), family environment (X2), organizational activity (X3), student achievement (X4) and the dependent variable of student interest in profession teacher (Y). To describe and test the influence of independent variables and dependent variable in this study, then in this section will be presented a description of data from each variable based on the data obtained from the field as follows:

Table 1. The main research data

Statistics		MPG Y	PERMHSX1	LKGKLX2	KORGX3	IPK X4
Valid		81	81	81	81	81
Missing		0	0	0	0	0
Mean		76.27	79.31	63.28	61.46	3.1249
Std. Error of Mean		.934	1.477	.800	1.022	.03231
Median		77.00	79.00	64.00	62.00	3.1000
Mode		79	79	67	51	3.09
Std. Deviation		8.410	13.289	7.198	9.194	.29080
Variance		70.725	176.591	51.806	84.526	.085
Range		43	66	37	46	1.23
Minimum		50	41	45	36	2.56
Maximum		93	107	82	82	3.79
Sum		6178	6424	5126	4978	253.13

a. Multiple modes exist. The smallest value is shown.

Normality test

Test data normality Interest in the teaching profession, conducted using Kolmogorov Smirnov Test and Shapiro Wilk Test, and the results can be seen in Table. Then, QQ Plots distribution of interest data on the profession of teachers can be seen in the picture, while the histogram distribution of interest data as latent variables, and student perceptions, family environment, organizational activity, learning achievement as independent variables. Kolmogorov Smirnov test yielded p = 0.20. The p = 0.20 is> 0.05, so it is concluded that the distribution of interest data in the teaching profession is a normal distribution, and visually the distribution form is shown in Table.

Table 2 Normality test

Tests of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
MPG(Y)	.102	81	.035	.963	81	.016
PERMHSX1	.071	81	.200*	.985	81	.494
LKGKLX2	.081	81	.200*	.979	81	.203
KORGX3	.069	81	.200*	.979	81	.207
IPK	.073	81	.200*	.981	81	.281

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Test linearity

The linearity test of the relationship can be determined by using the F test. In SPSS version 20 to test linearity using deviation from linearity from the linear F test. The relationship between independent variables with a linear dependent variable if the value of F_{hitung} is smaller than F_{table}, the result of linearity test relationship is as follows:

Table 3 Test linearity

Variabel	F_{hitung}	F_{tabel}	Kondisi	Keterangan
X_1-Y	1.534	3.08	$F_{hitung} < F_{tabel}$	Linier
X_2-Y	1.029	3.08	$F_{hitung} < F_{tabel}$	Linier
X_3-Y	1.308	3.08	$F_{hitung} < F_{tabel}$	Linier
X_4-Y	1.068	3.08	$F_{hitung} < F_{tabel}$	Linier

Multicollinearity test

Multicollinearity test is intended to determine whether there is multicollinearity between independent variables. In SPSS version 20 to test the linearity using VIF value. The independent variable does not experience multicollinearity if is count> and VIF counts <VIF. In this study, the value of alpha/tolerance of 0.05 and VIF of 5.00. The multicollinearity test results of the relationship are:

Table 4 multicollinearity test

Variabel	Tolerance	VIF Hitung	VIF	Kondisi
X_1	0.846	1.182	5.00	VIF Hitung < VIF
X_2	0.807	1.239	5.00	VIF Hitung < VIF
X_3	0.857	1.167	5.00	VIF Hitung < VIF
X_4	0.987	1.013	5.00	VIF Hitung < VIF

Testing Statistical Hypothesis

The 5th hypothesis test was conducted using partial correlation statistic technique using SPSS 20 program aid, with the result as in appendix 8, with the following result:

Testing of hypothesis 1, there is a significant correlation between student perception with the interest in the teaching profession, before controlling the factors 2,3, and 4 (zero order partial), the correlation between Factor 1 with interest obtained RX1Y = 0,266 and significant with p <0,010. After analyzed partially by controlling Factors 2,3, and 4, obtained RX1Y, 234 = 0.114 and not significant with p <0.319. Hence hypothesis 1 is rejected.

Testing of hypothesis 2, there is a significant relationship between family environment with interest in the teaching profession, before controlled to factor 1,3, and 4 (zero order partial), the correlation between family environment with interest in teaching profession RX2Y = 0,466 and significant with p <0,000. After analyzing partially by controlling Factors 1.3, and 4, obtained RX2Y, 134 = 0.386 and significant at p <0.00. Thus the hypothesis is accepted.

Testing of hypothesis 3, there is a significant relationship between the activity of organization with interest on teacher profession, before controlling of factor 1,2, and 4, obtained a correlation between the activity of organization with interest RX3Y = 0,221 and very significant at p <0,058. After analyzed partially by controlling Factors 1,2, and 4, obtained RX3Y, 124 = 0.054, and not significant with p <0.636. Hence hypothesis 3 is rejected.

Testing of hypothesis 4, there is no significant correlation between learning achievement with interest on teacher profession, before controlling the factors 1,2, and 3, obtained a correlation between learning achievement with interest RX4Y = 0,066 and not significant with p <0,560. After partially analyzed by controlling Factors 1,2, and 3, obtained RX4Y, 123 = 0.028, and not significant with p <0.805. Hence hypothesis 4 is rejected.

Testing of hypothesis 5, there is a significant correlation between student perception, family environment, organizational activity, learning achievement with interest in teaching profession obtained correlation R (1234) equal to 0,483 and coefficient determinant of R2 (1234) equal to 0,233, thus hypothesis be accepted. The value of R2 (1234) means 23.3% changes in the interest variable in teacher profession (Y) can be explained by student perception variable (X1) family environment, (X2), organizational activity (X3), learning achievement (X4), 7% is explained by another variable not examined.

Based on the results of statistical hypothesis testing can be drawn Venn diagram as follows:

Figure 1. Venn diagram testing of statistical hypotheses

4. DISCUSSION

Perception is one of the internal factors that influence the emergence of one's interest in an object because an interest will be preceded by the perception of things related to the object. If a person has a positive perception of a profession, then it will affect his interest in the profession. In this study, the respondents have a very less perception of interest in the teaching profession.

The family is the oldest educational institution, informal, the first and the main natural by children and educational institutions that are natural. Parents are responsible for nurturing, caring, protecting, and educating children to grow and develop properly. With the values received from the family, the environment will bring the interests and views of a person to the chosen profession.

The results showed that the activity of the organization did not affect the students' interest in the teaching profession. This can be caused by many factors, students of many automotive engineering education programs are active in various internal and external student organizations. In the internal organization of many students who are active, both are at the level of majors, faculty, and universities. Each organization has its own characteristics and objectives. Many types of organizations bring together students of every department or faculty that lead to certain interests and talents such as research, sports, music, religion and so forth.

From the results of analysis and testing the hypothesis shows that the data and results tested in this study were rejected empirically. Thus it is believed that the family environment has a positive relationship with the

interest of the teaching profession. Furthermore, it can be interpreted that the variables in this study have a very low relationship. In this factor, it is stated that an activity carried out by an individual that can be achieved successfully will lead to a pleasant feeling and this can magnify interest in such and such other matters. The success of learning can be seen from the achievement of learning that has been achieved by students. Achievement Index (IP) is the average value of learning outcomes that describe the absorptive power of learning for a given semester. The cumulative Achievement Index (GPA) shows mastery of theory or knowledge of lecture material. With that, if student achievement is shown in high GPA, then the student will have the interest to become a teacher. From the empirical data obtained are in the category of both the high achievement of learning does not guarantee high interest to become a teacher. Based on the results of the research conducted by the joint analysis between the two dependent and independent variables, the positive and significant correlation between student perception, family environment, organizational activeness, learning achievement of teacher professional interest showed correlation R (1234) of 0.483 and correlation coefficient R2 (1234) of 0.233 and Fcount 5.773> Ftable 2.23. This means that R2 (1234) of 23.30% interest in the teaching profession is explained by students' perceptions, family environment, organizational activity, and learning achievement, while 76.70% is explained by other factors not analyzed in this study. It can be seen from the result of research of family environment factor has bigger influence from perception variable, organizational activity, and learning achievement.

5. CONCLUSION

From the results of research above, because of the high relationship between independent variables, the relationship becomes very low after partially analyzed by controlling other independent variables. Therefore, in this study does not affect the perception of students on the interest in the teaching profession. It can be concluded that the family environment is the greatest influence on the interest in the teaching profession. in this study did not affect the activity of the organization to the interest in the teaching profession. in this study did not affect the learning achievement of interest in the teaching profession. There is a positive and significant correlation between student's perception, family environment, organizational activity, and learning achievement of interest in teaching profession in the students of FT UNP's automotive engineering education program which shows R (1234) value of 0.483 and determinant coefficient R2 (1234) of 0.233. The

value of R2 (1234) means 23.3% changes in the interest variable in teacher profession (Y) can be explained by student perception variable (X1) family environment, (X2), organizational activity (X3), learning achievement (X4) , 7% is explained by another variable not examined.

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7. AUTHOR'S BIOGRAPHY

Rasinov Chandra. Born in Medan, November 27, 1957. Lecturer in Automotive Department, School of Engineering, Universitas Negeri Padang. Earned his Graduate Degree in Research and Evaluation 1990,Universitas Negeri Jakarta

Anggi Aprianto was born in Balaiselasa on April 6, 1989. Bachelor of Automotive Engineering Education of Engineering Faculty at Universitas Negeri Padang. The writer was graduated on 2016, currently undergoing the magister of educational program majoring technology of educational and vocational of automotive engineering field.

Mawardi was born in Padang Pariaman on Mei 22, 1990. Bachelor of Automotive Engineering Education of Engineering Faculty at Universitas Negeri Padang. The writer was graduated in 2016, currently undergoing the magister of educational program majoring technology in educational and vocational of automotive engineering field.

Reza Rahmadani, Born in Jambi, June 10, 1990, Bachelor of engineering education in the Department of Automotive Engineering Automotive Engineering faculty, Universitas Negeri Padang. The year 2015 earned his Bachelor of engineering education in the Department of Automotive Engineering Automotive. Currently undergoing Education Master's degree Program in the Department of Vocational and Technological Education with Concentration field of Automotive Engineering, Universitas Negeri Padang.

An Experimental Study On The Effect Of Centrifugal Clutch Cooling Groove On Motorcycle Performance

RemonLapisa[1], HendikaSyahputra[2], Irma Yulia Basri[3], Rifdarmon[4] and Hendra Dani Saputra[5]
Department of Automotive Engineering, UniversitasNegeri Padang, Padang 25131
Corresponding author:hendradani@ft.unp.ac.id

ABSTRACT: This experimental research aims to analyze the effect of clutch disc groove on the engine power and torque of motorcycles. In this study there are three different specimens will be presented: the centrifugal clutch with a straight groove, loping groove, and V groove and will be compared to the standard one without any groove. The results showed that the engine power and motor torque is increased significantly in the grooved clutch specimen than the reference clutch. Moreover, the most effective clutch shape is V- a groove that can improve the motorcycle torque up to 32.3% for high angular speed 5000 rpm. On the other test, V-shape can also increase the engine power up to 28.5%. Otherwise, for low angular speed condition,3000 rpm, the centrifugal clutch with straight groove increase of the torque about 41,9% and sloping groove can improve in engine power that up 45%.

Keywords: Groove of the clutch, Centrifugal Clutch, Power, Torque.

1. INTRODUCTION

One of a part of a motorcycle that very important to transfer power from engine to wheel are transmission system. Motorcycle match different types of motorcycles in the transmission system.. Motorcycle Matic transmission used is automatic transmission "V" belt or known as CVT (Continuously Variable Transmission. The centrifugal clutch contained in the CVT consists of a clutch house (drum), spring splitter, ballast, and clutch. The centrifugal clutch component is one important component that serves to forward the rotation of the pulley to the rear-wheel drive. At low RPM, the rotation of the secondary pulley shaft is not forwarded to the rear-wheel drive because the centrifugal clutch housing has not yet attached to the clutch housing. As the engine will increase, the centrifugal force gets bigger and defeats the springing force on the clutch so as to cause the clutch heap to be thrown out and attached to the clutch house.

At this time the power and torque of the engine will be forwarded to the rear wheel drive, but the slip often occurs between clutch disc and clutch cover while continuing round. This is because the friction between of the clutch cover with clutch house an make heater on the clutch so that clutch disc be hardened and slippery.This will result in a decrease in clutch friction so it will decrease power and torque motorcycle.

There is some research about clutch cooling grooves. Example "Clutch cooling grooves for uniform plate temperature in friction launch" find by MuraliArcot and Paul Stevenson, Designated First copyright Arcot Murali KS, Stevenson Paul D. Than research About

"Groove pattern for high thermal capacity wet clutch"find by Parviz Payvar and Designated First copyright Borg-Warner Corporation. The research above tells the effect clutch grooves will be making less fiction and less thermal that make slippage of the clutch.

Based on some research above and observations in some workshops, standard clutch disc are often modified by adding grooves on the clutch. It aims to remove excessive heat and dust resulting from friction so as not to disturb the performance of the clutch. Grooves on the clutch are usually to air circulation and to avoid overheating clutch.

2. EXPERIMENTAL STUDY

2.1 Experimental Tools

This experiment uses a comparison between a standard centrifugal clutch no grooves with a centrifugal clutch modification grooves: straight groove, loping groove, and V-shaped groove.Each type of clutch groove is tested to see how much power and torque it produces. The tools used in the experiment use of clutch grooved to the power and torque of motorcycles dynamometer chassis with clutch standard, clutch straight groove, clutch sloping groove, and clutch V groove.

Here are some pictures of centrifugal no groove that compare with some of the modification of grooves: straight groove, clutch sloping groove, and clutch V groove
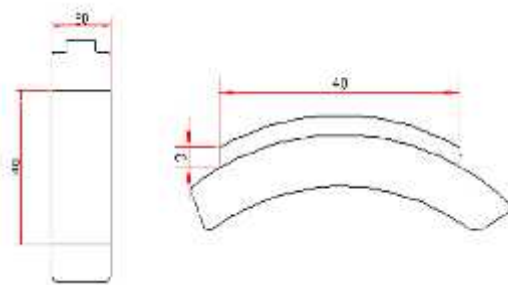
Picture1. Standard clutch, not groove
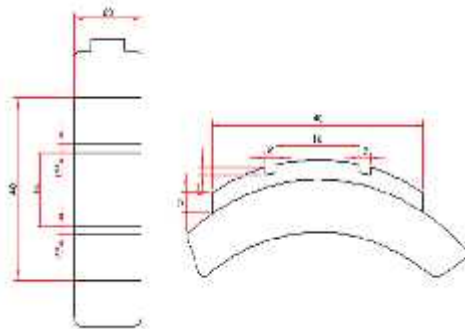
Picture 2. Straight groove
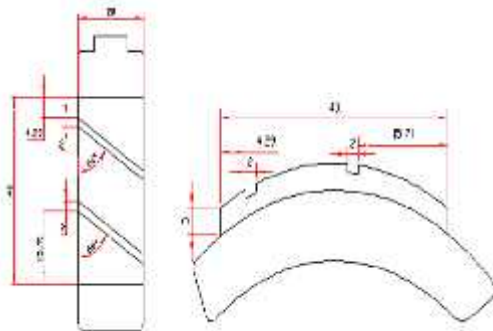
Picture 3. Sloping groove
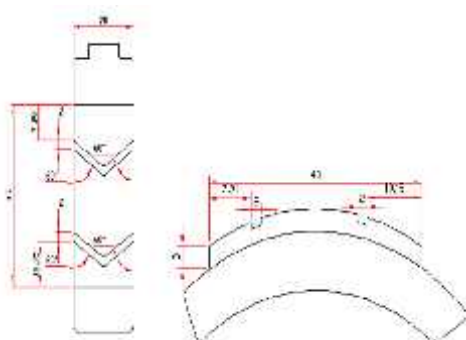
Picture 4. Straight groove

Some of the part groove above will be used on a motorcycle. This experimental see how powered and torque will be generated of each. The experimental using a Dynotester.

2.2 ExperimentalMethod

This research isan experimental research where this research is intended to know the existence or effect of treatment conducted on the object of research. This experimental also refers to the research of remonlapisa and partners about "The design and simulative study of heat exchanger profiled "spiral tube in the pipe as heat transfer between ethanol and water"(2009). This research discusses the available natural energy enforcement. In the research conducted the method is almost the same about how the natural friction energy utilization of the clutch to be treated by making multiple grooves. By making the grooves above can later reduce the style of heat and dirt on the clutch. Besides, with this research also see how much torque and power generated each flow.

Ahmad Arif and BambangSudarmata also experimental the characterization of a diesel engine with diesel fuel CNG type LPIG performance with setting the start of injection and duration of injection. The results of this experimental find and make efficiency and reduction of fuel consumption resulting in optimization of existing power in diesel motors.

The experimental will be conducted using three measurements: testing at 3000 rpm, 4000 rpm and 5000 rpm. This study will see how much power and torque generated by each standard clutch and clutch with any grooves in the test.

2.2.1Data Collection Techniques

Data collection on the tested on a motorcycle will use comparison standard clutch and that uses a grooved clutch. Testing will be done at 3 times and three of variation RPM: at 3000 rpm, 4000 rpm and 5000 rpm. The experimental find the average of each power and torque on time and variation RPM. The technique of collecting data in the form of tables which then analyzed. How the engine will produce power and torque from a comparison of RPMwith power and torque generated by standard clutch and clutch added to the groove.

2.2.2Data Analysis Technique

Analyzing data in this research is to use mean statistic calculation. The formula used is as follows:

$$\bar{X} = \frac{\Sigma X}{n}$$

Note:

$\bar{X}$ = Mean

ΣX = The amount of data for each specimen

n = Many per-specimen tests

Analyze data using percentage calculation formula

$$P = \frac{n - N}{N} \text{ x } 100\%$$

P **=** Percentage rate gained
n = Power/Torque after treatment
N = Power/Torque before treatment

3. RESULT AND DISCUSSION

3.1 Improved Torque

Table 1. Result Experimental Torque

Centrifugal Clutch	RPM	Torque (Nm)			Mean
		P1	P2	P3	
StandarCluctch	3000	9,45	9,87	9,47	**9,59**
	4000	10,31	8,83	8,63	**9,25**
	5000	7,19	6,48	6,64	**6,77**
Straight Groove	3000	14,41	14,25	12,19	**13,61**
	4000	10,73	11,2	10,12	**10,67**
	5000	8,06	8,54	7,66	**8,08**
Sloping Groove	3000	11,46	14,07	14,28	**13,27**
	4000	10,91	10,83	11,37	**11,03**
	5000	8,86	8,76	8,83	**8,81**
Groove V	3000	12,35	14,05	12,7	**13,03**
	4000	11,08	11,6	11,11	**11,26**
	5000	8,84	8,98	9,07	**8,96**

This is a graph of increase torque

	5000	4000	5000
Alur Lurus	41,9	15,3	19,3
Alur Miring	38,3	19,2	30,1
Alur V	35,8	21,7	32,5
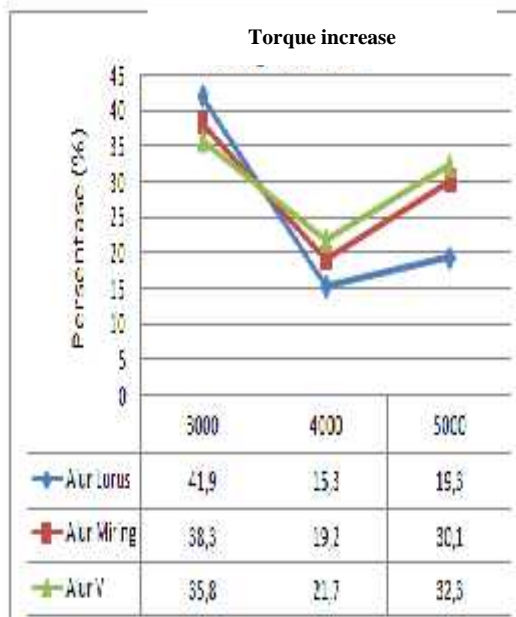
3.1.1 Straight groove vs Standard Clutch

Torque analysis using the compared standard clutch with a Straight groove at RPM 3000. The engine produces a torque of 9.59 Nm.When using the straight groove, torque increases to 13.61 Nm. At RPM 4000, using a standard clutch torque produced 9.25 Nm.When using a straight groove torque it increased to 10.67 Nm. At RPM 5000 using a standard clutch, the torque produced 6.77 Nm, when using a straight groove torque increased to 8.08 Nm.

3.1.2 Sloping groove vs Standard Clutch

Torque analysis using the standard clutch at RPM 3000 generates torque of 9.59 Nm when using the sloping grooved torque increases to 13.27 Nm. At RPM 4000 using the standard clutch generated 9.25 Nm, when using the sloping grooved the resulting torque increased to 11.03 Nm. At RPM 5000 using the standard clutch produced 6.77 Nm when using the sloping grooved increase to 8.81 Nm.

3.1.3 V Groove vs Standard Clutch

Torque analysis using the standard clutch coupling at RPM 3000 generates torque of 9.59 Nm when using the V groove torque increases to 13.03 Nm. At RPM 4000 using a standard clutch torque generated 9.25 Nm, when using the V groove it increased to 11.26 Nm. At RPM 5000 using a standard clutch generated 6.77 Nm, when using V groove increased to 8.96 Nm.

3.2 Improved Power

Table 2. Result Experimental Power

Centrifugal Clutch	RPM	Power (HP)			Mean
		P1	P2	P3	
StandarCluctch	3000	3,9	4,1	4,0	**4,0**
	4000	5,8	5,0	4,8	**5,2**
	5000	5,1	5,0	4,8	**4,9**
Straight Groove	3000	6,0	5,9	5,1	**5,6**
	4000	6,0	6,3	5,6	**5,9**
	5000	5,7	6,0	5,4	**5,7**
Sloping Groove	3000	5,9	5,8	5,9	**5,8**
	4000	6,1	6,1	6,3	**6,1**
	5000	6,2	6,2	6,2	**6,2**
Groove V	3000	5,2	5,8	5,3	**5,4**
	4000	6,2	6,5	6,2	**6,3**
	5000	6,2	6,3	6,4	**6,3**

This is a graph of increase power
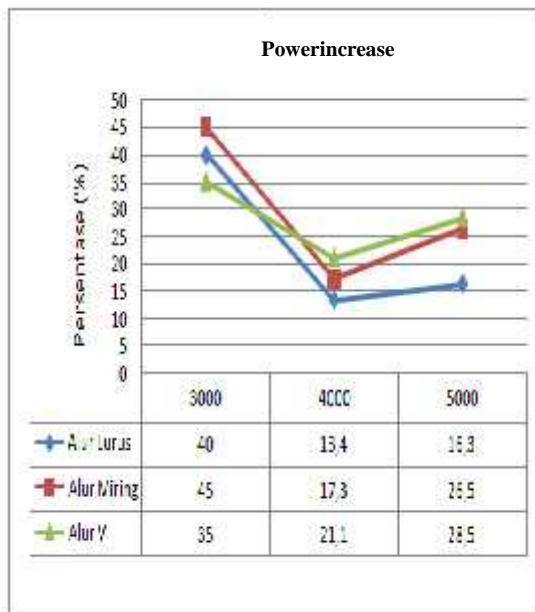
3.2.1 Straight groove vs Standard Clutch

A power analysis using the standard clutch at RPM 3000 generates power4.0 HP. When using the straight groove, power increases to 5.6 HP. At RPM 4000, using a standard clutch power produced 5.2 HP.When using a straight groove-power increased to 5.9 HP. At RPM 5000 using a standard clutch powerproduced4.9 HP. When using a straight groove-power increased to 5.7 HP.

3.2.2Sloping groove vs Standard Clutch

A power analysis using the standard clutch at RPM 3000 generates power4.0 HP. When using the straight groove, power increases to 5.8 HP. At RPM 4000, using a standard clutch power produced 5.2 HP.When using a straight groove-power increased to 6.1 HP. At RPM 5000 using a standard clutch power produced4.9 HP. When using a straight groove-power increased to 6.2 HP

3.2.3 V groove vs Standard Clutch

Power analysis using standard clutch at RPM 3000 generates power4.0 HP. When using the straight groove, power increases to 5.4 HP. At RPM 4000, using a standard clutch power produced 5.2 HP.When using a straight groove-power increased to 6.3 HP. At RPM 5000 using a standard clutch power produced4.9 HP. When using a straight groove-power increased to 6.3 HP

4. CONCLUSIONS AND SUGGESTIONS

4.1 CONCLUSIONS

The use of the clutch groove make the increase in power and torque generated:
1. Using a straight groove
   Torque increased 4.02 Nm at 3000 RPM 1.42 Nm at 4000 RPM, and 1.31 Nm at 5000 RPM. Power increased 1.6 HP at 3000 RPM, 0.7 HP at 4000 RPM, and 0.8 HP at 5000 RPM.
2. Using sloping groove
   Torque increased 3.68 Nm at 3000 RPM, 1.78 Nm at 4000 RPM, and 2.04 Nm at 5000 RPM. Power increased 1.8 HP at 3000 RPM, 0.9 HP at 4000 RPM, and 1.3 HP at 5000 RPM.
3. Using the V groove
   Torque increased by 3.44 Nm (35.8%) at 3000 RPM, 2.01 Nm (21.7%) at 4000 RPM, and 2.96 Nm (32.3%) at 5000 RPM. Power increased by 1.4 HP (35%) at 3000 RPM, 1.1 HP (21.1%) at 4000 RPM, and 1.4 HP at 5000 RPM.
5. The slip on the groove V is smaller at 4000 and 5000 RPM. when compared to the use of straight clutch grooves and sloping grooves. So that the power and torque forwarded to the rear drive shaft is more optimal when the clutch it work.

4.2 SUGGESTIONS

Using centrifugal clutch grooves on a motorcycle as an effort to increase the power and torque of the vehicle still needs furthermore research next time.

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EXPERT MODEL SYSTEM ON ENTREPRENEURSHIP PERSONALITY

Resmi Darni[1], Z. Mawardi Effendi[2] and Selamat Triono[3]

Department of Informatic Education, Muhammadiyah University Of Riau, Pekanbaru, Indonesia [1]
Department of Economic Education, Padang State University, Padang, Indonesia [2]
Department of Mechanical Engineering, Medan State University, Medan, Indonesia [3]

ABSTRACT: One of the problems faced by counseling teachers and counseling is their limited knowledge on how to direct students' interests in accordance with their personalities. Vocational high schools really need counseling program for career and counseling to guide the students' career match their personalities in order to reduce the number of unemployment who graduated from vocational high schools. Due to this fact, then it requires an expert in psychology or counselor that can direct the students to the right career suitable with their personality based on the result of the test or psychological assessment which have done by the experts in psychology. The high cost of psychological assessment, limited number of psychological experts and very slow result announcement, makes the students have difficulty in having counseling with the experts if they want to decide their chosen career that they want to have in the future. To solve this problem, it needs a system which has an ability like an expert in psychology. This system is equipped with some references knowledge about personality and interest in chosen career by the students in line with the students' personality. The main purpose of this research is to develop a web-based expert system using basic rules with chaining forward referenced method and PHP language program which meant to help the students in having counseling about their career through online, adaptive, practical, and efficient way. This research is focused on entrepreneurship career interest for students of vocational high school majoring in technological information, using 4D model of research methodology (Define, Design, Develop, and Disseminate). Data analysis used in validating factor is factor analysis with CFA type (Confirmatory Analysis Factor). This research is done on 200 vocational high school students who have studied entrepreneurship. From this research, it is found that there are 5 characters which built entrepreneurship personality namely: Persuader, Creative, Risk taker, Leader and Ambitious which later will become factors in developing CBT-EP program (computer based test for entrepreneurship personality).

Keywords: Personality; Entrepreneurship; Expert System; Structural Equation Modeling; Confirmatory Factor Analysis.

1. INTRODUCTION

Entrepreneurship derived from the word entrepreneur who refers to a figure or a particular human person. Therefore, discussing the issue of entrepreneurship will never escape from talk about the problems of the people and his personality. An entre-preneur must recognize and understand yourself, this will facilitate them to find, define and lead the path of entrepreneurship that suits their personality [1].

Entrepreneurship it has a very important role, entrepreneurship likened as a driving force in the economy nationally and internationally as well as being a symbol of resilient businesses and over-achievers. On this second Millennium era developed countries doing the revolution in the field of entrepreneurship, they develop a business school for entrepreneurship, the creation of characters, develop competence of entrepreneurship that we can look at '21 ST Century Competencies', as well as perform the measurement index of sustainable entrepreneur-ship[1]. While in Indonesia have entrepreneurship programs launched by the Government with the

allocation of funds for the activities of the Studium General entrepreneurship, Integrated Work Study Program (PBBT), Student Business Compe-tition and Expo Indonesia Indonesia Student Entrepreneurship (EXPO KMI). The purpose of all this is to find individuals who have the potential in the field of entrepreneurship. However this program alone turned out to be insufficient to locate seeds entrepreneurship potential. It takes a special selection by using the tool (instrument) is the right [2].

Until now, this was enough tools developed to measure the potential of entrepreneurship as KIEA (Kauffman Index Activities Entreprenurial), Entreprise Index SANTANDER, Legatum Prosperity Index, Erasmus, Ivey, IKRM, GEDI and PIKEN. Each of these instruments has different functions, ways of working and goals in discovering the potential for entrepreneurial, business or country entrepreneurship[3].

In the world of information and communication technology is known for a term Expert System a knowledge-based program that provides solutions with quality experts for

problems in a specific domain. Expert system is a computer pro-gram that mimics the thought process and expert knowledge in solving a particular problem. expert system is seen as a way of storage of expert knowledge in a particular field in the computer program so that a decision can be rendered in conducting reasoning intelligently. General knowledge in expert system taken from a human expert in a particular domain and expert system that attempted to emulate the methodology and performance of an expert on the (performance) [4], [5].

Expert system is not only used in the field of medical,and legal only , the expert system can also be applied in the field of career guidance and counseling , for career guidance and counseling also cons-titute an field a large and complex, one of the problems in the field of career guidance and counseling is how do Iprovide recommendations careers at exactly the right person in accordance with his personality. Therefore the solutions offered to solve this problem is to develop a model of expert system that can provide referrals in particular career entrepreneurship for students of vocational high schools.

2. MATERIAL

2.1 Material

There are some preparations that need to be done before building an expert system to measure the personality of entrepreneurship. first determine the indicators and criteria as well as the statement items of the entrepreneurship personality, the criterion indicator and the statement item can be determined based on the literature that suits the personality of entrepreneurship. the next stage do validation with expert personality entrepreneurship. After the entrepreneurial instrument finished in validation by experts, then the stage of building the expert system of entrepreneurship personality began to be implemented. the required equipment and software specifications are Intel Ci3-6006U 2.0GHz, 4GB RAM, 500GB HDD, Intel HD VGA, 21.5 FHD, Wifi, Keyboard & Mouse. Software are needed macromedia dreamweaver, MySQL, WebHosting.

2.2 General Procedure in Instrument Design

Determine the indicators, criteria and items of the statement to be designed into an entrepreneurship personality instrument.

Table 1. Instrument Design

No	Indicators	Criteria	Items of the Statement	Total of items
1	Persuader	Friendly	1,2,3,4,5	20
		Talkative	6,7,8,9,10	
		Open in various situations	11,12,13,14,15	
		Adept at influencing others	16,17,18,19,20	
2	Risk Taker	Likes Challenges	21,22,23,24,25	20
		Thorough	26,27,28,29,30	
		Good analytics	31,32,33,34,35	
		Likes Adventure	36,37,38,39,40	
3	Creative	Imaginative	41,42,43,44,45	20
		High curiosity	46,47,48,49,50	
		Initiative	51,52,53,54,55	
		Confidence	56,57,58,59,60	
4	Leader	Influential	61,62,63,64,65	20
		Visionary	66,67,68,69,70	
		Collaborative	71,72,73,74,75	
		Innovative	76,77,78,79,80	
5	Ambitious	Results-oriented,	81,82,83,84,85	20
		Focus on objectives	86,87,88,89,90	
		Individualist	91,92,93,94,95	
		Never give up	96,97,98,99,100	

Total all items	100

2.3 Contruct Validity Intrument

Contracts that have been validated by experts will be re-tested using Structural Equation Modeling (SEM). this can be seen in figure 1
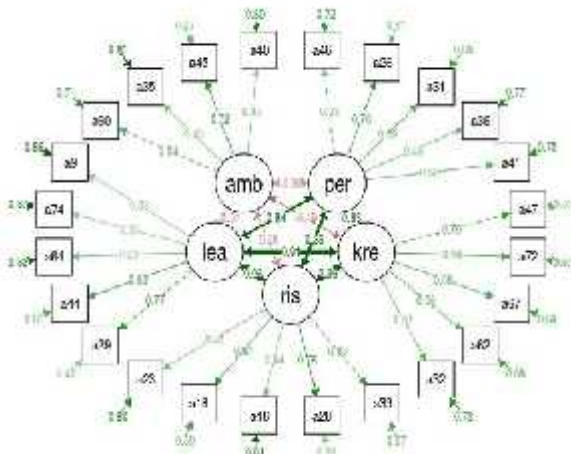
Fig.1 Intrument Validity Useing Structural Equation Modeling (SEM)

2.4 Expert System Design

An expert system is composed of three main modules [6]:

a. Knowledge Acceptance Module (Knowledge Acquisition Mode)
The system resides in the module will receive knowledge from expert. The process of gathering knowledge will used for system development, with the help of knowledge engineer.
b. Consultation Module (Consultation Mode)
At the moment the system is in a giving position answer to the problem posed by user, the expert system is in the module consultation.
c. Explanation Module
This module describes the decision-making process by system.

In the expert system there are 2 main components [6]:
a. Knowledge Base
knowledge is the essence of a system experts, namely the form of knowledge representation from experts. The knowledge base is composed of facts and rules.
b. Inference Engine (Inference Engine)
Engine inference serves to guide the process reasoning against a condition, based on the available knowledge base.

Bayes's theorem is a theorem with two different interpretations. In Bayes's interpretation, this theorem states how far the degree of subjective trust should change rationally when there are new clues. In the interpretation frekuentis this theorem explains inverse representation of probability of two events. Bayes probability is one way to overcome the data uncertainty by using Bayes formula is expressed as follows [7].

$$P(Hk \mid E) = \frac{P(E \mid Hk)P(Hk)}{\sum_{i=1}^{n} P(E \mid Hk)P(Hk)} \quad \dots (1)$$

$P(H \mid E)$: The probability of Hk hypothesis if given evidence E.

$P(E|H)$: The probability of the emergence of evidence E if Hk hypothesis is known to be true

$P(H)$: Hk hypothesis probability, without looking at any evidence.

n : Jumlah hipotesa yang mungkin

2.4.1 Data Tables of Entrepreneurship Personality

Table2.Indicator of Entrepreneurship Personality

Code_Personality	Indicator of Entrepreneurship Personality
K001	Persuader
K002	Risk Taker
K003	Creative
K004	Leader
K005	Ambitious

This personality table is used as a pattern matching information entered by users and knowledge base.

Table 3. Bayes Value

Bayes Value	Bayes Theorem
0.0- 0.2	No
0.3- 04	Maybe
0.5-0.6	Most likely
0.7-0.8	Almost Certainly
0.9-1.0	Certainly

Table 3. Criteria of Entrepreneurship Personality

Code criteria	Item Of Criteria	Weight
D001	Smile	0.9
D002	Warm	0.5

D003	Delightful	0.8
D004	Hilarious	0.5
D005	Interesting	0.9
D006	extravagant talk	0.9
D007	interrupting	0.6
D008	likes to be the center of attention	0.5
D009	Adaptable	0.7
D010	Aggressive	0.8
D011	Attention to others	0.8
D012	Kind	0.6
Code criteria	**Item Of Criteria**	**Weight**
D013	a good listener	0.4
D014	giving advice	0.4
D015	appreciate opinions	0.3
D016	good at seducing	
D016	good language skills	0.9
D017	good at persuading	0.7
D018	interesting when talking	0.6
D019	enliven the atmosphere	0.7
D020	persistent	0.9
D021	Confidence	0.8
D022	Brave	0.9
D023	Likes outdoor activities	0.5
D024	Stubborn	0.4
D025	High fighting power	0.8
D026	Liked the Count	0.6
D027	Have attention and height	0.5
D028	Persistent,	0.5
D029	Focus	0.8
D030	Quiet	0.4
D031	Like to solve the problem completely	0.8
D032	Humble	0.4
D033	Mathematician	0.8
D034	Logical	0.95
D035	Has a strong principle	0.81
D036	Like freedom	0.95
D037	Brave	0.8
D038	Fighters	0.4
D039	Love nature	0.7
D040	Messy	0.4
D041	Many ideas	0.9
D042	Fancy	0.9
D043	High curiosity	0.8
D044	Initiative	0.5
D045	Many hobbies	0.4
D046	Likes to ask	0.9
D047	Pay attention to many things	0.6
D048	Learn a lot	0.6
D049	Interested in many things	0.5
D050	Like to read	0.5
D051	good at reading opportunities	0.7

D052	be the inspiration of many people	0.6
D053	clever position	0.4
D054	has its own style	0.5
D055	do not like to be ordered	0.4
D056	Not resting on others.	0.45
D057	Dare to take a stand and not fear wrong.	0.6
D058	Not afraid to look stupid	0.8
D059	Dare to speak, argue and criticize	0.7
D060	Have a good self-control and emotional stable.	0.7
D061	not easy to answer	0.4
D062	polite speech	0.6
D063	good lifestyle	0.4
D064	high response	0.8
D065	quickly take action	0.7
D066	Keep learning	0.5
D067	Service Oriented	0.4
D068	Trusting Others	0.5
D069	Seeing Life As A Struggle	0.7
D070	Always Improving Yourself	0.4
D071	loves to work together	0.9
D072	appreciate the opinions of others	0.9
D073	appreciate the ability of others	0.8
D074	loves to share experiences and knowledge	0.5
D075	received criticism	0.4
D076	Self-accepting	0.9
D077	adaptive	0.6
D078	Reflective	0.6
D079	Balances intuition and analysis	0.5
D080	Persevering	0.5
D081	no matter the small changes	0.8
D082	less appreciate the results of hard work of others	0.7
D083	feel success is in the work itself	0.4
D084	like to rush in making decisions	0.5
D085	easily affected	0.4
D086	do not like change	
D087	do not like criticism	0.8
D088	if it fails it will be easy for him to rise up	0.5
D089	strong desire	0.4
D090	firmly on the stand	0.9
D091	do not like crowds	0.6
D092	difficult to work together	0.6
D093	difficult to accept change	0.5
D094	less friendly	0.5
D095	independent	0.8

D096	persistent	0.7
D097	tough	0.7
D098	not cheap received failure	0.5
D099	has a high fighting power	0.4
D100	optimistic	0.9

3. METHODS
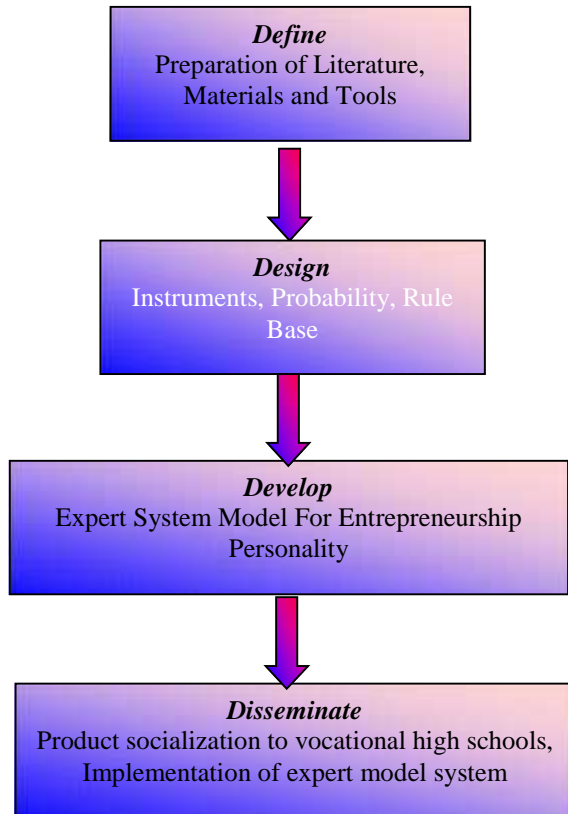
Fig.2 Research Methods using 4D Model

The research method used is 4 D model with 4 stages of development that is (Define, Design, Develop, Disseminate) in the first stage finds literature, materials and tools. the second stage of designing Instruments, determining the weight done by the expert, Rule Base, the third stage of developing the Expert System Model For Entrepreneurship Personality, the last stage of Product socialization to vocational high schools, Implementation of expert model system.

3.1 Product View
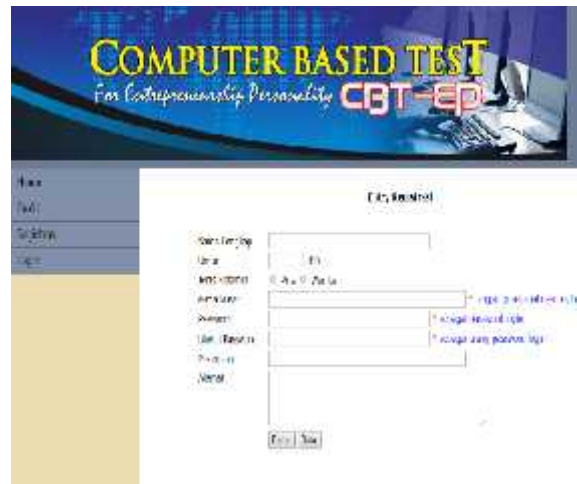
Fig. 3 Form registration

a. Participant Registration Form
Students must fill in the participants' data. After Charging, then click the save button, then the data will be stored in the database. After registering, the thing done is getting approval from the admin in order to do the next process.

Fig. 4 Form Login

b. Form Login
Before doing the test, participants are required to login to be able to do the test
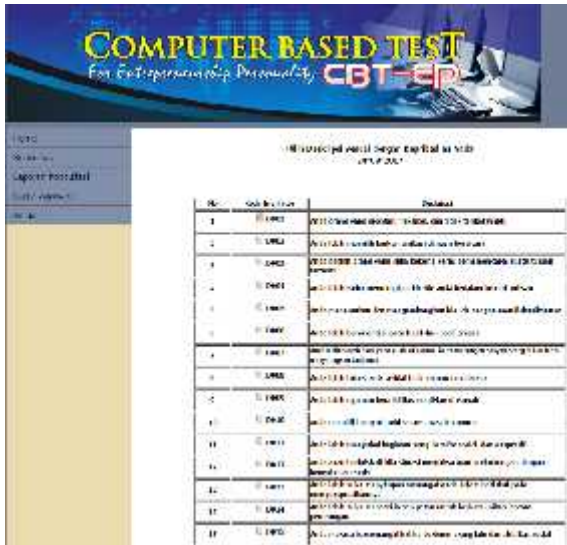
Fig. 5 Form Login

c. Entrepreneurship Personality Test Form

Participants are required to fill in the code of participants who have been obtained after the first registration. After the participant code is filled then, will appear the name of participants, gender, selected courses and photos of test participants. In this personality test form comes a statement that has led to assess the personality of the participants towards Entrepreneurship. The answer to the statement given in the form of Likert scale that has the weight of each answer. The right answer according to the personality of Entrepreneurship will get a high score.

4. DISCUSSION

This expert system model has assisted vocational high school students in recognizing their entrepreneurship potential, and assisting students in directing their career to the field of entrepreneurship, besides this model also helps select students who have strong, medium and non-entrepreneurial personality is to facilitate the implementation of training, the efficiency of training costs and the provision of funds PKM more to the right people so that entrepreneurs-entrepreneurs who can potentially utilize the facilities that have been given the government in the right target

5. CONCLUSION

This model can be applied to Vocational High School students especially in the field of technological expertise. This model is a supplement of the existing model in order to be used in providing career referrals for an individual. This model is highly dependent on the readiness of technology, whether hardware (server, personal computer / laptop), Software (Operating system, and web application) and internet network technology (bandwidth) adequate.

Application of this model is expected to optimize the use of technology resources, human resources and potential possessed by a vocational high school. The application of this model is able to make indirect media consultations that can be done anytime and anywhere without being limited by time and space. Through this model is expected to reduce the unemployment rate, especially for vocational high school graduates.

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THE ANALYZED OF TAR AS WASTE MATERIAL OF BITUMINOUS COAL GASIFICATION BY USING GASCHROMATOGRAPHY

Rijal Abdullah[1] dan Hengki Ade Satria[2]

[1]Department of Civil Engineering, Fakulty of Engineering, Universitas Negeri Padang
[2]Department of Mining, Fakulty of Engineering, Universitas Negeri Padang

ABSTRACT: The aims of this research is to detemine chemical compounds of TAR in bituminious coal gasification. The method used is experimental research. The coal Tar was collected by gasification process to bituminous coal which obtained from PT. NAL Sawahlunto. Commontly, the Graded o f c o a l a s m u c h a s 7.554.20 kcal/kg of calories, a flying substance of 39.62%, water content of 5.88% and ash of 4.21%. The gasification process has been carried out by using reactor tube with temperatures ranging from 800 to 1000°C with an air quantity of 6.93 l/s and a duration of testing of 2700 s. The result shows that the coal tar has 241 chemical compounds, such as benzene, heptadecane, eicosane, 2-Methyl-2-(alpha-thienyl)-1,3-dithiolane, 9-Octadecenoic acid (Z)-phenylmethyl ester (CAS) Benzyl oleate, and etc.

Keywords: *waste material,reactor tube, experiment research*

1. INTRODUCTION

The use of coal as a source of energy can be done by direct combustion, but it would be better if the coal is converted form of synthetic oil, among others by likuifikasi or gasification, because it can improve the effectiveness and efficiency.

Coal liquefaction is to convert coal into synthetic liquid fuel, by way of reacting coal with hydrogen at high temperature and pressure. While gasification is the conversion of coal into gas by way of combustion. The main product of gasification is referred to as syngas or also known as synthetic gas.

Miller (2005), Arif (2012), Sunggyu Lee (2007) gasification is a process for upgrading solid hard coal conditions by disposing of impure components and converting them into purified gases and can be utilized directly as fuel or more he continued reacted to produce other gases or liquid fuels and chemicals.

Synthesis gas as the main product of coal gasification can be utilized for the process of fischer tropsch, and to produce chemicals such as methanol and ammonia. In addition, the synthesis gas that has the combustible properties can also be utilized in the field of machining such as for combustion engines (internal combustion engine).

Arif (2012) states that in addition to producing syngas, coal gasification also produces char or charcoal and coal tar. This occurs because in the reactor design there is no source of combustion other than by simply relying on the initial combustion for the oxidation zone. Coal for gasification feeds has a coal ash content of not more than 10%. Meanwhile, the higher the volatile matter the higher the gas product, and the high fixed carbon value will enhance the performance of gasifier.

Arif (2012) Sunggyu Lee (2007) found that many tar as a byproduct that became the impurity of syngas. The more dominant tar is usually produced from bituminous coal. Tar obtained by about eight gallons per ton of coal (Speight, 2005).

Coal Tar is a mixture of complex compounds composed of several compounds with different functional groups and predominantly poliaromatic compounds. This compound causes coal tar to be a dangerous and toxic substance (B3 waste). The physical and chemical properties of tar are almost similar to petroleum but the coal tar has a high polyaromatic and impurity rate. Nevertheless tar has many benefits and uses. If the tar content is analyzed first and further processing is done then tar can be used as raw material in petrochemical industry, cosmetics, medicine, fuel, and others. Therefore tar became one of the commodity raw materials industry is quite expensive.

One of the largest tar producing countries is China, from Chongqing Jupeng Energy Co., Ltd. The tar-producing company sells coal tar at a price ranging from US $ 480 to US $ 750 / metric ton or equivalent to Rp 6,394,723.45 to Rp 9,991,755.39 /metric ton (Coal Tar Price Year 2017). While coal with 6,322 kcal / kg calories cost about US $ 86.23 /ton or equivalent to Rp 1,148,785.42 / ton. (Coal Price January 2017).

In general (Anonymous) in coal there are benzene with various derivatives that are very

useful for the industry. Toluene, benzoate Acid, Phenol, TNT, TNB, Nitrobenzene, and Paracetamol.

The high economic value of tar (as a by-product of coal gasification) should be a consideration for us to conduct a study of its potential. This is what encourages researchers to study the analysis of coal tar composition.

Fardhyanti and Damayanti, using gas chromatography tool (GC-MS) in analyzing tar from coal production of PT. KPC and PT. Arutmin, finds the results as in Table 1 below.
Table 1 Composition of Coal Tar in Kalimantan (PT. KPC dan PT.ARUTMIN).

THE COMPOSITIONS OF PT KPC COAL TAR

Peak Number	Compounds	Percentage (%)
1	Phenol	8.06
2	2 methyl phenol (o cresol)	5.45
3	4 methyl phenol (p cresol)	11.05
5	2,4-dimethyl phenol	5.14
6	3 ethyl phenol	5.33
19	1,8-dimethyl naphtalene	5.50
34	1,6-dimethyl-4-isopropyl naphtalene	8.65

THE COMPOSITIONS OF ARUTMIN-KALIMANTAN COAL TAR

Peak Number	Compounds	Percentage (%)
18	Benzene	1.63
22	Phenol	3.89
40	4-methyl phenol (p-cresol)	4.90
43	1,8-dimethyl naphtalene	5.94
50	1,2,3,4-tetrahydro-1,1,6-trimethyl naphtalene	3.08
61	1,6-dimethyl-4-isopropyl naphtalene	8.11

Source: International Journal of Chemical, Molecular, Nuclear, Materials and Metallurgical Engineering Vol:9, No:8, 2015.

The analyzed tar is the result of the process of pyrolysis of Kalimantan sub bituminous coal from PT. KPC and PT. Arutmin. With the analysis, it can be known what components are contained in coal tar and can be utilized again in meeting the needs of petrochemical industry and other industries so that tar can have higher economic value.

Based on the two types of research mentioned above, the authors are interested to analyze the tar content resulting from the process of bituminous coal gasification of PT products. NAL Sawahlunto uses gas chromatography analyzer (GC-MS).

2. RESEARCH METHODOLOGY

2.1. Materials Research
The material used in this research is bituminous coal PT. NAL Sawahlunto with water content (ar) 5.88%, fixed carbon (adb) 52.79%, flying substance (volatile matter, adb) 39.62, ash (ash content, adb) 4.21%.

2.2. Research Stages
There are two main steps in this stage, namely Coal Analysis and Coal Gasification.

2.2.1. Coal Analysis
After obtaining coal in underground mining PT. NAL Sawahlunto as gasification experiment material, then analyzed to the coal sample. Coal analysis revealed moisture, volatile, ash, fixed carbon, and calorie values. Furthermore, preparation of coal size using jaw crusher before feeding to gasification reactor.

2.2.2. Coal gasification

In the gasification process the researchers determined experimental variables based on Arif's research (2016) with the following data (see Table 2).

Table 2. Gasification Experiment Variable

Mass of coal (kg)	d_p of coal (mm)	Amount of air (liter/s)	Measurement time (s)
1,3	15	6,93	2700

Arif (2016)

Coal Gasification Procedures

a. Open the lid of the reactor to refill the prepared coals as much as 300 grams which has been given kerosene as the initial burning in the oxidation zone, then light the fire and wait until the coal becomes red-hot.
b. After that reinsert the prepared coal until it fills the entire contents of the reactor. Close the reactor and turn the oxidizing gas flow into the reactor. Right at that time the thermocouple was in a state of being measured.
c. Turn the air flow into the reactor
d. Let the gasification process proceed until the formation of brownish smoke as a sign that the sistesis and tar gases have formed.
e. When synthesis gas is still formed, the valve is opened in the sampling pipe to take a sample of tar that is connected to the pipe into a container that has been filled with water.
f. The gasification ends at 2700 seconds. Wait a while until the reactor temperature is low, then move the tar from the water-filled container to the provided sample container. open the lid of the reactor and remove the coal char.
g. Perform the same procedure for the next gasification test to add tar.
h. After all tests are completed, take the tar sample to the laboratory for analysis using a gas chromatographic tool.

2.2.3. Gas Chromatography (GC-MS)

Before tar was analyzed by gas chromatography (GC-MS) the samples were first prepared using toluene. The prepared tar is 0.05 grams with toluene 0.5 ml. Tar injected into a 2 micron GC-MS gas chromatograph.

The test variables are based on previous research conducted by D.S Fardhyanti and A. Damayanti as seen in Table 3 below.

Table 3. Chromatographic Experiment Variables Gas

Temperature of injection	583 K
Temperature of colom	313-578 K
Pressure of colom	10 kPa
Temperature do detector	583 K
Curren of colom	0,54 ml/menit

In the tar analysis process using GC-MS tool, it is tested three times, by distinguishing the injection temperature. Injection temperature used ie 290^0 C, 300^0C, and 310^0C.

Gas Chromatography Testing Procedure

a. Before the operation, the instrument is checked, whether the column is as desired. Is the septum in the injection port still good not leaking. Is the detector already installed according to the desired and others.

b. The gas stream starts with a low flow rate by opening the main and secondary valves of the carrier gas tank to indicate a 15 psi needle, this allows the carrier gas flow of 2-5 ml / min for the gasket column or 0.5 ml / min for the capillary column. Next check whether there is leakage of gas at the connection to the column and exit the column using soap spray.

c. The column is heated to the desired initial temperature, the detector temperature is set to 10-25 ° C higher than the column temperature, as well as the injection port temperature.

d. The velocity of the gas stream is then increased to 25-30 ml / min or until an optimum gas flow rate is reached.

e. The detector used is Mass Spectroscopy with helium gas as the carrier phase.

f. The volume of the injected sample is 2 microns. During elution ie during the sample trip from the injection port to the detector, if the column temperature is maintained constant, such elution is called Isothermal Elution. While Elusi with programmed temperature (temperature programming) is over elusi the column temperature is set up gradually at a certain rate, or set to rise at a certain temperature and held to its temperature. (linear and increase varied).

g. The signal from this detector will be recorded as a chromatogram on a simple or microprocessor-treated recorder displayed on the monitor screen.

h. In the chromatogram displayed by the microprocessor at once can know the level of each component by performing qualitative and quantitative analysis..

i. The results of composition analysis of coal tar as a by-product of bituminous coal gasification PT.NAL Sawahlunto.

The gasification process is done by using fixed bed reactor with 1,3 kg of coal mass with 6.93 L / s air quantity, measuring time for 45 minutes (2700 seconds) and testing temperature up to 1000oC. The tar analysis was performed using GC-MS under the brand Shimadzu GC-2010 Plus. Conditions running using wiley type library, injection temperature 310 ° C using Rtx-5MS capillary column with 40 ° C to 305 ° C, the carrier gas used is helium gas with a pressure of 10 Kpa and a total flow of 0.54 mL / min and samples are injek as much as 2μL. Based on the results of the experiment it is known that benzene compounds and derivatives are more dominant in coal tar. As seen in the table of each of the following experiments.

Experiment I

Table 4. Dominant Components in Coal Tar Trial One

Peak	Compound		Percent
	Name	Type	(%)
2	Benzene (CAS) Phene	Aromatic	0,33
6	9-Octadecenoic acid (Z)-phenylmethyl ester (CAS) Benzyl oleate	Aromatic	
12	Benzene, ethyl- (CAS) EB	Aromatic	
13	Benzene, 1,2 dimethyl- (CAS) o-Xylene	Aromatic	
30	Benzaldehyde (CAS) Phenylmethanal	Aromatic	
45	Benzenemethanol (CAS) Benzyl alcohol	Aromatic	
133	Benzeneacetic acid, alpha, 3,4-tris[(trimethylsilyl)oxy]-,trimethilsilyl ester (CAS) TETRAKISTRIMETHYL	Aromatic	
139	1,2-Benzenedicarboxylic acid, dioctyl ester (CAS) Dioctyl phthalate	Aromatic	
Total			13,08

Experiment II

Table 5. The Dominant Components in Coal Tar
In the second testing

Peak	Compound		Percent
	Name	Type	(%)
41	9-Octadecenoic acid (Z)-phenylmethyl ester (CAS) Benzyl oleate	Aromatic	4,76
48	Benzene, ethyl- (CAS) EB	Aromatic	1,36
49	Benzene,1,2-dimethyl-(CAS) o-Xylene	Aromatic	0,83
55	Benzene,1,2-dimethyl-(CAS) o-Xylene	Aromatic	0,52
67	Benzaldehyde (CAS) Phenylmethanal	Aromatic	2,40
214	Benzeneacetic acid, alpha,3,4-tris[(trimetylsylil)oxy]-, trimethylsilyl ester (CAS) TETRAKISTRIMETHYLSI	Aromatic	0,43
223	1,2-Benzenedicarboxylic acid, dioctyl ester(CAS) Dioctyl phthalate	Aromatic	0,26
	Total		10,56

Percobaan III

Tabel 6. Komponen yang Dominan dalam Tar
Batubara Percobaan Tiga

Peak	Compound		Percent
	Name	Type	(%)
4	Benzene (CAS) Phene	Aromatic	0,34
18	Benzene, ethyl-(CAS) EB	Aromatic	1,52
19	Benzene, 1,2-dimethyl-(CAS) o- Xylene	Aromatic	1,18
23	Benzene, 1,2-dimethyl-(CAS) o- Xylene	Aromatic	0,55
35	Benzaldehyde (CAS) Phenylmethanal	Aromatic	2,53
187	Benzenaecetic acid, alpha,3,4-tris[(trimethylsilyl)oxy]-, trimethylsilyl ester (CAS) TETRAKISTRIMETHYLSI	Aromatic	0,56
195	1,2-Benzenedicarboxylic acid, dioctyl ester (CAS) Dioctyl phthalate	Aromatic	0,36
	Total		7,04

3. CONCLUSIONS AND SUGGESTIONS

Based on the analysis of tar by-product of bituminous coal gasification PT. NAL Sawahlunto using GC-MS tool was known that the more dominant component in tar is benzene compound.

Based on the research that has been done, there needs to be gasification testing for various levels of coal and analyzing the composition of tar produced, and the need for economic study of the tar.

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EMPLOYEE PRODUCTIVITY IN TWO CROSS CULTURES BASED ENTREPRENEURSHIP

Riki Adriadi[1], Ganefri[2] and Fahmi Rizal[3]

[1]Faculty of Engineering, Doctoral Student, Padang State University; [2,3] Lecturer Padang State University

ABSTRACT: In the completion of building projects we often encounter complexs problems, delays in implementation. This is because most contractors in planning the project schedule do not consider the value of Work Motivation and Entrepreneurship attitude toward labor productivity in complexity. Thus causing a mismatch between the duration and the working group of the plan with the duration as well as the actual work group. Weakness in considering the productivity of labor due to productivity problems in the project is very complex and the existence of internal and external factors that influence it. In this case, in one construction project there are two different ethnic and cultural that is Minang culture and Javanese culture, based on observation in the field of several things observed are: a) The existence of motivation level of work and Entrepreneurship Soul to Productivity among workers from Minang and Java Not yet b) Different level of work motivation among Workers from Minang and Java, c) Differences in Life Entrepreneurship level among Workers from Minang and Java, d) Differences in Work Productivity among Workers from Minang and Java, e) The influence of the level of work motivation and Entrepreneurship on Productivity among workers from Minang and Java.
The method used is MANOVA (Multivariate of Variant analysis) statistics and is realized in SEM (Structural Equations Modeling).

Keywords: Productivity, Motivation and Entrepreneurship

I. INTRODUCTION

Productivity is a hope and a dream in achieving the maximization of the implementation of a company both construction projects and other companies, but hope and dreams would need planning and implementation process that is structured from all parties and every item of work. According to Ervianto (2005: 215), Productivity is defined as the ratio between output and input, or the ratio between the output with the total resources used. In a construction project, the productivity ratio is the value measured during the construction process, can be separated into labor costs, materials, money, methods and tools. Resources used during the construction process are materials, machines, men, methods, money. Meanwhile, according to Sulistiyani (2009: 247), Workers work productivity concerns the final problem, namely how much the final results obtained in the production process. Productivity is inseparable from efficiency and effectiveness where efficiency is measured by output and input ratios. In other words, efficiency measurement requires identification of performance results. There are many factors that affect the productivity of construction workers such as: working time, construction procedures, change of desire, negative perception, weather, level of economic development, scientific management, union of workers, technology, social security, salary or wages, education, experience, worker age, discipline, work ethic, health, technology, production facilities, work climate, and so forth. Current conditions in the field with the two ethnic and two cultures that exist in a construction project, the workers who come from minang and workers from the Java. certainly a lot of complex problems that occur, there are two things that become the most important factor for our review in overcoming the decline in productivity, namely the problem of Worker Motivation and Entrepreneurship attitude Construction workers. The success of a construction project will be greatly challenged by the motivation of the worker in improving productivity, achievement oriented in profit, strength and hardiness / tenacity, hard work, energetic and work initiative (Hunger and Wheelen, 2003). While entrepreneurship involves the formation of attitude / mindset (attitude), skills development (skills), and knowledge pembekalan (knowledge). In other words, entrepreneurship is one's potential to be developed through education and training in the form of experience, challenge, and courage to take good work and / or create jobs.

II. DISCUSSION

2.1 Productivity

According to Imam Soeharto (1995) defines labor productivity as "a large volume of work produced by a workforce or by a team of workers over a period of time." A definition similar to the above definition is proposed by D 'Onofrio (2003), also Halligan, Demsetz, and Brown (1991) which defines labor productivity as "The amount of work completed by a worker or group of workers in a single unit of time". Labor productivity is designated as the ratio of the total output generated per man-hours and man-hours, ie the hours worked to complete the work. It can be concluded that there are two elements that can be included as productivity criteria, namely: a) Large / small output produced b) Working time required.

Working time is a general measure of the value of inputs that must be known to carry out research and assessment of the productivity of human labor. Input in the form of time can be researched and obtained by conducting a study on the procedures and measurement of working time (motion and time study).

Fulenwider (2009) stated that labor productivity is influenced by skill level, motivation and schedule pressure.

Handoko (1984) suggests several factors that affect a person's work productivity are: a) Aptitude and Interest, b) Personal background includes education and work experience to demonstrate past activities, c) Technical skills for estimating ability in technical execution of work, d) analytical ability to estimate thinking ability in analyzing, e) Attitude and requirement to estimate responsibilities and authority of person, f) Health, personnel, and stamina to know physical ability in executing work.

2.2 Motivation

Motivation is a drive of will that causes a person to perform an action to achieve a certain goal. Motivation comes from the word motif which means "encouragement" or stimulus or "driving force" that exists within a person.

Motivation can be said to be difficult, because to observe and measure the motivation of every worker there is no criteria, because the motivation of each worker is different from each other.

A. The theory of need from Maslow

Maslow theory is often called the hierarchy of needs model. Because it concerns human needs, then this theory is used to indicate the needs of a person who must be filled in order he was motivated to work. According to A. Maslow in general there are five hierarchies of human needs, namely:

a) The physiological needs, These needs are the main needs that must be met first by the individual.

b) The safety and security needs, Each individual gets security for himself including his family.

c) Belogngingness and social needs, Every human always feel the need of association with other human being. During human life in this world can not be separated from the help of others.

d) Esteem needs, Bad man's behavior, still crave respect and appreciation.

e) Self-actualization, ie always believe in yourself. The need to gain self-satisfaction and realize its potential. Humans who can achieve this level of self-actualization become complete human beings, gaining satisfaction from needs that not everyone is aware of.

2.3 Entrepreneurship

According to Zimmerer (1996) Entrepreneurship is a process of applying creativity and innovation in solving problems and finding opportunities to improve business life. In Entrepreneurship Literature Review (Entrepreneurship) can be interpreted as the soul, spirit, attitude, behavior, and potential ability

of someone in handling business and or activity that leads to searching, creating, applying work, technology, and new product by increasing efficiency in order provide better services to gain greater benefits "(Subijanto, 2012).

III. METHODOLOGY

The type of this research is correlation research by connecting two variables through qualitative method and quantitative method, qualitative method which its data collection interact directly with the research object and the result is not obtained through statistical procedure. While the quantitative method, data collection through research instruments in the form of population and sample and the results obtained through statistical procedures. Correlational or correlational research is a study to determine the relationship and level of relationship between two or more variables without any attempt to influence the variable so there is no manipulation of variables (Faenkel and Wallen, 2008: 328).
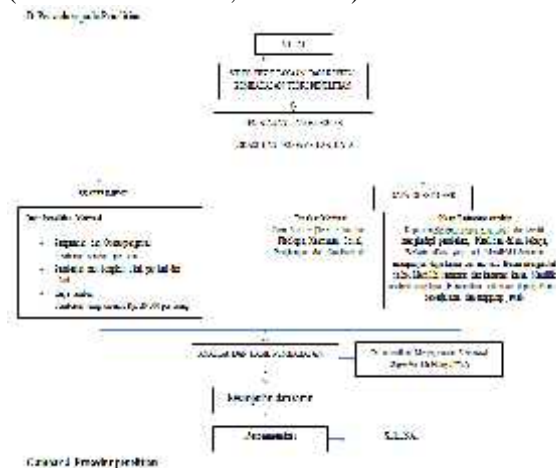
 Here is a research procedure:

In conducting this research, on the construction of Housing Mega Asri Hills located in the road complex Azizi Padang. The research plan will be conducted on May 21, 2017 until September 22, 2017. Respondents in this study are construction workers (skilled workers) only on brick installation work (brick wall) with working time is normal time (not overtime), that is from 08:00 - 16:00 WIB.

IV. ANALYSIS AND RESEARCH

The research was analyzed to the worker with brick wall work item by doing experiments and giving motivation to the worker in order to increase work productivity, and then given the questioner collectively by containing some questions with standardization of motivation and entrepreneurship, in case with expectation to see comparison the level of motivation to productivity between two worker cultures among minang and workers accepting Java. And the level of entrepreneurship between the two worker cultures among minang and workers in Java.

Figure 1. Research Scheme

Figure 3. Estimated Cost of Research
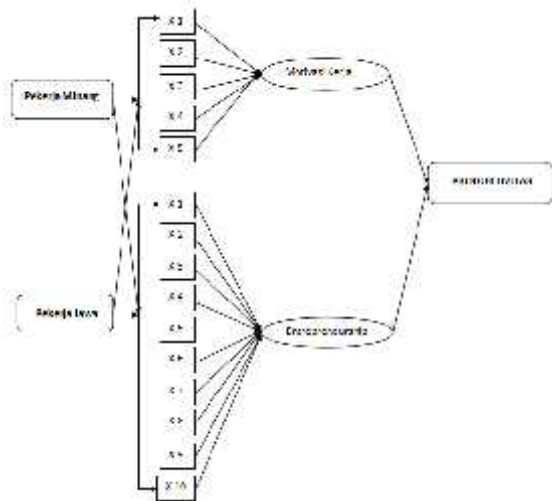
1. Measurement of Productivity of Minang Workers by doing field observation by giving motivation in the form of direction from Owner / supervisor, uniform per person, rice packing 1 time per day and cigarettes, overtime and incentive money Rp. 20,000 per person.
2. Measurement of Worker Productivity Minang by doing Questioner in the form of some questions about: honesty, leadership, Responsive and creative to face change, accuracy in work, communicate well, Have courage have creativity and innovative, Dare to take risks, Have passion and willpower, Have the right analysis, Not Consumptive, Oriented to the future and able to cooperate and responsibility.
3. Measurement of Javanese Worker Productivity by doing field observation by giving motivation in the form of direction from Owner / supervisor, uniform per person, rice packing 1 time per day and cigarettes, overtime and incentive money Rp. 20,000 per person.
4. Measuring the Productivity of Javanese Workers by doing Questioner in the form of some questions about: honesty, leadership, Responsive and creative to face change, accuracy in work, good communication, Have the courage have creativity and innovative, Dare to take risks, Have passion and willpower, Have the right analysis, Not Consumptive, Future-oriented and able to cooperate and responsibility.
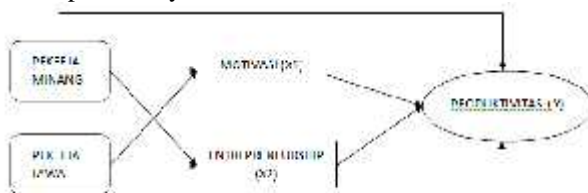
Figure 2. Variables Motivation of work and Entrepreneurship on Productivity.

Figure 4. Research Results

V. CONCLUSIONS

Based on the results of data analysis and discussion that has been done in this study and look back on the exposure of the previous chapters, then in accordance with the formulation of problems that have been determined can be drawn conclusions on the results of this study as follows:

1. There is a positive and significant influence on worker's motivation and worker's performance on worker productivity based on observation and observation in the field that recapitulation analysis with increasing percentage of Worker Productivity has increased significantly.
2. In multiple linear regression analysis, constant value of 9.933, regression coefficient

of workers motivation of 0.651 and leadership and employee performance of 0.045 on productivity.
3. Giving motivation to the worker's performance will further increase productivity to workers both internal and external aspects,

good performance will better guarantee a construction project work and will improve the quality of good performance and productivity that can be relied upon.

4. Supervisors or bosses should be able to wisely provide employment and the needs and completeness to fulfill the work in a project, so that workers freely work in accordance with their wishes and plans and strict, disciplined and fair supervision.

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DEVELOPMENT OF INTERACTIVE MULTIMEDIA CD OF INSTRUCTIONAL MEDIA ON BUILDING CONSTRUCTION

Rizky Indra Utama[1], Nurhasan Syah[2], Rijal Abdullah[3]

Department of Civil Engineering, Faculty of Engineering, Universitas Negeri Padang

ABSTRACT: This development reaserch was designed to develop an instructional media in this case interactive multimedia CD on Building Construction. This interactive multimedia CD instructional media was designed to increase motivation of students in so that students can understand learning material in building constructional subject, and to increase learning outcomes on building construction subject. This reaserch was using Research and Development (R and D) method of research, and *Four-D* (*Define, Design, Develop, and Disseminate*). The data was primer data that had been collected from media expert, teacher, and students. Data analysis technique that used in this reaserch was descriptive analysis data technique by descripting validity, practicality and effectivity of interactive multimedia CD instructional media. Based on the research results in this research concluded that this interactive multimedia CD instructional media is valid, practical, and effective and is recommended to be used as instructional media on Building Construction Subject.

Keywords: Interactive Multimedia CD, Validity, Practicality, Effectiveness

1. INTRODUCTION

Efforts to produce education in accordance with the functions and objectives of the national education system, are needed to improve educational programs. One of the existing educational programs is vocational education that serves to prepare each individual learner to become a professional workforce, ready in continuing education to a higher level, and can adapt to any changes in the environment so that it is expected to improve the welfare of individuals, society, nation and state. Vocational High School (Vocational School) is one of the vocational education institutions that contribute to the achievement of national education goals that have the task of preparing students by providing knowledge and skills to be able to work in accordance with competence and skill program, have high adaptability and competitiveness to enter the world of work.

Vocational Secondary School (SMK) Negeri 2 Payakumbuh is one of the institutions that play a role to prepare learners have skills according to their respective fields. SMK Negeri 2 Payakumbuh is one of vocational schools in Payakumbuh. SMK Negeri 2 Payakumbuh has several majors, one of which is the Department of Building Engineering program in Construction and Concrete Construction Engineering (TKBB). At the Department of Building Engineering students are required to be proficient in the field of building. To achieve these goals is supported by several subjects, one of which is the subject of Building Construction.

Subject Building Construction is a subject that studies about materials and work related to the construction of a building. The materials contained in this lesson include the nature and characteristics of wood, type and classification of concrete stones, type and classification of steel, type and classification of mortar materials, the execution of wall works, various connections and wood links, type of foundation and soil bearing capacity , design of plumbing systems and distribution networks, as well as other materials related to building construction. Therefore, it is needed learning media that can support students' understanding and mastery of building construction lesson materials.

Brown in Iswidayati (2010: 2) says that "Learning media used in learning activities can affect the effectiveness of learning". The effectiveness of a communication process can be identified from how the message conveyed by the communicator can be accepted by the communicant. Furthermore it is said also that "In the process of learning teachers are required to be effective communicators, so that messages or materials delivered to the communicant or learners can be received effectively as well". From the above opinion can be concluded that the teacher is required to be an effective communicator while the learning media itself can affect the effectiveness of learning.

One of the learning media that can be used by communicators or teachers in the delivery of learning materials is the media-based visualization animation learning, the media presentation that contains interactive animation that can make students or communicant more interested in learning.

2. RESEARCH METHODOLOGY

This research uses research and development method (Research and Development). The development model used in this research is Four D

(4D) model. According to Thiagarajan et al (1974), this 4D model consists of 4 development stages: define, design, develop, and disseminate or be adapted into 4-D models, defining, designing, developing, and deploying

The first stage is the determination stage (define) which consists of front end analysis, student analysis, concept analysis, and the formulation of learning objectives. The second stage is the development stage which contains the formation of benchmark reference test, media selection, format selection and design of prototype. While the third step is the stage of product validation, practicality, and effectiveness test. The subject of the experiment in the development of interactive learning media is the students of class X TKBB Building Skill Program SMKN 2 Payakumbuh. The last stage is to deploy (Desseminate) in the form of media dissemination stage of interactive multimedia CD developed

The research instrument used to measure the validity and the practice of learning media of interactive multimedia CD developed in the form of validation sheet and questionnaire of practice. The validated component of instructional media is in accordance with didactic requirements, construction terms, and technical requirements (Anggaryani (2006: 97-98)). Practicality data is derived from teacher and student responses. Meanwhile, to measure the effectiveness of learning media model of interactive multimedia CD used instrument test student learning outcomes. Data obtained then analyzed to determine the validity, practicality and effectiveness of learning media interactive multimedia CD developed.

3. RESULTS AND DISCUSSION

3.1 Validity Test Results

Validity test aims to determine the level of prevalence of learning media developed. The retrieval of validity data is done by using validation sheet. Interactive multimedia learning media CD validated by two material experts who are expert teachers of Building Construction in SMKN 2 Payakumbuh and two lecturers of media experts who are lecturer of Postgraduate Faculty of Engineering State University of Padang. Based on validation test results obtained average media validation test score of 87.83%, so it can be concluded the results of validation of learning media interactive multimedia CD entry in the category of "Very Valid".

3.2 Practicality Test Results

Practicality is related to the ease of use of learning media developed interactive multimedia CDs. Practicality data obtained through a questionnaire filled by two practitioners (Teacher

Building Construction Lessons) and also a questionnaire filled by students who use interactive learning media CD multimedia. The result of the assessment on the practicality based on the teacher's response obtained the average value of teacher's questionnaire response about media practice that is 88.57%, so it can be concluded the teacher questionnaire response data to the media practicity goes into the category of "Very Practical". Initial test of learning media of interactive multimedia CD is done to small group consist of 9 students. The result of questionnaire result of small group student response about media practicability is obtained by average value that is 89,54%, so it can be concluded the questionnaire data of small group student response to the practice of the media is included in the category of "Very Practical".

Learning media product that has been tested in small group which is very practical, then done trial of media practicity toward big group or trial to all students of class X TKBB SMKN 2 Payakumbuh. The result of questionnaire of student response of big group about media practicity is 90,74%, so it can be concluded the questionnaire data of student's response to the media practicity goes into the category of "Very Practical".

3.4 Effectiveness Test Results

Assessment of the effectiveness of learning media development of interactive multimedia CD on the subjects of Building Construction is done by conducting test of learning outcomes conducted at the beginning and end of learning. The value of pretest test is taken before learning using interactive multimedia CD learning media. For the final test (posttest) is done after 3 meetings after using the interactive multimedia CD. Both of these test results were then compared to see the effectiveness of the interactive multimedia learning media that was applied. Based on the pretest or preliminary test, the data of complete student (> KKM that is 75) are 14 people (58,33%) and the unfinished student is 10 people (41,67%). After done posttest, hence got complete student data (> KKM that is 75) counted 23 person (95,83%) and student which not yet complete is 1 person (4,17%). Based on these results can be seen there is an increase in learning outcome as much as 37.50%, so it can be concluded the level of effectiveness of learning media interactive multimedia CD is very good.

4. CONCLUSION

Based on the results of research development of learning media interactive multimedia CD has been done, then obtained the following conclusions.

Learning media product interactive multimedia CD generated in the form (file, image, video, sound) learning media of Building Construction.

Learning media Interactive multimedia CD has been assessed by validators from various studies with very valid categories.

Practicality of media in learning seen from the implementation of the use of learning media as a whole goes well. It is seen from the response of teachers / practitioners and the results of student responses that show the learning media developed including the category very practical.

The effectiveness of media developed against students seen from the results of student learning after learning by using interactive multimedia CD media.

Based on the results of learning obtained by students showed that the effectiveness of learning media interactive multimedia CD in terms of learning outcomes is very good.

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MULTIMEDIA INTERACTIVE IN WEB PROGRAMMING SUBJECTS

Rusli Saputra, Sophan Sophian and Delia Putri

Faculty Of Engineering, Padang State University, Padang; STMIK Indonesia Padang, Padang

ABSTRACT: With technological advances, a blend of computer and CDs can be used as a medium of effective and efficient learning in interactive learning CD's form. A survey conducted at STMIK Indonesia Padang, it is known that the learning outcomes of students in the subjects of Web Programming are still low. It is estimated that the poor learning outcomes are caused by the limited sources of learning media. The purpose of this paper is how to design a multimedia interactive CD as a learning medium of Web Programming to improve students' learning outcomes. This designing of multimedia interactive CD uses Exploratory Tutorial. Because of this method, students can access all of the theories which have a correlation with Web Programming and tutorial how to make a web start from designing until hosting activity. With the interactive learning medium, students can learn anywhere and anytime that is expected to improve the learning outcomes of students.

Keywords: Multimedia Interactive, Web Programming, Interactive Learning, CD Interactive

1. INTRODUCTION

Education is the most important thing in our lives, it means that every human being deserves and hopes to always develop in education. Education, in general, has a meaning of a life process in developing each individual to be able to live and live life.

Education serves to help learners in their development, namely the development of all the potential skills and personal characteristics to a positive, both for himself and his environment. Education is not just providing knowledge or values or trained skills. Education works to develop what potentially and actual have owned learners because learners are not the empty glass that must be filled from outside. Various efforts have been made by the government to improve the quality of education, that is :

1) the development of learning models,
2) the development of instructional media,
3) the upgrading for educators,
4) the provision of learning infrastructure,
5) the training

Education is one way to improve the welfare of the nation. Education that can support the future development is education that develops the potency of students, such that he would be able to solve the problems that he faces. Educational institutions play a major role in creating an atmosphere of learning and the learning process so that learners can actively develop all of their potency to be human of faith, pious, capable, creative and independent. Therefore, the Institutions should implement quality learning to be able to achieve the educational goals that have been outlined in the regulations, in accordance with the stipulated in the regulations No.

20 the Year 2003 about National Education Goals Chapter II, Article 3.

The quality of Indonesia's education outcomes in educational reforms still needs attention and priority. In the Vision and Development Strategy of Education for the Year, 2020 Demands for Quality (MoNE, 1996: 19) said four basic national strategies are: (1) equal opportunity, (2) relevance, (3) quality, and (4) efficiency. The quality of education can point to the quality of the process and the quality of the product. An education is called qualified in terms of process (which is also strongly influenced by the quality of its input) if the learning process is effective, and learners experience meaningful learning processes, supported by human resources, funds, facilities, infrastructure. The process of quality education will produce a quality (graduate) product as well. Therefore, systematic intervention is given to the process to provide assured quality assurance.

One way to improve the quality of education is to use appropriate learning models to achieve learning objectives. Understanding Learning Models - According to Slavin (2010), the learning model is a reference to a learning approach including its purpose, its syntax, its environment, and its management system. Meanwhile, according to Trianto (2009) learning model is a broad and comprehensive approach and can be classified based on learning objectives, syntax (pattern sequence), and the nature of the learning environment. A good learning model is used as a reference for planning in learning in the classroom or tutorial to determine the learning tools in accordance with the teaching materials that are taught.

The rapid development of applications has changed the way information is delivered, especially in education to adapt to current technology and to be used in teaching and learning. Undoubtedly, there

are a number of applications that have been developed as technology tools to support learning now.

Development of information technology and computers have given very significant influence in the development of instructional media *(learning media),* because the presence of these technologies has been able to integrate so many different types of media into a learning model, called *Computer Aided Instructional* (CAI).

Computer education in Indonesia is currently in great demand by students. The percentage of large computer students is encouraging many universities to organize a computer study program. An information system is a field of education under the umbrella of the Faculty of Computer Science. In this department, students will be directed to master the sciences and have expertise in the field of information technology. The final goal of this field of study is to make students have skills or abilities in the field of computers so that not only can be a professional technological professionals but also able to create their own employment.

One of the subjects in the program study Information Systems in STMIK Indonesia Padang is WEB Programming. Web programming, is often abbreviated as PW or PWeb, is subject that learns how to make a web. To know how to make a web, we have to know web programming's language and software of web maker.

This course is taught by a teacher and accompanied by one of assistant lecturer and the student's numbers are 45-50 people in one laboratory. All this time, this course was taught in a conventional manner that was only using the infocus media and the students were performing step by step that was taught on their computers.

When a student was plagued with coding or the program that they made was not successful then the lecturer and assistant would approach student desk and correct and explain where his error. This method is less effective because the large numbers of students in one class are not comparable with the lecturers and assistants lecturer to correct and to approach the students one by one. So many students were bored and did not pay attention.

To cope this problem, it is required an innovation to improve the interest and abilities of students so that achievement of students in these courses increased. One form of innovation that can be done by using technological development is to make an interactive CD-shaped learning media. Interactive CD contains material of course and coding required to create a website and comes with a tutorial on each material. Because of this CD, students can learn the lecture materials and see the tutorial website creation that was performed by the lecturer.

Interactive Multimedia CDs make it easier for students to learn on a regular basis independent and students can choose the material in accordance with their wishes each. By using Interactive Multimedia CD media students can learn wherever and whenever. Interactive Multimedia CD is one media that is economical and efficient compared to other media such as E-learning which requires an internet connection to access it.

Interactive Multimedia CDs have advantages among others are flexible (can choose the material as you wish or use time when it will be used), content-rich (providing that information pretty much in accordance with the material presented) and interactive (two-way communication between media and users). Not only have advantages, Interactive Multimedia CD also has shortcomings among others only will work for things as pre-programmed, require multimedia equipment (computers) to access it, its development requires a professional team, and the development requires a long time.

Of the problems described above can be formulated problems in this study:

1. How to design an Multimedia Interactive CD for the WEB Programming course?
2. What affects the use of instructional media Multimedia Interactive CD for learning outcomes of students?

To be able to answer the questions above then conducted research with the title " Multimedia Interactive in Web Programming Subjects"

The purpose of this study is designing a Multimedia Interactive CD for the WEB Programming course in STMIK Indonesia Padang and analyzing the effect of the use of instructional media Multimedia Interactive CD for learning outcomes of students in STMIK Indonesia Padang.

2. LITERATURE REVIEW

Learning model is defined as a systematic procedure in organizing learning experiences to achieve learning objectives. Can also be interpreted an approach used in learning activities. So, the actual learning model has the same meaning with the approach, strategy or method of learning. Currently, there are many kinds of learning models developed, from simple to complex rather complicated models because they require a lot of tools in their application.

According to Arrend there are four things that are closely related to the learning model that is:
• A logical rational theory constructed by its creators or its developers.
• The point of view/basis of thinking about what and how students learn.
• Teacher behavior that teaches that the learning model can be good.
• Class structures necessary to achieve maximum learning objectives

Learning model is one component of learning system. Learning model that can make learners

active or in accordance with the Scientific Approach such as Inquiry model, Project Based Learning (Model PjBL), Problem Based Learning (PBL), and Cooperative Learning. Some of the learning models are government-emphasized learning models for use in learning in the Curriculum 2013. However, the application of learning models is not merely to comply with the rules, but also needs to pay attention to several factors, including the material characteristics that will be delivered. As good as any model of learning, but if the application is less in accordance with the characteristics of the competence of the material it wants to achieve less delivered.

There are several characteristics of the learning model in particular are:

1. The logical theoretical rationale composed by the creators or developers.
2. The ground of thinking about what and how students learn.
3. Teaching behavior required for the model can be accomplished successfully.
4. Learning environments that duplicate the objectives of learning can be achieved.

The use of learning methods is a process that encourages students to become initiators, independent practitioners, risk-takers, problem solvers, and decision makers, teachers, thus, acting only as facilitators (Kettanun, 2015). Selection of this method should also be tailored to the characteristics and abilities of students, such as students' speaking ability. Brown, (2001) 6 categories of students' speaking ability in class:

• imitative - how often they read from notes
• Intensive - how much they can produce their own language
• Responsive - whether the language they use is authentic
• Interactive: Transactional - whether they can deliver effective facts and opinions to the audience
• Interactive: Interpersonal - whether they can use the irony, humor and other sociolinguistic dimensions in their presentation
• broad - how the overall monologue is planned.

Learning method is a way that teachers use to implement the plan is to achieve learning objectives that have been prepared in the form of real or practical activities. If the learning strategy is still conceptual then the learning method is practical to be applied. The scope of the learning method is smaller than the strategy or learning model.

Learning method is a procedure or a method used by teachers to implement practical plans to achieve learning objectives. So the method focuses on achieving the learning objectives. methods must also be tailored to the learning strategy. Various methods can be used in learning such as lecture method, demonstration, discussion, simulation, laboratory, field experience, brainstorming, debate, symposium, etc.

Instructional media play an important role in the learning process. The use of media education can help lecturers in delivering the lecture material. Learning success is determined by two main components are the methods of teaching and learning media. The use of computer-assisted learning media has a significant influence on the attractiveness of the students to learn competency that is taught (Ali 2009)

Media is an integral part of teaching and learning process to achieve the goals of education in general and the purpose of learning in schools in particular. The word media comes from the Latin medius which literally means 'middle', 'intermediary' or 'introduction'. In Arabic, the media is an intermediary or messenger of the sender to the recipient of the message. If the media carries messages or information that is instructional or contains instructional purposes then the media is called Learning Media

According to Brunner in Arsyad (2005), there are three main stages in learning mode, those are direct experience, the experience of pictorial/drawings, and abstract experience. The influence of media in learning can be seen from the level of the learning experience that will be accepted by the students.

The practical benefits of instructional media in teaching and learning process are as follows:

1. Learning media can clarify the presentation of messages and information so as to facilitate and improve the process and learning outcomes
2. Learning media can improve and direct the attention of children so that it can lead to learning motivation, more direct interaction between students and the environment, and the possibility of students to learn individually in accordance with the ability and interests
3. Media learning can overcome the limitations of the senses, space and time
4. Learning media can provide students with similar experiences about events in their environment.

Learning media are many kinds and kinds. Starting the smallest simple and cheap to sophisticated media and expensive. There are media that can be made by the teacher himself, there are a factory-produced media. There are already available media in the environment that we can directly use, there are also media that are specifically deliberately designed for learning purposes.

Although the media are many varieties, the reality is not many types of media commonly used by teachers at school. Some of the most familiar media and almost all schools make use of is print (book).

Web programming is one way to create a web with the implementation of the codes programming language that can run on the server. Supported programming language for web programming, among others, PHP, JSP, ASP, and others. On the web programming, there are two sides

programming. The first is the client-side programming, client-side programming is the process performed on the client side (browser), the script program can only be viewed by using view source.

Programming language is part of computer languages, as well as other kinds of languages. For example, HTML is a markup language and computer language, but not traditionally considered as a programming language. Programming language is a software of computer language used to design or create the program in accordance with the structure and method which are owned by the language of the program.

Interactive CD is one of the new interactive media that is still unknown, This media is the development of Internet technology that is known very well at this time, the data proved that more than 200 million people use this interactive media. Interactive CD is a medium that can be packaged in a CD (Compact Disk) which purposes are the interactive application is in it and also have some menus that can clickable to display a certain information.

3. METHODS

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┌─────────────────────────────┐
│       Evaluation            │
└─────────────────────────────┘
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              ▼
         ◇ Revision ◇          Yes
              │
            No │
              ▼
┌─────────────────────────────┐
│      Used Program           │
└─────────────────────────────┘
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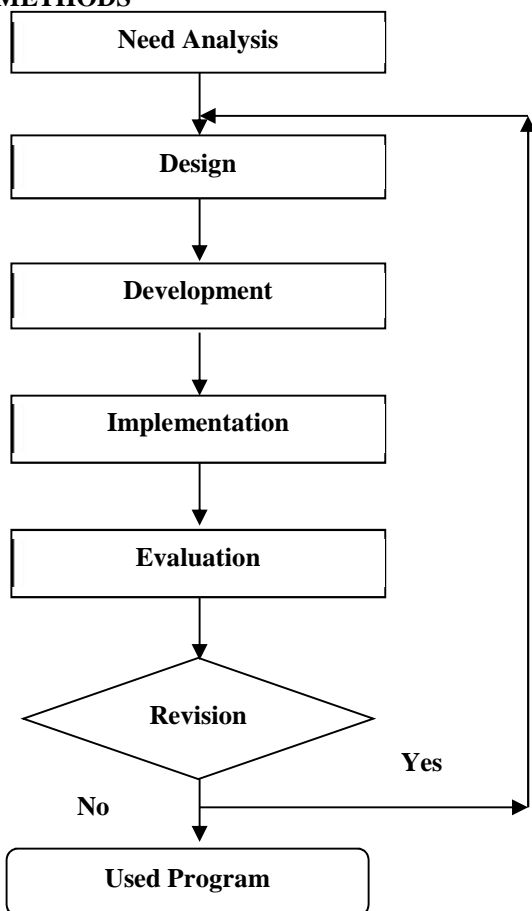
This research was conducted in STMIK Indonesia Padang on Web Programming courses in the academic year 2015/2016. This research is classified on research and development method *(Research and Development)*. Development model of instructional

media, Interactive Multimedia CD is using the model of *Instructional Development Institute* (IDI) (Delianti 2013). According to Aditya (2012), IDI apply the principles of approaching systems that involves three stages, those are invention (define) or a needs analysis, development (develop), and evaluation (Evaluate). Sugiyono (2009: 297) in Dedi Wahyudi (2014) argues *Research And Development* are research that is used to produce a particular product, and test the effectiveness of that product (Wahyudi 2014).

The first phase of this research is the discovery phase *(define),* which contains background analysis and problem identification. The second phase is the phase of development *(develop)* which contains the preparation of the initial form *(prototype)* product and product validation. While the third phase is the stage of evaluation/assessment *(Evaluate)* which contains the steps of practicalities test and the effectiveness as well as the analysis.

Design and development of instructional media are going through the five stages: need analysis, media design, media development,examination and implementation.

The instruments were used questionnaires, interviews, observation and tests have been given to the students. Questionnaire is a data collection tool in the form of a series of questions that were asked to the respondents to get a response or product assessment that has been made in terms of content, design, text, animation, clarity of content, and the ability to motivate learners through interactive learning media.

The questionnaire would be divided into two groups. The first questionnaire was given at the beginning of research to analyze the problems faced in connection with this research. The second questionnaire was

given at the time of learning media has been implemented in the course of Web Programming to see the effectiveness of this learning media in increasing interest and the students' learning outcomes. The questionnaire was given to the students who took a course of Web Programming in odd semester of academic year 2015/2016 and the Web Programming's lecturers in STMIK Indonesia Padang. Furthermore, after doing an implementation of a series of tests (test material) on learners to see the changes in achievement/learning outcomes.

4. RESULTS and DISCUSSION

1. Design and Implementation System

From the questionnaires that have been distributed to the students and the lecturers about the activity of learning web programming course, it can be concluded:

a. From the lecturers who have completed the questionnaires, the average of the lecturers stated learning outcomes of the students in this course is low, this can be seen from the final value that was obtained in the examination are still low. Only a few students who scored above average.

b. The lecturers are also constrained in making the learning process because of the large number of students in a laboratory, which cannot be reached by the lecturers, so a lot of students who are not focused and not paying attention.

c. From questionnaires were filled out by the students, it is known that the students' interest in the subject is still low, because many students do not focus to the study because of a large number of students in one class.

d. Many students were also constrained to study independently because they do not understand and do not have a tutorial on the material that is taught.

From the problems that have been analyzed, then we design an Interactive Multimedia CD. Here the main menu of instructional media program that has been designed:

On the main menu consists of materials, tutorials, tasks and contacts. Material's menu contains lecture material each week from the first meeting until the last meeting, as well as what you want to achieve from the meeting / the material. Tutorial's menu contains a video tutorial about the material that is taught, such as video how to install Xampp application to run PHP coding, to design database by using MySQL, and other material that is learned in one semester.

Then in the task's menu contains the tasks that will be given to the students of weekly assignments until the end of the task. So the students know what will be their task and will prepare themselves early.

The programs have been designed and then implemented on a *web programming* class in STMIK Indonesia and can run well, so we can say this program has eligibility aspect is used as a medium of learning.

2. The Influence of Using System Against Student Learning Outcomes.

Once the system was designed, the system was implemented to the students. Each student in the class was given a soft copy of this interactive CD for the students to learn independently outside of the classroom. Lecturer of this course also implemented the learning method by using Interactive CD.

From the results of the implementation, three lecturers who were samples agree that using of this media in the learning process is very helpful the lecturers, where the lecturers can explain the material by using the system and showing a video tutorial on the material being taught. The video tutorial can be played over and over in front of the classroom so the students can better understand. In addition each student also has this interactive CD so that students can learn independently. It is certainly very helpful the lecturers because they do not have to go to each table of students who have problems in the lecture's material.

Effectiveness test conducted to see the students' learning outcomes after using Interactive Multimedia CD. The average of the examination's results was obtained by the students after using this medium is to be above 70, the tasks were given can also be solved by the students with satisfactory results, so 90% of students can pass on this course with very satisfactory results.

From the questionnaires have been filled by the students then we know that improving the students' learning outcomes due to increased the interest of students in learning because the appearance of the material is more interesting, and the *soft copy* of the interactive CD is owned by each student so the students can independently learn anywhere and anytime. The students can also prepare earlier for the tasks that will be given because they have already known the job description that they will receive in one semester so they have prepared from long ago. So there is no reason for a lack of time in doing the task.

5. CONCLUSIONS and SUGGESTIONS

1. Conclusions

From the discussion that has been described above it can be concluded that:

a. Interactive Multimedia CD system which is designed as a medium of learning in *Web*

Programming course is feasible and can be implemented in learning activity because the system can run well without any obstacle encountered.

b. The designed system is very practical and can assist the lecturers in teaching because the system is equipped with a video tutorial of material is being taught.

c. For students/learners, the use of instructional media Interactive Multimedia CD is very effective, because it can increase the students' interest in studying the course's materials, the students can independently learn anytime and anywhere so the final grades of the students in course that uses this learning media have increased.

2. Suggestions

To complete this designed system, there are some suggestions that the writer would give:

a. In order for the use of instructional media are more effective and can reach out to the whole class then the college can provide speaker in teaching activity so the voice of the video tutorials can be heard well.

b. Based on the test and analysis have been done on the effectiveness of the learning media so it is recommended to another course to be able to apply these media in learning activity.

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PREDICTED VULNERABILITY ASSESSMENT OF NON ENGINEERED HOUSES BASED ON DAMAGE DATA OF THE 2009 PADANG EARTHQUAKE IN PADANG CITY, INDONESIA

Rusnardi Rahmat Putra[1,2], Junji KIYONO[3]and Aiko FURUKAWA[4]

[1] Lecturer, Department of Civil Engineering, Padang State University, Indonesia.
[2] Researcher, Department of Urban Management, Environmental Studies, Kyoto University, Japan.
[3] Professor, Department of Urban Management, Environmental Studies, Kyoto University, Japan.
[4] Associate Professor, Department of Urban Management, Environmental Studies, Kyoto University, Japan.

ABSTRACT: In this study, we estimated future vulnerability of non-engineered houses based on damage data of the 2009 Padang earthquake in Padang, Indonesia. Since Padang earthquake is the largest earthquake event from several few years, it was an M 7.6 that occurred on September 30, 2009 and caused more than 1000 casualties and damaged 106658 houses from slight damage to severe damage. as this earthquake was not an inter-plate but an intra-plate earthquake, and the magnitude of the 2010 Mentawai earthquake was smaller than expected, the strain has not been fully released. This means that there is still the high possibility of another gigantic earthquake occurring in the near future. Following the event, A 12-site microtremor array investigation to gain a representative determination of the soil condition of subsurface structures in Padang has been conducted. From the dispersion curve from the array observations, the central business district of Padang corresponds to relatively soft soil condition with Vs_{30} less than 400 m/s. Because only one accelerometer was existing, the 2009 Padang earthquake was simulated to obtain peak ground acceleration for all sites in Padang city. By considering the damaging data of the 2009 Padang earthquake for engineered houses, Seismic risk vulnerability estimation of non-engineered houses for rock, medium and soft soil condition can be obtained, and also estimate the loss ratio based on the ground response, seismic hazard of Padang and the existing damaged to non-engineered structure houses due to Padang earthquake in 2009 data for 500 return periods of earthquake events.

Key words; soil profile, Padang earthquake, microtremor array, seismic vulnerability

1. INTRODUCTION

The Indonesian archipelago is located at the boundary of three major tectonic plates, the Indo-Australian, Pacific, and Eurasian plates, stretching from Sumatra in the west to Papua in the east (Fig.1).Indonesia is at the collision point of these three crustal plate. The high subduction-related seismicity in this region means that tsunami and other earthquake hazards are also high. Indonesia has approximately 17,504 islands, with a total land area of 1.92×10^6 km^2 and a sea area of 3.26×10^6 km^2. It has experienced a large number of earthquakes in the past. According to catalogued events, the number of earthquakes that have occurred in this region exceeds 48,000 with a magnitude greater than 4.0 from AD 1779 to 2010 [1].

Most of the major historical earthquakes in Indonesia have caused significant damage to facilities [2]-[3]-[4]. Many large earthquakes have occurred in the shallow seas of the area that can produce massive tsunami like the 2004 Banda Aceh event. This earthquake off the coast of Sumatra resulted in hundreds of thousands of deaths and a million people homeless [5] . The most recent one is the Mentawai tsunami that occurred on October 25, 2010.

The city of Padang is located on the west coast of Sumatra in western Indonesia, lies close to the Sumatran subduction zone that is formed by the subduction of the Indo-Australian Plate beneath the Eurasian Plate. Relative motion of the plates occurs at a rate of about 50 to 70 mm/year and this is the main source of subduction-related seismicity in the area [6]. Based on our catalog, seven giant earthquakes have occurred in this region since records began: 1779 (Mw 8.4), 1833 (Mw 9.2), 1861 (Mw 8.3), 2004 (Mw 9.2), 2007 (Mw 7.9 and 8.4) and 2009 (Mw 7.6). The hypocenter of the Padang earthquake that occurred on September 30, 2009 was located in the ocean slab of the Indo-Australian Plate at -0.81°S, 99.65°E and at a depth of 80 km. It produced a high degree of shaking and the tremor was felt in the Indonesian capital, Jakarta, about 923 km from the epicenter. The tremors also were felt in neighboring countries such as Malaysia and Singapore [7]. The earthquake caused landslides and collateral debris flows in the hills surrounding Lake Maninjau. A major landslide in Gunung NanTigo, Padang Pariaman completely destroyed some villages and forced road closures.

This 1900-km-long active strike-slip fault zone that runs along the backbone of Sumatra poses seismic

and fault hazards to a dense population distributed on and around the fault zones [8]. The Sumatran Fault is highly segmented. It consists of 20 major geometrically defined segments and the slip rate along the fault increase to the northwest, from about 5 mm/yr [8].

This fault also has generated large destructive earthquakes, e.g., 1892 (Mw 7.1), 1943 (Mw 7.6) and 2007 (Mw 6.4). These faults are capable of generating strong ground motion in the future that would greatly affect vulnerable structures.

1.2 Regional Geology and Recent Earthquakes

The city of Padang, with a population of 856,814 people as of 2008, is the capital of West Sumatra province. The location of the city center is at 100.38°E, 0.95°S. The main part of Padang is situated on an alluvial plain between the Indian Ocean and the mountains. For the most part, the mountainous area is formed of Tertiary sedimentary rocks with outcrops of metamorphic rocks seen in some places. The alluvial plain spreads along the base of the mountains and is
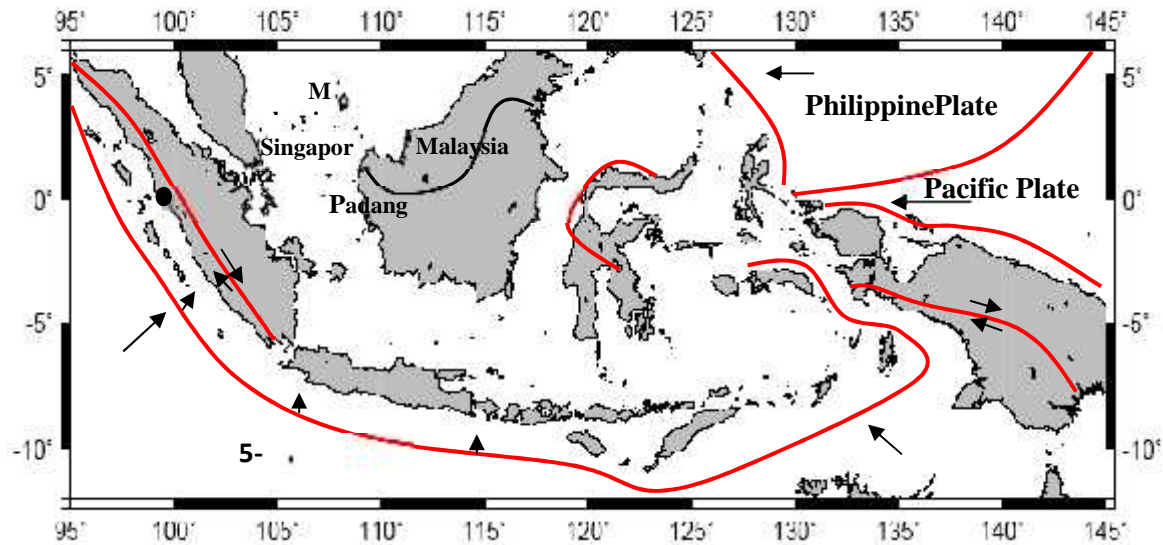
Fig.1 Tectonic and plate boundaries, large arrows indicate the direction of plate motion. Black circle is Padang.

According to our catalogs, the Sumatran Fault produces a very high annual rate of earthquakes, many of which occur in the shallow region under the island of Sumatra (Fig.2).
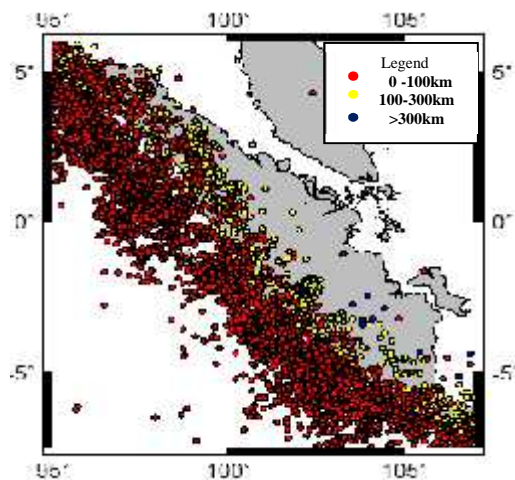
Fig.2 Seismicity of Sumatra and western Indonesia, Mw>4 1779-2010

roughly 10 km wide in the east-west direction and 20 km wide in the north-south direction.

The topography of the Padang region is very similar to the tsunami-damaged area of Miyagi Prefecture in Japan, that was inundated by as much as 4-5 km from the coast after the March 11, 2011 the off the Pacific Coast of Tohoku Earthquake (Mw 9.0). In Padang, about 600,000 people live in the coastal area (covering about 60 km2). The population density is very high, about 8500 people/km2. The city is located on the coast of the Indian Ocean between the Sumatran Fault and the Sunda Trench Fault. Both faults are active with slip rate ranging from 10 to 27 mm/year [8]. According to our catalog, 2995 events with a magnitude greater than 4 occurred in this region from AD 1779 to 2010 (Fig.2). The seven giant earthquakes mentioned previously have all been strongly felt here. For example, the source of the 2009 Padang earthquake was located in the ocean slab of the Indo-Australian Plate.

It produced extensive shaking and severe damage to houses and buildings in Padang and Padang Pariaman, because its epicenter was about 60 km offshore from Padang (Fig.3). As the Padang earthquake was an intra-slab earthquake at

intermediate depth with a comparable magnitude, the event did not generate a tsunami of significance [4].

Due to this earthquake, 1117 people were reported killed, 1214 severely injured, 1688 slightly injured, and 3 were left missing in West Sumatra. The earthquake also destroyed many houses, buildings and infrastructure (heavily damaged houses numbered 114,797, with 67,198 moderately damaged and 67,837 slightly damaged). In Padang, 5458 buildings sustained damage [9]. This event occurred at the end of the working day, just 15 minutes after offices and schools closed; if it had struck earlier, the number of causalities would definitely have been higher as a result of building collapses.
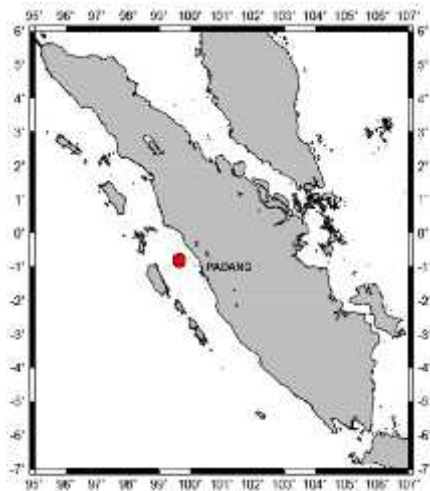
Fig.3 Padang earthquake on September 30, 2009, Mw 7.6.

There are four accelerometers in Padang. Three were donated by Engineers Without Borders Japan (EWBJ) and installed in 2008, and the other was installed by the Indonesian Government's Bureau of Meteorology, Climatology and Geophysics (BMKG). However, only one ground motion record is available for the Padang earthquake. Due to an electric power cut during the earthquake, only the BMKG device recorded the time history of the earthquake. The observed record shows about 20 s of strong shaking with a peak ground acceleration (PGA) of 0.3 g and a predominant period of 0.5 s (Fig.6). The location of this station is a mountainous suburb about 12 km in from the coast. The subsurface condition at this station is rocky; the average shear wave velocity for the upper 30 m of the subsurface here, Vs30, is 697 m/s [10].

1.3 Damage From the 2009 Padang Earthquake

The city of Padang covers an area of about 695 km2 and is divided into 11 districts: B. T. Kabung, K. Tangah, Kuranji, L. Begalung, L. Kilangan, Nanggalo, P. Barat, P. Selatan, P.Timur, P. Utara, and Pauh (Fig.7). 51.0% of the land is forested, 28.52% is used

for farming, 9.54% for housing and 7.1% for rice fields (Padang Local Government, 2009). The population of more than 857,000 is increasing by 2% per year. The K. Tangah district has the highest population and most extensive area compared with the other districts in the city. The population distribution and density is shown in Table1 1 (Padang Local Government, 2008).

The central business area of Padang is close to the coast and consist of several districts: P. Barat, P. Utara, P. Selatan and P. Timur, B.T. Kabung, K. Tangah. The downtown area is utilized as a center of political and commercial activities. Although the Padang earthquake affected all districts of the city, the major damage occurred downtown, because about 80% of population lives near the coast (Tables 2 and 3).

2. SITE CHARACTERIZATION BY MICROTREMOR OBSERVATION

2.1 Microtremor Aray Observations

The velocity of surface waves is well known to vary as a function of frequency (or period) due to dispersion. Since dispersion is a function of subsurface structure, the substructure can be estimated from a Rayleigh wave dispersion curve. We carried out microtremor array investigations using 12 sites at several districts in Padang (Fig.4). Dispersion curves were calculated using the SPAC method [11] to obtain a velocity structure from the microtremor recordings. An outline of the procedure follows. It is necessary to simultaneously record microtremors with an instrument array of at least three stations. The dispersion of a measured surface wave is a response to the subsurface structure directly below the array, and the estimation of the subsurface structure causing the dispersion is determined by means of inversion of Rayleigh waves. The basic principles of the SPAC method assume that the complex wave motions of microtremors are stochastic processes in time and space. A spatial autocorrelation coefficient for a circular array can then be defined when the waves composing the microtremor (i.e., the surface waves) are dispersive. Hence, the spatial autocorrelation is a function of phase velocity and frequency. Rayleigh wave records were measured for the 12-array observation sites using the SPAC method and inversion analysis was undertaken on the observed dispersion curves to estimate the soil profiles. In the inversion analysis, the Particle Swarm Optimization (PSO) algorithm was adopted to solve the non-linear optimization problem [12]. The basic procedures of PSO are outlined below.

The particle swarm concept originated as a simulation of simplified social system. The original intent was to graphically simulate the choreography of bird of a bird block or fish school. However, it was found that particle swarm model can be used as an optimizer, PSO simulates the behaviors of bird
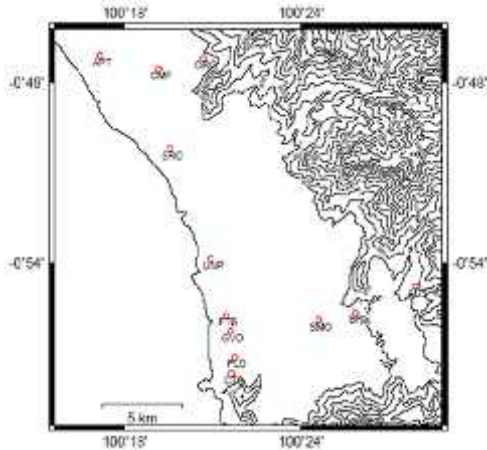
flocking. Suppose the following scenario: a group of birds are randomly searching food in an area. There is only one piece of food in the area being searched. All the birds do not know where the food is. But they know how far the food is in each iteration. So what's the best strategy to find the food? The effective one is to follow the bird which is nearest to the food. PSO learned from the scenario and used it to solve the optimization problems. In PSO, each single solution is a "bird" in the search space. We call it "particle".

All of particles have fitness values which are evaluated by the fitness function to be optimized, and have velocities which direct the flying of the particles. The particles fly through the problem space by following the current optimum particles. PSO is initialized with a group of random particles (solutions) and then searches for optima by updating generations. In every iteration, each particle is updated by following two "best" values. The first one is the best solution (fitness) it has achieved so far. (The fitness value is also stored.) This value is called pbest. Another "best" value that is tracked by the particle swarm optimizer is the best value, obtained so far by any particle in the population. This best value is a global best and called gbest. When a particle takes part of the population as its topological neighbors, the best value is a local best and is called lbest.

We estimate the subsurface structure of the model by solving a nonlinear minimization problem with the fitness function below.

$$v_i^{t+1} = \omega\, v_{i}^{t} + c_1 r_1 (p_{i}^{t} - x_{i}^{t}) + c_2 r_2 (p_{g}^{t} - x_{g}^{t}) \tag{1}$$

$$x_i^{t+1} = x_i^{t} + v_i^{t+1} \tag{2}$$

where v_{i}^{t} is particle velocity of the ith component in dimension d in the interaction, x_{i}^{t} is the particle position of the ith component in dimension d in interaction, c_1 and c_2 are constant weight factors, p_i is the best position achieved by particle i, p^g is the best position found by the neighbor of particle i, r_1 and r_2 are random factors in the [0,1] interval and ω is the inertia weight. Before performing the inversion

analysis, the subsurface structure was assumed to consist of horizontal layers of elastic and homogeneous media above a semi-infinite elastic body. The shear wave velocity and thickness of each layer are the parameters determined by the inversion analysis. The results enable us to determine the condition of shallow subsurface structures (11). The outline of the SPAC method for the phase velocity calculation of Rayleigh waves follows.

$$F(\omega) = \frac{1}{2} \int_{-\infty}^{\infty} f(t) \cdot e^{(-i\omega)} d$$
$$= A_f(\omega) \cdot e^{\left(-i\,_f(\omega)\right)} \tag{3}$$

$$G(\omega) = \frac{1}{2} \int_{-\infty}^{\infty} g(t) \cdot e^{(-i\omega)} d$$
$$= A_g(\omega) e^{\left(-i\,_g(\omega)\right)} \tag{4}$$

$A_f(\omega)$, $A_g(\omega)$ and $\emptyset_f(\omega)$, are difference between the amplitude of $\emptyset_g(\omega), F(\omega), G(\omega)$ respectively. Futher cross correlation in the frequency region of the two waveforms will be as follows.

$$= F(\omega) \cdot \overline{G(\omega)} = A_f(\omega) \cdot A_g(\omega) \cdot$$
$$i\Delta\emptyset(\omega)) \tag{5}$$

It shows the phase difference of $\Delta\emptyset(\omega)$
$$\Delta\emptyset(\omega) = \frac{\omega}{c(\omega)} \tag{6}$$
$c(\omega)$ is the phase velocity from the phase difference.

$$C_f = A_f(\omega) \cdot A_g(\omega) \cdot$$
$$e^{\left(i\frac{\omega}{c(\omega)}\right)} \tag{7}$$

The complex coherence of two waveforms is defined by the following equation.

$$C_f(\omega) = \frac{C_f(\omega)}{A_f(\omega) \cdot A_g(\omega)}$$
$$= e \, p\left(i\frac{\omega}{c(\omega)}\right) \tag{8}$$

$$R\left(C_f(\omega)\right) = c\left(i\frac{\omega}{c(\omega)}\right) \tag{9}$$

$$c(\omega, \varphi) = \frac{c(\omega)}{c} \tag{10}$$

$$S(\omega, r) = \frac{1}{2} \int_0^2 e^{\left(i\frac{\omega}{c(\omega)} c\right)} d \tag{11}$$

$$R\left(S(\omega, r)\right) = \frac{1}{2} \int_0^2 c^{\left(i\frac{\omega}{c(\omega)} c\right)} d \tag{12}$$

$$J\left(\frac{\omega}{c(\omega)}\right) = \frac{1}{2} \int_0^2 e^{\left(\frac{\omega}{c(\omega)} c\right)} d \tag{13}$$

where $J(x)$ is the zero-order Bessel function of the first kind of x, and $c(\omega)$ is the phase velocity at frequency ω. The SPAC coefficient $\rho(r, \omega)$ can be obtained in the frequency domain using the Fourier transform of the observed microtremors.

From the SPAC coefficient (r,), the phase velocity is calculated for every frequency from the Bessel function argument of equation. 15 and the velocity model can be invert. The layer thickness and the average S-wave velocity in Figure 6 each array site. For the average S wave velocity model obtained by averaging the estimated ground structure of the array site was to be calculated by a weighted average using a S-wave velocity structure is estimated as a weighted layer thickness.

$$R\left(S\quad(\omega,r)\right) = J\left(\frac{\omega}{c(\omega)}\right) \qquad (1)$$

From the SPAC coefficient $\rho(r, \omega)$, the phase velocity is calculated for every frequency from the Bessel function argument of equation. 15 and the velocity model can be invert. The layer thickness and the average S-wave velocity in Figure 6 each array site. For the average S wave velocity model obtained by averaging the estimated ground structure of the array site was to be calculated by a weighted average using a S-wave velocity structure is estimated as a weighted layer thickness.

$$\overline{V_s} = \quad V_s \cdot \frac{H_i}{H} \qquad (15)$$

From the dispersion curve, we can produce an interpretation Vs_{30} (average shear wave velocity for the upper 30 m) as show in Table 4, shows the contours of Vs_{30} for every 200 m/s increment and soil characteristic every layer.

3. SEISMIC RISK ASSESSMENT AND LOSS ESTIMATION

Seismic risk assessment and loss estimation is an essential first step to seismic hazard reduction for a large structural inventory. Knowing the seismic risk and potential losses allows for proper budgetary planning, raising public awareness, assessment and allocation of the necessary manpower for mitigation and disaster management operations, educating the public and professionals on preparedness and mitigation, and prioritization of retrofit applications [4]. Components of seismic risk assessment and loss estimation are (1) Hazard analysis; (2) Local site effects (microzonation); (3) Exposure information (structural inventory); (4) Vulnerability analysis; (5) Estimation of risk and loss. These components are briefly described in the following subsections. The vulnerability is the proneness of some category of element at risk to undergo adverse effects inflicted by potential earthquake.

Seismic risk probability = seismic hazard probability (occurrences probability vs. PGA) x vulnerability loss (loss vs. PGA)   (16)

3.1 Seismic Hazard Analysis For Padang City

This study falls primarily within the disciplines of geology and seismology with input from civil engineering. Probabilistic Seismic Hazard Analysis (PSHA) aims to quantify the uncertainties and produces an explicit description of the distribution of future shaking that may occur at a site [13]. We consider all possible earthquake events and estimate ground motion along with their associated probabilities of occurrence in order to assess design ground motion for structure. The annual probability of exceedance is determined for some level of earthquake shaking at site. In this study, we consider the earthquakes of which magnitudes are larger than 4.0 in moment magnitude scale, and adopt an area model to determine source because earthquake events may occur anywhere in the region as showed in Fig.5. According to our catalog, about 2,995 events occurred in this region during the period from 1779 to 2012. We compared several existing attenuation equations and selected a suitable one for Indonesia. They are compared with ground motion attenuation observed at three stations. From the comparison, we adopted Fukushima's attenuation as an appropriate equation and applied to seismic hazard analysis. In addition, we calculated the Seismic hazard curve describes the aggregate hazard at a particular site. The seismic hazard $H(A)$ is defined as the annual occurrence rate of earthquake that produce a ground motion exceeding a given level at a specific site, based on Cornel et al. (1968). The overall hazard is composed of the respective contribution $Hi(A)$ from each source zones, $i,$ out of the set of zone I as shown in Eq. (17). The range of possible M_i and R_i have been discretized into n_M and n_R interval, respectively, by using the discretization technique.

$$(IM>x) = \sum_{i=1}^{sources} m(M_i>m_{min}) \sum_{j=1}^{n_M}\sum_{k=1}^{n_R} P(IM>x|m_j,r_k)$$
$$*P(M_i=m_j)P(R_j=r_k) \qquad (17)$$

where $(IM>x)$ is the annual earthquake occurrence rate of which peak value exceeds a given level, x;
$(M_i>m_{min})$ is the rate of earthquake with magnitude greater than m, $P(IM>x|m_j,r_k)$ is the probability of occurrence of the associated magnitude and distance; $P(M_i=m_j)$ is the probability associated with all magnitude between m_j and m_{j+1} to the discrete value m_j; $P(R_j=r_k)$ is the probability of occurrence of the associated distance. One of the advantages of probabilistic seismic hazard analysis is that we can account for all possible earthquake source in area.

A disadvantage of PSHA is that concept of design earthquake is lost. Which earthquake scenario is most likely to cause PGA>x?.
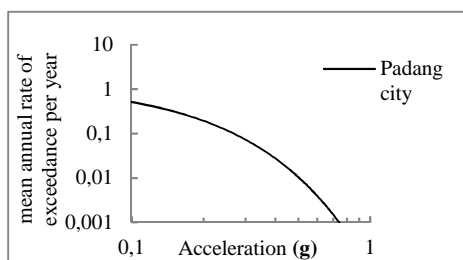
Fig.5 Seismic hazard curve for Padang city at 10% probability of exceedance in 50 years.

There was no instrumentally observed record of the shaking in the downtown area of Padang during the earthquake or only one time series record is available in mountainous area.

However, BMKG recorded the shaking by a strong-motion seismograph placed on a rocky site in Andalas University (BMKG), which it is about 11km eastern site from coastal.

As known, Engineer Without Border of Japan installed 3 accelerometer devices at 3 sites in Padang; Andalas University, sub-mayor office and government office, unfortunately these instruments did not record ground motion during earthquake caused of the electric was cutting off.

Table 4. Results of microtremor array observations (Vs, average shear wave velocity of the upper 30 m)

Site name	1st layer		2nd layer		3rd layer		4th layer		Average Vs(30)
	Thickness (m)	Vs (m/sec)	Thickness (m)	Vs (m/sec)	Thickness (m)	Vs (m/sec)	Thickness (m)	Vs (m/sec)	
ADS	3	163	8	409	~	1891.3	-	-	693
BRI	7	344	13.8	526	38.9	744	~	1219	600
SMO	1.9	135	9.7	468	35.7	508	~	789.4	506
GVO	43.8	198	17.8	308	35.3	356.7	~	515.3	198
FTB	21	158	45	263	35.1	378.8	~	432.4	189
UNP	28.2	163.2	59.3	284	~	469	-	-	171
CTS	5.2	96.8	12.5	184	44.8	296.8	~	471.6	233
FLD	17.7	177	35.6	315	13	410.3	~	479.6	232
ORG	26.1	372.4	12.6	492	~	1266.3	-	-	388
CMF	5.7	163	30.7	197	77.2	293.6	~	423.8	190
SRC	30	190	40.2	257	~	290	-	-	190
APT	20.5	146.7	53.1	234	102	348.7	~	555.3	175

3.2 Ground Shaking Due to Padang Earthquake September 2009

The shaking level will shows that majority of the Padang city is identified with a violent shaking severity rating in Padang city.

3.2.1 Ground response analyses

Several methods for evaluating the effect of local soil conditions on ground response during earthquake are presently available. Most of these methods are based on the assumption that main response in a soil deposit are caused by the upward propagation of shear waves from underlying rock formation. Analytical procedures based on this concept in cooperating nonlinear soil behavior, have been shown to give results in good agreement with field observation in a number of cases. Accordingly, they are finding increasing use in earthquake engineering for predicting response within soil deposit and the characteristics of ground surface.

Caused of this reason, we simulated the 2009 Padang earthquake ground motion from Andalas University to target site in downtown of Padang city by using sub soil structure or soil profile from our microtermor array observation.

The input data, a time series of September 30th 2009, Padang earthquake was recorded at Andalas University (BMKG). The Accelerometer provided by meteorology and geophysics agency of Indonesia government. First step, ground motion at Andalas University was analyzed to get new ground motion at the bedrock, second step, ground motion at the bedrock simulated to the surface target site. Considered peak horizontal acceleration of the input is N-S direction.

From the ground response analysis, the ground motion at the surface for some sites and by using kriging method to interpolate the results, we obtained all ground motion in Padang city and plotted in Fig.6. The peak of ground motion is increasing from the rock

District	Damaged houses			Total	Damage ratio			Total damaged in US $ (Rp)
	Severe	Moderate	Slight	Houses	Severe	Moderate+	Slight+	
L. Kilangan	2441	2098	2315	9047	0.27	0.5	0.76	$363 million
K. Tangah	7191	8423	7566	25888	0.28	0.6	0.9	$1.21 billion
L. Kuranji	4990	4749	4753	16098	0.31	0.6	0.9	$767 million
P. Barat	2160	2202	2399	10604	0.2	0.41	0.64	$347 million
P. Utara	2666	3036	3102	11446	0.23	0.5	0.77	$450 million
P. Selatan	2436	2535	2887	8843	0.28	0.56	0.89	$399 million
P. Timur	1670	3087	3395	12152	0.14	0.39	0.67	$381 million
Nanggalo	2787	1911	1468	11528	0.24	0.41	0.53	$360 million
L. Begalung	4976	5305	6506	17993	0.28	0.57	0.93	$836 million
Pauh	1129	1426	2005	6947	0.16	0.37	0.66	$214 million
B.t. Kabung	1151	1044	1219	3414	0.34	0.64	1	$176 million
Total	33597	35446	37615					$5.5 billion

site (high land) to downtown (soft soil condition) about 1.5 times higher.

3.3 Vulnerability Assessment

Vulnerability can simply be defined as the sensitivity of the exposure to seismic hazard(s).

The vulnerability of an element is usually expressed as a percentage loss (or as a value between zero and one) for a given hazard severity level [14]. In a large number of elements, like building stocks, vulnerability may be defined in terms of the damage potential to a class of similar structures subjected to a given seismic hazard.
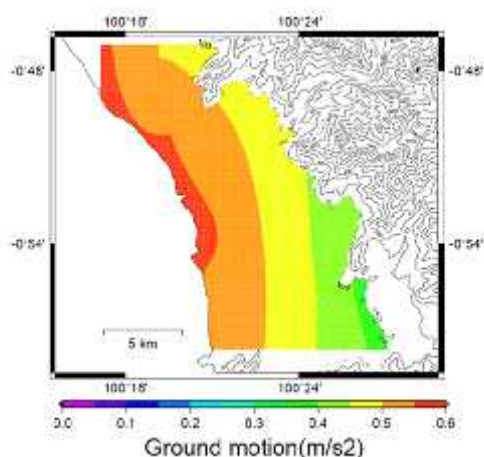
Fig.6 Ground motion whole Padang city.

Vulnerability analysis reveals the damageability of the structure(s) under varying intensity or magnitudes of ground motion. Multiple damage states are typically considered in the analysis. Based on the data of damaged houses by ground shaking of Padang earthquake in 2009 (Table 2).

We estimated damage ratio for residential in Padang and based on the ground shaking at each area ((soft, stiff soil and rock). In table 1 shows the soil characteristic is classified into 3 type based on its shear velocity, 0-150 m/s is soft, 151-300m/s is stiff soil and upper 300m/s is rock. The damage degree is classified into 3 categories, severe, moderate (+) and slight (+). Here, for each categorize means is; severity is from major structural damage to totally collapsed (un-repairable), moderate is widespread,
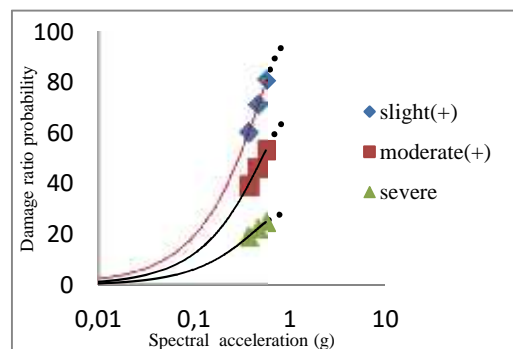
Fig.7 Vulnerability functions (based on PGA) for low rise residential.

extensive non-structural damage (repairable) and slight is non-structural damage (easy repairable). The ground shaking acceleration for each area is 0.56g, 0.45g and 0.36g for soft, stiff soil and rock respectively. The damage ratio (%) for each classified soil is; soft is 25, 53, 80, medium is 22, 46, 71, rock is 19, 39, 60 for severe, moderate(+) and slight(+) respectively.

Table 3. Damaged houses estimation due to Padang earthquake 30 September 2009 (Padang local government, 2009)

3.4 Seismic Risk Vulnerability

Risk combines the expected losses from all levels of hazard severity, also taking their occurrence probability into account, while vulnerability of an element is usually expressed for a given hazard severity level [15]. Loss is defined as the human and financial consequences of damage, including injuries or deaths, the costs of repair, or loss of revenue. In this paper consequences of damage and the cost of repair are taking account only. The distinction between risk and loss is often very loose and, based on their definition; these terms are sometimes used interchangeably. Since the standard definition of risk is a probability or likelihood of loss, between zero and one, it may be more appropriate to express risk. The district was the most severely damaged. Based on our survey of this district, we found mostly non-engineered houses.

This earthquake also affected lifelines in Padang. The strong ground shaking destroyed public water distribution pipes leading to 2,906 reported leakage points in total [14]. Damage to pipelines forced the cessation of water delivery to consumers for several weeks.
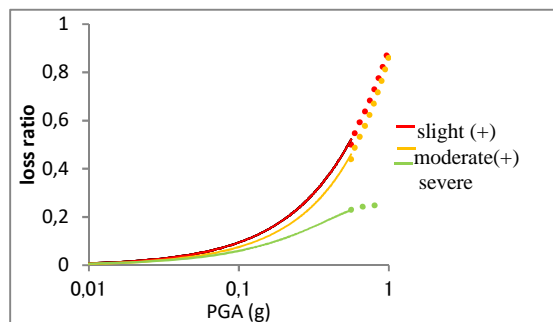
Fig.8 Loss ratio prediction
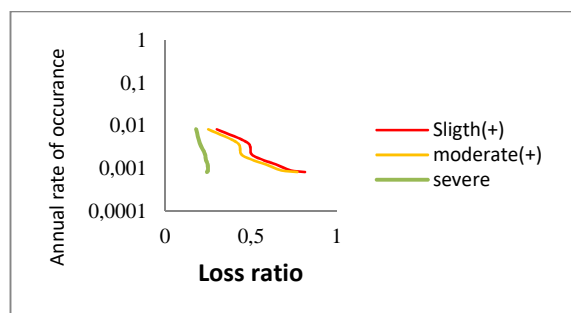
Fig.9 Loss probability for each annual rate of occurrences.

4. CONCLUSIONS

According to microtremor array observations, downtown Padang is underlain by soft soil conditions (Vs30<400 m/s). Consistent results concerning the soil condition were found based on predominant period observations and the soil characteristic.

Padang city has high probability giant earthquake occurrence and high level for seismic risk vulnerability for future earthquake.

These results provide critical information for making shaking maps, updating hazard maps, and developing disaster prevention countermeasures in Padang.

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TWO SPECIES OF TERMITE DAMAGING TO BUILDING AND HOUSES AT BANDA ACEH (SUMATRA, INDONESIA)

S Syaukani[1], M Bahi[1], M Muslim[1], M Shabri Abd Majid[2], D Sutekad[1], Y Yasmin[1], N Novita[3]

[1]Faculty of Mathematics and Natural Science, Syiah Kuala University, Indonesia
[2]Faculty of Economics and Business, Syiah Kuala University, Indonesia.
[3]Faculty of Teacher Training and Education, Syiah Kuala University, Indonesia

ABSTRACT: In general, termites are one of the insects playing important role in the ecosystem of tropical rain forests. On the other hand, some species of termites have been reported to causing serious economic loss. Moreover, lack of information on their biology and technology of termite control have highly contributed to termite problem to buildings and houses in Banda Aceh. Termites were collected in four sub-districts of Banda Aceh city, namely Syiah Kuala, Kuta Alam, Banda Raya and Ulee Kareng. Termites were identified by using morphological and anatomical characters of soldier and workers castes. Result showed that these two species were found as two dominant termites in causing bad damages on buildings and houses around Banda Aceh, Lack of knowledge of termite control methods, low quality on timber usage, and sanitation surrounding constructions have been found as significant problems for increasing termite attacks on the buildings and houses at Banda Aceh.

INTRODUCTION

Termites are the most important arthropods in the process of decomposing organic matter in lowland forest ecosystems [1,2]. These insects provide a very rapid response to the destruction of habitats in tropical rain forests, especially logging followed by opening canopies of the trees [1]. Currently, there are more than 2,800 specimens and 281 genera termites have been identified worldwide that are divided into seven families (Mastotermitidae, Serritermitidae, Kalotermitidae, Rhinotermitidae, Termopsidae, Hodotermitidae dan Termitidae) [17]. The last five families are found in the Oriental Region [18], whereas in Indo-Malayan there are only three families identified (Kalotermitidae, Rhinotermitidae dan Termitidae) [4,5,6].

Termites have been known as the major destructive pests in the tropics, subtropics, and temperata, but data on the damage caused by termites are still very few available [7]. The intensity of the attack and the extent of damage vary in some cities in Indonesia. The percentage of termite attack against various buildings in Jakarta, Surabaya, and Bandung is very high (77-90%) [8]. *Coptotermes* is the genus causing the greatest harm in infecting buildings around the world, followed by *Odontotermes,* *Microcerotermes, Reticulitermes*, and *Heterotermes* [7].

The economic loss due to termite attack against the building on Batam Island reaches Rp 50 billion, with an average loss of each house was up to three million rupiah [8]. The economic loss due to termite attack against the building was calculated for about 250 billion in Indonesia [9].

The geographic condition of Banda Aceh, which is located 1 to 5 meters above sea level, is an ideal location for the development and spreading of termites. Knowledge of termite deterrence prevention and the overcoming destruction technology, number of species and patterns of termite spreading of the building destroyer, and the magnitude of economic losses that have not been revealed due to the attack of various types of termites that attack buildings in Banda Aceh City. In addition, the most fundamental step in termite control technology is the availability of data on the taxonomy and ecology of various types of termites that attack buildings in Banda Aceh City are mandatory.

METHODS

Field Survey

Data collecting of termites was conducted by purposive sampling method [18] by selecting three sub-districts from nine sub-districts in Kota Banda Aceh. Every building and houses found in signs of termite attack is carefully examined. The termites were collected into ethanol 70%. The colonies are documented, the primary data were recorded manually and digitally. The morphology, condition, and location of each attacked object are also recorded. All termites (reproductive, worker, soldier and laron) are collected in each colony. Some secondary data covering behavior, physical and biological properties are also documented.

Laboratory works

Heads, bodies, and pronotum of each type of soldier are documented with a digital microscope (KEYENCE HF VH-8000). Mandible, labrum, and antennae from worker caste dissected and made preparations with Euparal 3C 239 (Waldeck GmbH & Co. KG). After that, all photos are documented by using Digital camera Nikon Coopix 3340 which is connected with Nikon Eclipse E600. Multi-focused montage images for each termite member portion of the termite are processed with Helicon Focus 4.03 Pro. Then, each photo was edited with Adobe Photoshop CS6-Ext. The termite morphology photograph method in more detail refers to [10,11,12,13].

Identification, Terminology, and Measurement

Each specimen was collected from the field and then it was sorted by a morphological approach (soldier and worker caste) *nesting and foraging biology, biogeographical information*. Morphological characters used in this study refer to [5,6,11, 14,15,16]. The measurement method for each collected-termite type refers to [6,11,12].

RESULTS

Species of termites attack Buildings and houses

Coptotermes curvignathus (186 colonies) and *C. gestroi* are the two dominant species that attack buildings and houses in Banda Aceh. Indications of termite infecting on buildings can be detected from the existence of galleries built to connect between food sources and their nest. Galleries are becoming very important for termites because it can protect them from predators and can maintain humidity and temperature that is crucial for their survival.

Coptotermes is easily recognizable by behavior in spraying sticky white liquid as a mechanism to defend themselves from their enemies. Large in size for soldier and workes castes makes this social insect capable to attack building in a wider area. In the earlier stage termites attack from inside of the wood. This strategy makes their attacks undetectable until the buildings are in severe condition.

Some houses that are seriously attacked by termites are among the most dangerous categories to live in. Warehouses, garages, and bookshelves are widely found attacking by the insects in Banda Aceh. Termites also attacked gardening plants around the building. Tree stumps and twigs scattered around the building are the ideal medium for triggering the presence of termites.

Termites generally attack houses more often where the roofs are made of wooden material, especially when the roof made of low-quality wood. Piles of cardboard, paper, and obsolete household furniture were the earliest attacked objects when infecting buildings. We also found that wood-fence, animal wood-cages are effective medium for termites to reach buildings. The notion-occupied houses also became an ideal medium for termites to attack in earlier nuptial flight, then spread to neighboring houses

Strategies to Prevent or Control Termites

(1) The clean environment around the building becomes the most effective way to prevent termites from infecting buildings.

(2) Separation/cutting of plant or plant parts in contact with the building/house should be avoided to prevent the transfer of termites into the building.

(3) Selection of wood quality that is relatively durable or good for construction materials can prevent from termite,

(4) Prevention by using termiticide to the wood, soil, floor before buildings is very effective in preventing the spread of termites from infecting the building,

(5) Termite distribution data in Banda Aceh is needed before a building or house is constructed. Due to the fact that some areas in Banda Aceh are occupy by these two dangerous termite species to attack building (unpublished data)

Technology Prevention and Control of Termites

Generally, most people in Banda Aceh are limited understand about termite in an attack a building. People just realized when the termite attack has reached the category of moderate or severe with control technology that requires a high cost. In some cases, we found that the cost of replacing certain materials is cheaper when compared to termite control costs.

CONCLUSION

1. We found two species of termites *C. curvignathus dan C. gestroi* which are the most dominat in destructing buildings and houses in Banda Aceh.
2. Lack of public knowledge on signs of infected buildings by termites of is major constraints in reducing termite attack on buildings.
3. Environmental condition and sanitation around the building is an important factor to cut off distribution chain of termites.
4. It is needed a hazard map and termite distribution in Banda Aceh.
5. A new technology is needed in controlling or preventing termite attack on the building in Banda Aceh.

ACKNOWLEDGMENT*S*

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PERSONNAL MANAGEMENT IN INFORMATION SYSTEMS APPLICATIONS WITH TOGAF FRAMEWORK

[1]Safrian Aswati, [2]Saleh Malawat, [3]Suhendra, [4]Yessica Siagian, [5]Arridha Zikra Syah

[1]Pascasarjana Faculty of Engineering,
Doctoral Program of Vocational Education Technology,
State University of Padang,
[2]Management Study Program University of Asahan,
[3] Informatics Engineering Study Program STT Sinar Husni Medan,
[4,5] Information System Study Program STMIK Royal Kisaran

ABSTRACT : Organizational goal will be achieved affected by the Organizational goal will be achieved affected by the existence of human resources (SDM) and also the role of information technology.Any organization definitely have a source of human resources or public servants whose function was to handle of these organisations well. Employees are a source of the success and of the backbone of an organization in running their activities so that human resources need to managed as well as possible with the help of information in accordance with the system.Stmik royal the range is an institution of higher education in the achievement of his object influenced by human resources one of which is a lecturer. In this research writers discussed human resources management he got from his lecturers who is in stmik royal. The main tasks he got from his lecturers in stmik royal the range is to hold tri darma college which are (1).Carry out teaching, .Carry out research, (3).Carry out devotion to the public. Acts of tri darma of this college will be can be used as one of the requirements to get the functional positions and also a the functional positions and penyetaraan classes. Currently the management of the company to get the functional positions and penyetaraan the done by enough lecturers who concerned with visit directly to the office of kopertis 1 areas north sumatra with the paperwork be requirement.Of course turning over the filings pertaining to acts of tri darma higher education institutions which have been done by a lecturer. It is very not effective because of the paperwork used as a condition was not to be cultivated and in validation STMIK Royal the range. These affect enough lecturers who will either over and over again back to kopertis when the file is feasible to or there a shortage of. It is therefore in this research design writer proposed information system with the framework togaf. It gives us a framework the phase that systematically in design systems information.

Keyword : Framework, TOGAF, STMIK Royal, Lecturer

1. INTRODUCTION

Every organizations must have human resources and employees who function to manage the company well (Mcleod and schell 2007). Employees are a source of success and the back bone of an organizations in activity implement, so the staffing system needs to be managed by using information technology in accordance with the system.(marimin et. Al. 2006). At the time of the research was conducted at the STMIK ROYAL KISARAN there are supporting element of lecturers. Lectures are human resources (personnel) that support in teaching – learning process. At the STMIK ROYAL KISARAN there are two categories of lecturers, there are permanent and adjunct lecturer. In the research , the writer discusses about the staffing management of ROYAL KISARAN Permanent lecturer. The main task of the lecturer is the implement of lecturer law that consist of : 1). Teaching 2). Research 3). Community service. The Lecturer Law can be used as a requirement to obtain

functional positions and the equalization of rank. At this time, attempt to get a promotion of functional positions and the equalization of rank done by the lecturer. The lecturer visit to kopertis wilayah I sumatra utara with their requirements file. The requirements file is related to the lecturer law that has been done. This is not effective because the files used as such terms ate not processed and validated from STMIK ROYAL KISARAN. it is takes time for lecturers if requirement's files is uncompleted. Therefore, in this study the writer propose the design of information systems with the framework TOGAF in order to process the data of permanent lecturers in STMIK ROYAL KISARAN. The data processed in accordance with the file used by the lecturer to apply for promotion and the equalization of rank. There are consist of : 1). Personal data of lecturers. 2). Teaching history 3). Research data 4). Community service 5). Scientific work. The data is entered and validated by informational system operator in the end of the semester. If the data is eligible for its functional

position, the informational systems will provide information to the lecturer, it can process the lecturer data well. The information system in the form of employees information system (simpeg) online. This research is to analyse and design the development architecture SIMPEG in STMIK ROYAL KISARAN with the framework of TOGAF. Meanwhile, the purpose of the research is to make blueprint simpeg online and the implemented using the prototype method. The result of simpeg prototype online is evaluated and assessed its effectiveness. This research is expected to reach the target of accurancy, quickness, ease of monitoring and validation. Its expected to facilitate the processing of lecturer administration process which is the demand of modern application.

2. THEORITICAL REVIEW

2.1 Research Before

1. Research conducted by Iyan Supriana entitled Model of Business Information Systems Architecture In Bakosurtanal Based on TOGAF resulted in the conclusion that from several frameworks in information system design, TOGAF is an appropriate framework for the application of information technology to Bakosurtanal because it can provide a blueprint (blue print) is good and fast the reseach
2. Research conducted by Meuthia Rachmaniah, Hari Agung Adrianto, Abdul Aziz with the title of Designing Human Resource Management Information System With The Open Group Architecture Framework (TOGAF) resulted in conclusion that TOGAF provides systematic and sequential stages.
3. Research conducted by Roni Yunis and Kridanto Surendro entitled Model Enterprise Architecture For Higher Education In Indonesia resulted in conclusion that TOGAF ADM as one method that can be used to do the development of enterprise architecture. Each stage of TOGAF ADM can be done correctly if the business processes that exist within the organization really need to be understood and able to be completed identified and true.

2.2 Enterprise Architecture Framework

Framework is defined as a key understanding of the EA that acts as a logical structure in classifying complex information. Using a framework to develop EAs, it is important to consider what criteria are met

by the framework. As for some criteria that serve as consideration in choosing framework that is:

1. Taxonomy completeness, refers to how well a framework classifies the application architecture.
2. Process completeness, refers to how a framework provides guidance in the form of a (step-by-step) process for creating an EA.
3. Practice guidance, refers to how much a framework helps the user's mind-set (easy using) within the organization to understand the development of the EA.
4. Maturity model, refers to how much a framework provides guidance in assessing or evaluating organizations that use EA.
5. Governance guidance, refers to the extent to which a framework helps provide understanding and create effective governance models for EA.
6. Partioning guidance, refers to how well a framework will guide an effective autonomy partition to a company so it becomes an important approach to managing complexity.
7. Vendor neutrality, refers to how likely it is for EA to rely on a special consulting organization when using the framework.
8. Information availability, refers to how large a framework is in generating quantity and quality of information.
9. Time is value, megacu on how long a framework takes the time used to build solutions that provide business value.

2.3 TOGAF

TOGAF is a framework that provides a comprehensive approach to designing, planning, implementing and managing EA.TOGAF has an ADM (Architecture Development Method) which is a methodology consisting of several stages to develop and maintain the technical architecture of the organization, where ADM creates iterative cycles for the entire process, between and each phase so that in each iteration a new decision is made that can determine the area enterprise scope, level of detail, and target time to be achieved (Udin, 2011).the Open Group (2009) states that TOGAF ADM also describes the principles used as a measure to assess the success of EA development where the principles are:

1. Enterprise Principles

The development of the architecture is expected to support all parts of the organization, including the organizational units in need.

2. Principles of Information Technology

Leads to consistent use of information technology in all parts of the organization, including the organizational units that will use.

3. Architecture Principle

Designing system architecture based on business process requirement and how to implement it.

Figure 1. Process Stages of TOGAF Achitecture Development Method (ADM)

2.4 Architecture Development Method

The steps of TOGAF ADM can be summarized as follows:

a. Architecture Vision

Creating uniformity of views on the importance of enterprise architecture to achieve organizational goals formulated in the form of strategy and determine the scope of the architecture to be developed.at this stage contains the questions asked to obtain the ideal architecture.

b. Business Architecture

Defines the initial state of business architecture, determines the business model or desired business activity based on business scenarios.at this stage the tools and general methods for modeling such as: BPMN, IDEF and UML can be used to build the required model.

c. Information System Architecture

At this stage more emphasis on the activity of how the information system architecture developed.the definition of information system architecture in this stage includes the data architecture and application architecture that will be used by the organization. Data architectures focus more on how data is used for the needs of business functions, processes and services. Techniques that can be used with the: ER-Diagram, Class Diagram, and Object Diagram.on the application architecture is more pressing on how the application needs are planned by using Application Portfolio Catalog, and emphasize on the application model that will be designed. Techniques that can be used include: Application Communication Diagram, Application and User Location Diagram and others.

d. Technology Architecture

Build the desired technology architecture, starting from determining the type of technology candidate required by using Technology Portfolio Catalog which includes software and hardware. In this stage also consider the necessary alternatives in the selection of technology.techniques used include Environment and Location Diagrams, Network Computing Diagrams, and more.

e. Opportunities and Solution

At this stage more emphasis on the benefits derived from enterprise architecture that includes business architecture, data architecture, application architecture and technology architecture, so that becomes the basis for stakeholders to choose and determine the architecture to be implemented.to model this stage in the design can use the technique of Project Context Diagram and Benefit Diagram.

f. Migration Planning

At this stage will be an assessment in determining the migration plan of an information system.usually at this stage for its modeling using the assessment and decision matrix of the main needs and supporters in the organization against the implementation information system

g. Implementation Governance

Prepare recommendations for implementation of implemented governance, governance including organizational governance, information technology governance, and governance.the mapping of these stages can also be combined with the framework used for governance such as COBITS from the IT Governance Institute (ITGI) (Open Group, 2009).

h. Arcitecture Change Management

Establish an architectural management plan of the new system by monitoring the technological developments and changes in the organizational environment, both internal and external and determining whether to undertake the next enterprise architecture development cycle.

3. RESEARCH METHOD

As for research methods that were used namely

a. Data collection

Direct observation to the location of the research (observation) in order to see directly things or the data which pertaining to matter required in the preparation of such research studies documentation, purpose and structure of organisations business processes and policy information technology.

1) *Library Research*

At this stage done by seeking literature against materials material that is needed that deals with the topic that taken as the basis for the wake of the as well as to obtain landasan-landasan theory to probe a bit deeper again about togaf in the development of information systems.

2) Framework TOGAF

  a. Design of enterprise architecture
  b. The design of information systems architecture
  c. Architectural design technology
  d. Opportunities and solutions
  e. Migration and planning

4. RESULT AND DISCUSSION

The TOGAF framework can be seen in the steps below

a. *Architecture Vision*

At this stage it explains the vision of explaining the vision of the organization as a place of research to achieve its goals.as for the vision of STMIK Royal is a high teacher who produces competent human resources in the field of systems and information technology that can compete according to the needs of current and future graduate users. STMIK Royal is an organization engaged in the field of formal higher education there are lecturers who became one of the benchmarks to achieve his vision.this lecturer must have competence and qualification through Tri Darma Perguruan Tinggi which its data management must be able to be processed well.

b. Business Architecture

In the second phase of TOGAF Business Architecture also provides techniques that can be used to model business architecture such as the use of BPMN (Business Process Modeling Notation), so that it is obtained an easy to understand business architecture model from

defined functions.BPMN process model is a clear picture of decision makers in every personnel management process (lecturer)
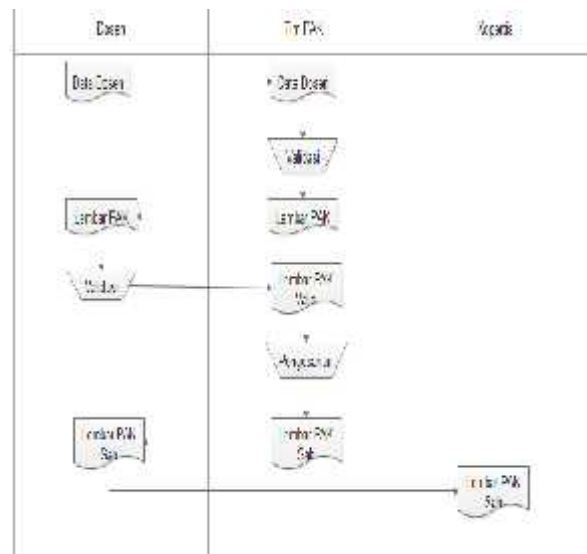
Figure 2. Business Process Modelling Nation

c. *Business Architecture*

Business architecture of personnel management (lecturer) with information systems can be seen in the use case design below
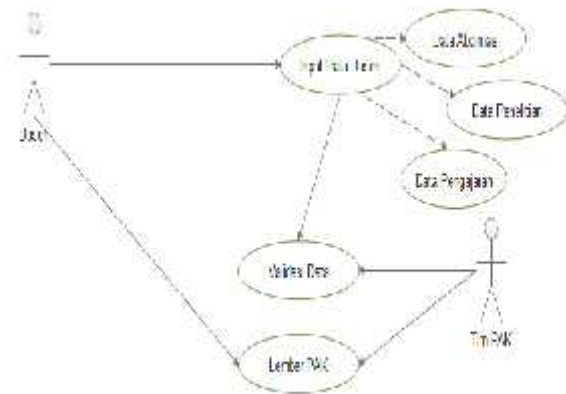
Figure 3. Business Architecture

d. *Information System Architecture*

Information system architecture of personnel management (lecturer) can be seen in the class diagram design for data architecture and application architecture as below.
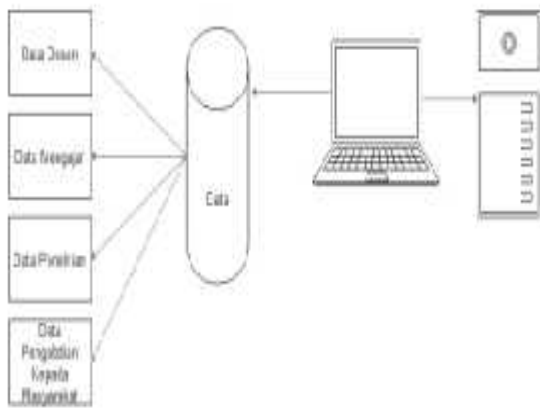
Figure 4. Aplication Architecture
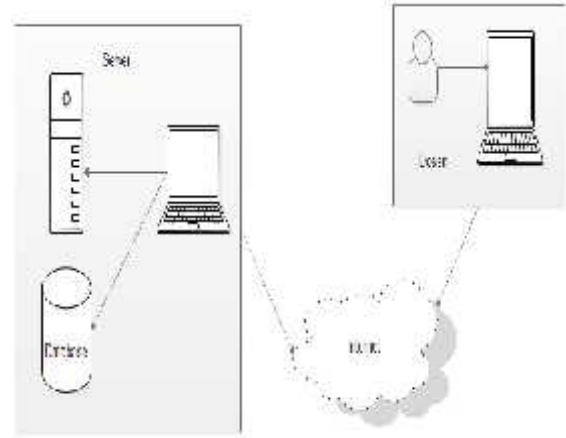
Figure 6. Technology Achitecture
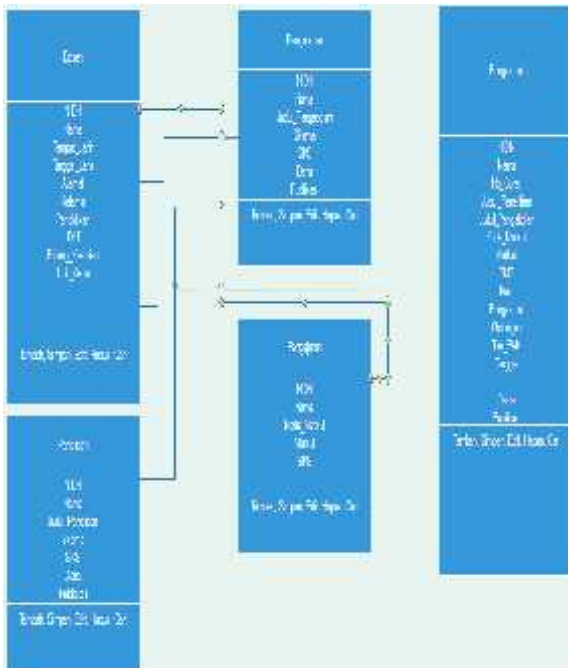
Figure 5. Data Achitecture

e. *Technology Architecture*

Technology architecture of personnel management (lecturer) is the completeness of technology that is included in the information design system.

f. *Opportunities and Solution*

Opportunities And Solution describes the advantages of using information systems and solutions provided from the use of information systems from existing problems. The information system designed with the TOGAF framework provides solutions to the problems that exist in the STMIK Royal Kisaran. Solutions in the form of information systems that can perform data processing properly and efficiently. For profit (oppotunities) can be seen in the chart below.

Figure 7. Profit

g. Migration Planning

This stage is a migration plan (renewal) of the information system designed for the future that is coming:

1. If the amount of data is processed more and more then there will be database changes that can accommodate large amounts of data.
2. Information systems will be integrated into mobile devices (smartphones) with support for android operating system

5. CONCLUSION

1. Use of TOGAF framework in designing personnel management information system at STMIK Royal Kisaran because this framework provides systematic and iterative stages.
2. The design of personnel management information systems, especially lecturers at STMIK Royal Kisaran serve as an alternative new system in managing staffing in terms of administration for functional positions of lecturers.
3. The design of this information system can provide good information for the teaching history of lecturers, research and dedication to the community included in the Tri Darma of Higher Education where this history will be used as the basis for the administration for the functional position of the lecturer.

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ANALYZING OF TECHNICAL CUTTING OF EMPTY PALM BUNCHES

[1]Safril and [2]Dedi Wardianto
[1]Politeknik Negeri Padang
[2]Universitas Muhammadiyah Sumatera Barat
Email: [1]*safikriri@yahoo.co.id*, [2]*dediwardianto2015@yahoo.co.id*

Abstarct: Generally, this study aimed at conducted technical evaluation of palm fruit cutting machine. Especially, this study aimed at: 1) Conducting structure identification and physical properties of empty palm bunches, 2) Studying of specific cutiing style (GPS) and specific cutting energy (EPS) on spikelet, stalk of empty palm bunches with various corners of the blade, sliding angle and cutting angle, 3) Technical evaluation of palm fruit cutting machine. This study was conduct at Politeknik Unand Laboratoty, agricultural engineering laboratory of Unand and PT. AMI Padang. This study had several stages, were follows: 1) Separating and calculating weight between spikelet, stem and fruit that follow in empty palm bunches and next measuring TKS water content on base, middle and end. 2) Conducting the cutting on spikelet, stalk of empty palm bunches with various corners of the blade, sliding angle and cutting angle. 3) Evaluating on palm fruit cutting machine that using optimum blade angle. The results of this study obtained that: 1) Structure and physical properties of empty fruit bunches was percentage. 2) Cutting style and cutting energy that used corners of the blade, sliding angle and cutting angle. 3) The result of technical evalution of palm fruit cutting machine (TKS) obtained that the results of this study could be used as guide on development of empty cluster counting machine and increasing business utilization of empty palm bunches.

Keywords: Technical cutting, empty palm bunches, GPS and EPS

1. INTRODUCTION

During palm empty fruit bunches (EFB) is the waste from palm oil mill is available in large quantities and untapped. While the rate of development of oil palm plantation area in Indonesia has increased rapidly in the last few years. In 1997, in Indonesia there are plant oil palm area of 2.1334 million hectares where crops have been grown generate waste oil palm empty fruit bunches About a 2.2 million tonne dry weight and is expected in 2000 will reach 2.8 million tons of dry weight (Seminar NasionalMAPEKI, 1998). While in West Sumatra area 235 118 ha of oil palm plantations several companies processing of fresh fruit bunches (FFB) of which PTP.VI with a capacity of 60 tonnes per hour, PT.Bakri PP with a capacity of 60 tonnes per hour, while PT.Agrowiratama with a capacity of 30 tonnes per hour (Department of Agriculture and Plantation, West Sumatra Province, 2002) and approximately 20-25% of the fresh fruit bunches (FFB) processed by the industry is a palm empty fruit bunches (EFB). Number of empty fruit bunches of oil increasingly grow if not managed properly can have negative impacts on the environment, while the utilization of waste oil palm empty fruit bunches (EFB) is still limited. These wastes are usually incinerated or transported to the garden to be used as mulch (Adlin, 1992; Chan et al., 1981; Abdullah et al., 1990).

Utilization of waste palm oil waste into value-added needs to be done, which is a palm empty fruit bunches solid waste palm oil mill. As waste lignocellulosic fibers contained in the oil palm empty fruit bunches can be described in a mechanical or semi-chemical. Semi-chemical process is more suitable for the provision of fiber that must be ground into a pulp with lower lignin content. While the mechanical process can be used to produce fibers that can be used directly by the wood panel industry, or processed into paper.

2. METODH

This study was conducted from November 2001 to January 2002. The location for the making of palm empty fruit bunches (EFB) have PTPN VI Agam. For the analysis of water content of the oil palm empty fruit bunches conducted at the Laboratory of Agricultural Technology Universitas Andalas Padang, while the manufacture of cutting knives palm empty fruit bunches conducted at the Laboratory of Mechanical Technology Polytechnic Unand. Testing spikelet and stalk cutting forces palm empty fruit bunches conducted at the Laboratory of the Polytechnic University of Andalas material, as well as testing the capacity of the machine is done in PT. AMI. This research through several stages: 1) identification of the structure and physical properties of empty fruit bunches of oil palm (TKS), 2) force and energy to the cutting of empty fruit bunches of oil with the angle of the blade is varied, 3) technical test chopper empty fruit bunches of oil, 4) economic evaluation.

3. RESULTS AND DISCUSSION

3.1 Identification of Structure and Properties empty palm bunches (EFB) The observation of weight, length, height, geometric mean diameter, and Sphericity from oil palm empty fruit bunches (EFB) can be seen in Table 4.1, Table 4.2 and Table 4.3 , It also indicated the percentage component of palm empty fruit bunches (EFB) like stalks, spikelet, and the fruit does not fall that go wasted along the palm empty fruit bunches (EFB).

Table 4.1 Decomposition of the percentages by weight of the components of palm empty fruit bunches

No	Berat Sampel (Kg)	Tangkai (Kg)	Tangkai (%)	Spikelet (kg)	Spikelet (%)	Buah (kg)	Buah (%)
1	1,0	0,41	45,05	0,47	51,65	0,03	3,30
2	1,4	0,35	28,00	0,88	70,40	0,02	1,60
3	1,6	0,70	44,87	0,82	52,56	0,04	2,56
4	1,9	0,80	43,96	0,95	52,20	0,07	3,85
5	2,0	0,80	43,01	1,00	53,76	0,06	3,23
6	2,3	0,70	30,97	1,30	57,52	0,26	11,50
7	2,5	0,90	36,29	1,42	57,26	0,16	6,45
8	2,6	1,00	38,17	1,42	54,20	0,20	7,63
9	2,7	1,00	36,63	1,53	56,04	0,20	7,33
10	2,8	1,00	35,71	1,60	57,14	0,20	7,14
11	3,3	1,10	33,64	1,80	55,05	0,37	11,31
12	4,2	1,13	27,03	2,80	66,99	0,25	5,98
13	4,8	1,60	34,78	2,70	58,70	0,30	6,52
14	5,2	1,75	33,98	3,00	58,25	0,40	7,77
15	8,2	2,00	25,32	4,70	59,49	1,20	15,19

In Table 4.2 shown the percentage of the maximum and minimum oil palm empty fruit bunches structure consisting of stalks, spikelet well as the standard deviation.

Table 4.2 Percentage structure of palm empty bunches

No	Parameter	Minimum	Maksimum	Rata-rata	Standar Deviasi
1	Kandungan Tangkai, %	25,32	45,05	35,80	6,390
2	Kandungan Spikelet, %	51,65	70,40	57,40	5,250
3	Kandungan Buah, %	1,60	15,70	6,80	3,730

Note: The number of samples for the identification of the physical properties of oil palm empty fruit bunches are 15 pieces; whereas for the determination of the percentage of the components used TKS sample of 5 pieces.

From Table 4.2 the percentage of stalk minimum weight is 25.32% of the weight of bunches, while the minimum stalk weight was 45.05% by weight of palm empty fruit bunches. Weight Average - Average stalk of each palm empty fruit bunches 35.80% while the standard deviation of the weight measurement conducted on 15 samples of oil palm empty fruit bunch stalk is 6.390%. For the study of spikelet component is known that the minimum weight percentage is 51.65% by weight of palm empty fruit bunches, while the maximum spikelet weight is 70.40% by weight of palm empty fruit bunches. Weight - average of each spikelet on palm empty fruit bunches was 57.40% while the standard deviation of the weight measurement conducted on 15 samples of spikelet was 5.250%. Similarly, a study of the fruit component known minimum fruit weight percentage is 1.60% by weight of palm empty fruit bunches were sampled. While the maximum fruit weight is 15.70% of the weight of the bunch, and the average weight of the fruit of each palm empty fruit bunches is 6,80%, while the deviasai standard of weight measurement conducted on 15 samples of fruit remaining on the bunch is 3.735% ,

To identify the structure of oil palm empty fruit bunches (EFB), then in some parts of the study sample was measured. The parts that are measured as shown in Figure 4.1 consists of a cluster length (l), the width of the bunches were observed (w) and height bunches (h). While the complete measurement results of some research sample are shown in Table 4.3.
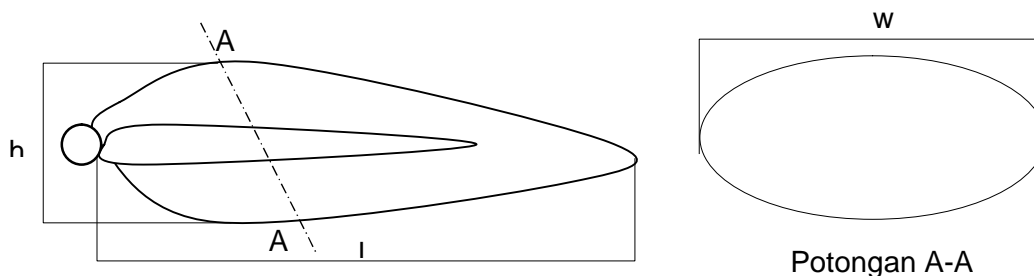
Figure 4.1 The dimensions are measured from oil palm empty fruit bunches (EFB).

Table 4.3 The dimensions of the measurement results against palm empty fruit bunches

No	Berat Sampel (Kg)	Panjang (l), cm	Tinggi (h), cm	lebar (w), cm	GAD	sphericity
1	1,0	30,00	13,00	17,00	18,79	0,63
2	1,4	31,00	13,00	23,00	21,01	0,68
3	1,6	40,00	14,00	29,00	25,32	0,63
4	1,9	38,00	15,00	25,00	24,24	0,64
5	2,0	33,00	18,00	27,00	25,22	0,76
6	2,3	42,00	19,00	28,00	28,17	0,67
7	2,5	36,00	18,00	23,00	24,61	0,68
8	2,6	44,00	17,00	25,00	26,54	0,60
9	2,7	54,00	20,00	28,00	31,15	0,58
10	2,8	42,00	19,00	35,00	30,34	0,72
11	3,3	41,00	20,00	34,00	30,32	0,74
12	4,2	45,00	21,00	28,00	29,80	0,66
13	4,8	40,00	24,00	34,00	31,96	0,80
14	5,2	46,00	22,00	40,00	34,34	0,75
15	8,2	57,00	24,00	37,00	36,99	0,65

Based on data - measurement data to palm empty fruit bunches, as are shown in Table 4.3 above is known that, geometrically from oil palm empty fruit bunches not but approached geometrically symmetrical spherical ellipse or oval, with keovalan prices varying between .58 to .75. Furthermore, the prices of minimum, maximum and average - average and standard deviation of the measurement of the dimensions of empty fruit bunches of oil palm and physical properties of some of the sample to the empty fruit bunches of oil (TKS) is shown in Table 4.4 below:

Table 4.4 Physical properties and components palm empty fruit bunches

No	Parameter	Minimum	Maksimum	Rata-rata	Standar Deviasii
1	Berat (Kg)	1,00	8,20	3,10	1,860
2	Panjang, cm	30,00	57,00	41,27	7,540
3	Lebar, cm	17,00	40,00	28,87	6,120
4	Tinggi, cm	13,00	24,00	18,47	3,580
5	Geometric Mean Diameter	18,80	36,90	27,92	4,870
6	Sphericity	0,57	0,79	0,68	0,060

Note: The number of samples for identification of the physical properties of palm empty bunches are 15 pieces; whereas for the determination of the percentage of the components used TKS sample of 5 pieces.

Samples palm empty fruit bunches as research object has a weight of between 1.0 to 8.2 kg. While the size, expressed as the length, width, and thickness of an average based on the results of their research were: 41.27 cm, 28.87 cm and 18.47 cm high. For the average percentage content of bunches, spikelet, and fruit, respectively:

35.80%, 57.40% and 6.80%. Sphericity selected as a parameter stating the form of empty fruit bunches of oil palm. These parameters indicate the relative shape of the bunches of round objects. Hadi (2001) Sphericity can be determined by the following equation:

$$y = 1,0322x - 19.6662 \qquad r = 0.94 \ (4.3)$$

Where: y = Geometric mean diameter, cm

x = weight of palm empty fruit bunches, kg Data and regression line connecting the geometric mean diameter with a weight of empty fruit bunches of oil palm (TKS) is shown in Figure 4.2
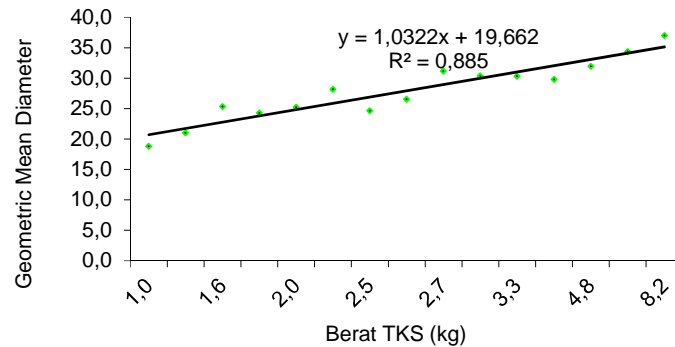
Figure 4.2 the relationship between the weight of the geometric mean diameter of empty fruit bunches of oil palm (TKS)

To form geometric empty fruit bunches of oil palm (TKS) with a coefficient multiplier taken price sphericty or roundness average - average of palm empty fruit bunches is 0.68.

A = 0.68 w. d (4.4) From the measurement results to the palm empty fruit bunches (EFB) with the measured parameters of length, width, and thickness of the sample 5 palm empty fruit bunches are measured have an influence on the price determination sphericty or palm empty fruit bunches.

Based on this research, the relationship between the weight of oil palm empty fruit bunches (EFB) and the length of the palm empty fruit bunches (EFB) obtained by the following equation:

$$y = 1,246x - 31.295 \ r = 0.74 \ (4.5) \ \text{where: y = long palm empty fruit bunches, cm}$$

x = weight of empty fruit bunches of oil palm, kg Data and regression line showing the relationship between these two variables Figure 4.4
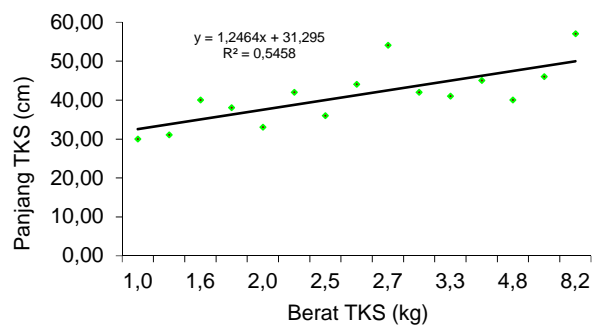
Figure 4.4 the relationship between the weight of empty fruit bunches of oil to the length of bunches

From a regression equation (4.3) and regression equation (4.5) the above obtained coefficients r correlation for both equations is 0.74.

Palm empty fruit bunches (EFB) consists of the stalks, spikelet, and fruit bandwagon and are not terontok in palm oil processing plant, can be illustrated by the results of research that has been done on each sample.

In the identification of the structure and properties of palm empty fruit bunches, do also testing the water content. The water content can be defined in two ways, namely wet basis and a dry basis. The moisture content of wet basis (W_{wb}) is calculated by the following equation:

$$W_{wb} = \frac{\text{berat basah} - \text{berat kering}}{\text{berat basah}} \times 100\% \qquad (4.6)$$

wet weight while the moisture content on a dry basis (wdk) is calculated by the following equation:

$$W_{dk} = \frac{\text{berat basah} - \text{berat kering}}{\text{berat kering}} \times 100 \% \qquad (4.7)$$

Table 4. 5 Data analysis of water content in oil palm empty fruit bunch stalk

No	Region	Br. cawan (gram)	Br. Basah Bahan (gram)	Br.Kering Bahan (gram)	B.Basah + Br.C (gram)	Br.Kering + Br.C (gram)	W_{wb} (%)	W_{dk} (%)
1	Basal	14.1598	6.0612	1.3447	20.2210	15.5045	77.8146	350.7474
2	Equatorial	13.7879	6.3605	1.1865	20.1484	14.9744	81.3458	436.0725
3	Apical	13.8629	4.6015	1.8321	18.4644	15.6950	60.1847	151.1599
1	Basal	13.5772	4.3567	1.4065	17.9339	14.9837	67.7164	209.7547
2	Equatorial	13.2818	5.7184	1.4551	19.0002	14.7369	74.5541	292.9902
3	Apical	13.7271	3.8349	1.9679	17.5620	15.6950	48.6845	94.8727
1	Basal	14.1432	5.6015	1.3322	19.7447	15.4754	76.2171	320.4699
2	Equatorial	13.8629	5.3567	1.0346	19.2196	14.8975	80.6859	417.7557
3	Apical	13.7735	4.3605	1.5835	18.1340	15.3570	63.6854	175.3710

table 4.6 Data analysis of water content in oil palm empty fruit bunches spikelet

No	Region	Br. cawan (gram)	Br. Basah Bahan (gram)	Br. Kering Bahan (gram)	B. Basah +B.C (gram)	Br. Kering + Br.C (gram)	W_{wb} (%)	W_{dk} (%)
1	Basal	3.4425	0.7666	0.6090	4.2091	4.0515	20.5583	25.8785
2	Equatorial	2.9426	1.4390	1.1829	4.3816	4.1255	17.7971	21.6502
3	Apical	4.2146	1.8208	1.5254	6.0354	5.7400	16.2236	19.3654
1	Basal	2.9506	1.1284	0.8986	4.0790	3.8492	20.3651	25.5731
2	Equatorial	3.6506	1.3779	1.1334	5.0285	4.7840	17.7444	21.5723
3	Apical	4.0292	1.7332	1.4490	5.7624	5.4782	16.3974	19.6135
1	Basal	4.0871	1.0324	0.8272	5.1195	4.9143	19.8760	24.8066
2	Equatorial	2.9569	1.1680	0.9496	4.1249	3.9065	18.6986	22.9992
3	Apical	3.2314	1.6582	1.3204	4.8896	4.5518	20.3715	25.5832

Table 4.6 Based on the research analysis spikelet palm empty fruit bunches, the highest water content there at the base, while the water content was lowest for the end portion. It can be concluded based on the weight of each part of the stem and spikelet, both wet weight and dry weight of the sample. Given the magnitude of the price difference in the weight of each part of the stem and spikelet is not too significant, then the difference is considered not affect the cutting force and specific cutting energy required for crushing palm empty fruit bunches (EFB).

4.2.1 Influence of Angle Eyesknife

Angleblade is one of the parameters which influence the price of cutting force and specific cutting energy required for crushing palm empty fruit bunches (EFB).

In Table 4.7 and Table 4.8 are shown the data and analysis of the research results, which show the influence caused by the angle of the blade against the cutting forces and energy cut to three variations of the angle of the blade used, namely, 250, 300 and 350.

Table 4.7 Data and analysis results research on the impact angle of the blade against the force and energy cut-specificstem empty fruit bunches of oil

No	ANE	ANO	SA	F (N)	l (mm)	s1 (mm)	s2 (mm)	s3 (mm)	w1 (mm)	w2 (mm)	w3 (mm)	d (mm)	A (mm²)	GPS (N/cm²)	EPS (Nm/cm²)
1	25⁰	0⁰	0⁰	600	300	205	120	55	259,67	152,00	69,67	9,0	1558,0	38,511	0,3466
2	30⁰	0⁰	0⁰	800	400	305	220	155	259,25	187,00	131,75	10	1728,3	46,287	0,4629
3	35⁰	0⁰	0⁰	950	300	205	120	55	259,67	152,00	69,67	7	1211,8	78,397	0.5488

Table 4.8 Data and analysis of the results of research on the impact angle of the blade to cutstyle and energy a specificon palm empty fruit bunches spikelet

No	ANE	ANO	SA	F (N)	l (mm)	s1 (mm)	s2 (mm)	s3 (mm)	w1 (mm)	w2 (mm)	w3 (mm)	d (mm)	A (mm²)	GPS (N/cm²)	Eps (Nm/cm²)
1	25⁰	0⁰	0⁰	550	110	40	35	35	6,36	8,18	5,45	8,00	407,3	135,045	1,804
2	30⁰	0⁰	0⁰	650	135	50	40	45	8,52	8,22	5,11	7,00	459,8	141,380	0,9897
3	35	0⁰	0⁰	900	125	50	50	25	8,00	5,23	4,00	9,00	612,0	147,059	1,3235

Based on the data shown in Table 4.7 and Table 4.8 for the three variations of cutting the corner of the eye using three variations known that the stalk pieces, the smallest specific cutting force is 38.51 N / cm2 , while the smallest specific cutting energy is 0.3466 Nm / cm2 which is the angle of the blade 250. while the spikelet, the smallest specific cutting force is 135.045 N / cm2, while the smallest specific cutting energy is 1.0804 Nm / cm2 which is on the corner of the eye knife 250. While based on research that has been done by (Hadi, Zoehadi, 1993) to the fresh fruit bunches (FFB) in the range of angle of 150 to 400.

Table 4.9 Data influence angle of the blade against the cutting forces and energy on a specific piece of fresh fruit bunches (FFB) and oil palm empty fruit bunches.

.Sudut Mata Pisau	Tangkai				Spikelet			
	TBS		TKS		TBS		TKS	
	EPS	GPS	EPS	GPS	EPS	GPS	EPS	GPS
Derjat	Nm/cm²	N/cm²	Nm/cm²	N/cm²	Nm/cm²	N/cm²	Nm/cm²	N/cm²
15	0.55	90			2.75	310		
20	0.60	80			1.90	260		
25	0.70	70	0.35	38.51	2.70	340	1.08	135
30	1.35	140	0.46	46.29	3.85	450	0.99	141
35	1.25	130	0.55	78.40	3.20	380	1.32	147
40	1.55	155			4.50	465		

Influence of angle Slide

In the following table are shown the results of measurement and analysis the effect of shear angles to the GPS and EPS by using a variation of the angle of the blade, for the three variations on a stalk cutting and spikelet palm empty fruit bunches. Furthermore, by being seen in the following table.

Table 4.10 Data and analysis with the effects of the friction angle of the GPS and EPS on a stalk spikelet with the angle of the blade 25º

No	ANE	ANO	SA	F (N)	l (mm)	s1 (mm)	s2 (mm)	s3 (mm)	w1 (mm)	w2 (mm)	w3 (mm)	d (mm)	A (mm²)	GPS (N/cm²)	EPS (Nm/cm²)
1	20⁰	25⁰	0⁰	900	300	205	120	55	259,67	152,00	69,67	11,0	1904,2	47,263	0,5199
2	30⁰	25⁰	0⁰	800	400	305	220	155	259,25	187,00	131,75	15	2592,5	30,858	0,4629

| 3 | 40⁰ | 25⁰ | 0⁰ | 700 | 300 | 205 | 120 | 55 | 259,67 | 152,00 | 69,67 | 18 | 3116,0 | 22,465 | 0,4044 |

Table 4.11 Data and analysis with the effects of the friction angle of the GPS and EPS on a stalk spikelet with the angle of the blade 30º

No	ANO	ANE	SA	F (N)	L (mm)	S1 (mm)	S2 (mm)	S3 (mm)	W1 (mm)	W2 (mm)	W3 (mm)	d (mm)	A (mm²)	GPS (N/cm²)	EPS (Nm/cm²)
1	20º	30º	0º	1000	450	112.5	112.5	112.5	260.6	130	83,3	12	1040	51.269	0.5192
2	30º	30º	0º	800	400	100	100	100	260.6	140	93.8	17	1586.666	42.210	0.4885
3	40º	30º	0º	650	450	112.5	112.5	112.5	260.6	143.3	64.4	19	1815.133	30.767	0.4610

Table 4.12 Data and anali sa result of research the influence of the friction angle of the GPS and EPS on a stalk spikelet with the angle of the blade 35º

No	ANO	ANE	SA	F (N)	L (mm)	S1 (mm)	S2 (mm)	S3 (mm)	W1 (mm)	W2 (mm)	W3 (mm)	d (mm)	A (mm²)	GPS (N/cm²)	EPS (Nm/cm²)
1	20º	35º	0º	1100	500	125	125	125	280.4	157.1	98,7	13	1361.5333	58.723	0.6774
2	30º	35º	0º	900	450	112.5	112.5	112.5	280.4	160.5	86.92	16	1712	47.285	0.505
3	40º	35º	0º	700	500	112.5	112.5	112.5	280.4	157.1	70.6	18	1885.2	35.522	0.47740

Table 4.13 Data and analysis with the effects of the friction angle of the GPS and EPS on spikelet with the angle of the blade 25º

No	ANO	ANE	SA	F (N)	l (mm)	s₁ (mm)	s₂ (mm)	s₃ (mm)	w₁ (mm)	w₂ (mm)	w₃ (mm)	d (mm)	A (mm²)	GPS (N/cm²)	E PS (Nm/cm²)
1	20⁰	25⁰	0⁰	400	110	70	35	5	76,36	38,18	5,45	12,00	610,9	65,476	0,7857
2	30⁰	25⁰	0⁰	470	135	95	60	30	98,52	62,22	31,11	13,00	853,8	55,046	0,7156
3	40⁰	25⁰	0⁰	600	125	85	50	20	102,00	60,00	24,00	20,00	1360,0	44,118	0,8824

Table 4:14 Data and analysis with the effects of shear angle terh adap GPS and EPS on spikelet with the angle of the blade 30º

No	ANO	ANE	SA	F (N)	L (mm)	S1 (mm)	S2 (mm)	S3 (mm)	W1 (mm)	W2 (mm)	W3 (mm)	d (mm)	A (mm²)	GPS (N/cm²)	EPS (Nm/cm²)
1	20º	30º	0º	500	150	38	38	38	30.4	28.5	15.5	10	165.33	90.73	0.91
2	30º	30º	0º	470	140	35	35	35	34.2	28.4	14.7	9	170.40	82.16	0.74
3	40º	30º	0º	600	135	34	34	34	35.3	25.1	12.8	10	167.33	80.68	0.81

Table 4:15 Data and analysis with the effects of the friction angle of the force and energy cutting specifics on spikelet with the angle of the blade 35º

No	ANO	ANE	SA	F (N)	L (mm)	S1 (mm)	S2 (mm)	S3 (mm)	W1 (mm)	W2 (mm)	W3 (mm)	d (mm)	A (mm²)	GPS (N/cm²)	EPS (Nm/cm²)
1	20º	35º	0º	600	170	42.5	42.5	42.5	31.2	25.5	14.2	10	157.56	107.90	0,91
2	30º	35º	0º	500	150	38	38	38	28.6	28	12.8	11	205.33	73.05	0.80
3	40º	35º	0º	650	140	35	35	35	34.3	25.2	16.4	9	151.20	92.59	0.83

Based on the data shown in Table 4.10 to Table 4:15 appears that, at least spikelet specific cutting force is 44.118 N / cm2 at an angle shear 400, while the smallest specific cutting energy is 0.7156 Nm / cm2 is the shear

angle of 300, while on the rod, the smallest specific cutting force is 22.465 N / cm2 while the specific cutting energy smallest is 0,404 Nm / cm2 which is at an angle of 400, while based on research has been done by (Hadi, Zoehadi, 1993) to the fresh fruit bunches (FFB) in the range of angle of 00 to 400

Table 4:16 Data shear angle influence on the specific cutting force and specific cutting energy fresh fruit bunches (FFB) and oil palm empty fruit bunches.

Sudut Geser	Tangkai				Spikelet			
	TBS		TKS		TBS		TKS	
	EPS	GPS	EPS	GPS	EPS	GPS	EPS	GPS
Derjat	Nm/cm²	N/cm²	Nm/cm²	N/cm²	Nm/cm²	N/cm²	Nm/cm²	N/cm²
0	1.30	155			3.40	380		
10	0.70	115			1.90	270		
20	0.80	100	0.52	47.26	2.05	260	0.79	65.48
30	0.90	110	0.46	30.86	2.35	280	0.72	55.05
40	0.60	70	0.40	22.47	1.70	190	0.88	44.12

From Table 4:16 visible cutting force and specific cutting energy has a minimum price on the angle of the blade slide 400. at the rod cluster fresh fruit prices low cutting force is 70 N / cm2 and a specific cutting energy smallest is 0.60 Nm / cm2. Conversely cutting force and specific energy of the highest cut at an angle of 400 is 155 N / cm2dan 1.30 Nm / cm2. At spikelet bunches of fresh fruit, low cutting force is 190 N / cm2 and a specific cutting energy smallest is 1.70 Nm / cm2. While the cutting force and specific energy of the highest cut at an angle of 400 is 380 N / cm2dan 3.40 Nm / cm2. As the effect of shear blade angle settings, when compared between cutting forces and low specific cutting energy required in the palm empty fruit bunches with fresh fruit bunches (FFB), the specific cutting force required on the rod average of fresh fruit bunches - a higher average 52.74 %. Furthermore, the specific cutting force required on average fresh fruit bunches spikelet - a higher average 63.62%. Kemudin specific energy required cut stalks of fresh fruit bunches average - higher average 37.74% and specific energy required pieces of fresh fruit bunches spikelet average - higher average 56.3%. As described in section influence angle of the blade, the difference in price - the price of cutting force specific energy and cut specifically between fresh fruit bunches and empty fruit bunches of oil, caused fresh fruit bunches (FFB) is fused with rods so that the water content and fiber - fiber constituent bunches and stalks still be fresh and strong.

4.2.3 The influence of shearing angle

shearing angle is one of the parameters that will influence the price of cutting force and specific cutting energy required for crushing palm empty fruit bunches (EFB). In Table 4:17 to 4:22 are shown the results of measurement and analysis of the influence of the angle shearing of the GPS and EPS each - each to stalk and spikelet with three variations of angle shearing of the 00, 150 and 300, can be seen in Table 4:17 below:

Table 4:17 Data and analysis of the results of research influence angle shearing of the GPS and EPS on a stalk empty fruit bunches of oil palm with the angle of the blade 25⁰

No	SA	ANO	ANE	F (N)	l (mm)	s₁ (mm)	s₂ (mm)	s₃ (mm)	w₁ (mm)	w₂ (mm)	w₃ (mm)	d (mm)	A (mm²)	GPS (N / cm²)	EPS (Nm/cm²)
1	0⁰	0⁰	25⁰	900	300	205	120	55	259,67	152,00	69,67	8,0	1384,9	64,99	0,52
2	15⁰	0⁰	25⁰	800	400	305	220	155	259,25	187,00	131,75	8,5	1469,1	54,46	0,46
3	30⁰	0⁰	25⁰	850	300	205	120	55	259,67	152,00	69,67	9	1558,0	54,56	0,49

Table 4:18 Data and analysis with the effects of shearing angle to the GPS and EPS on a palm empty fruit bunches with stalks angle of the blade 30⁰

No	SA	ANE	ANO	F (N)	L (mm)	S1 (mm)	S2 (mm)	S3 (mm)	W1 (mm)	W2 (mm)	W3 (mm)	d (mm)	A (mm²)	GPS (N/cm²)	EPS (Nm/cm²)

1	0º	30º	0º	1000	450	112.5	112.5	112.5	275.8	110	80	9	660.00	68.18	0.61
2	15º	30º	0º	850	500	125	125	125	284.2	130	59.7	8.9	771.33	64.82	0.58
3	30º	30º	0º	800	450	112.5	112.5	112.5	270.6	120	64.8	9.5	760.00	59.21	0.56

Table 4:19 Data and analysis with the effects of shearing angle to the GPS and EPS on a palm empty fruit bunches with stalks angle of the blade 35^0

No	SA	ANE	ANO	F (N)	L (mm)	S1 (mm)	S2 (mm)	S3 (mm)	W1 (mm)	W2 (mm)	W3 (mm)	d (mm)	A (mm^2)	GPS (N/cm^2)	EPS (Nm/cm^2)
1	0º	35º	0º	1050	500	100	100	100	300.6	180.3	98	10	653.33	76.53	0.77
2	15º	35º	0º	900	450	100	100	100	310.4	186.2	118	9	708.00	63.56	0.57
3	30º	35º	0º	850	400	112.5	112.5	112.5	380.3	156.9	99	9	594.00	67.34	0.61

Table 4:20 Data and analysis of the results of research on the impact angle of shearing on GPS and EPS spikelet empty fruit bunches of oil palm with the angle of the blade 25^0

No	SA	ANO	ANE	F (N)	l (mm)	s1 (mm)	S2 (mm)	s3 (mm)	w1 (mm)	w2 (mm)	w3 (mm)	D (mm)	A (mm2)	GPS (N / cm^2)	EPS (Nm/cm^2)
1	0^0	0^0	25^0	200	110	70	35	5	76,36	38,18	5,45	5,00	254,5	98,571	0,39
2	15^0	0^0	25^0	350	135	95	60	30	98,52	62,22	31,11	6,00	394,1	88,816	0,53
3	30^0	0^0	25^0	400	125	85	50	20	102,00	60,00	24,00	6,00	408,0	78,039	0,58

Table 4:21 Data and analysis with the effects of shearing angle to GPS and EPS spikelet empty fruit bunches of oil palm with the angle of the blade 30^0

No	SA	ANE	ANO	F (N)	L (mm)	S1 (mm)	S2 (mm)	S3 (mm)	W1 (mm)	W2 (mm)	W3 (mm)	d (mm)	A (mm^2)	GPS (N/cm^2)	EPS (Nm/cm^2)
1	0º	30º	0º	300	300	75	75	75	65	14	5.6	7	303.33	98.90	0.69
2	15º	30º	0º	300	350	87.5	87.5	87.5	63	13.7	5.8	7.2	302.40	115.74	0.83
3	30º	30º	0º	350	350	87.5	87.5	87.5	60	14.5	6.2	7.4	296.00	118.24	0.88

Table 4:23 The effect of the angle shearing against cutting forces specific and energy cut specific fresh fruit bunches and bunches of empty oil

Sudut Pemotongan	Tangkai				Spikelet			
	TBS		TKS		TBS		TKS	
	EPS	GPS	EPS	GPS	EPS	GPS	EPS	GPS
Derajat	Nm/cm^2	N/cm^2	Nm/cm^2	N/cm^2	Nm/cm^2	N/cm^2	Nm/cm^2	N/cm^2
0			0.5199	64.987			0.929	78.571
15			0.4629	54.456			0.5329	88.816
30			0.491	54.557			0.5882	98.039
40	0.60	70			1.25	150		
50	0.75	90			1.55	160		
60	1.25	130			2.00	210		

70	1.40	140			1.95	200		
80	1.65	160			2.30	255		
90	1.60	165			2.10	260		

Based on research results , also can be taken a conclusion that both the specific cutting force and specific cutting energy required for cutting is not dependent on kecevatan pieces.

4. CONCLUSION

maximum cutting force at the cutting stalks of palm empty fruit bunches obtained amounted to 78.397 N / cm2 using the angle of the blade 350, it appears that the smallest cutting force to stem oil palm empty fruit bunches lies at an angle of 25o blade of 38.511 N / cm2, thus also affecting against specific cutting force and specific cutting energy will be small and large on both the angle of the blade, with a cutting width that is different, with far angle of the blade can save 40.8% cutting force. For cutting spikelet in the same way variations in angle of the blade obtained cutting force smallest angle of the blade 25o at 135 N / cm2, and the largest on the angle of 35o of 147.059 N / cm2, while the cutting force specific energy and cut specifically also influenced by both angle of the blade, with the far angle of the blade can save 12%. Stalk cutting forces palm empty fruit bunches can be reduced to 48% of the cutting forces spikelet. Differences in cutting force and specific cutting energy required to cut oil palm empty fruit bunches are smaller when compared to the force and energy required to cut spesifikyang cut fresh fruit bunches (FFB) by Hadi and Zohadie, 1996.

Technical performance improvement needs to be done before cutting palm empty fruit bunches, to make allowances between the blade pieces which have been attached to the rotary cylinder with the ground beef, so there is no energy losses cut and style of cut. On palm empty fruit bunches cutting clearances obtained 1-2 cm, using the formula us = cw   p, where (us) looseness, (c) the work factor of 0.01, (d) the thickness of the oil palm empty fruit bunches which will cut the average - average of 300 mm, (p) cut voltage of 0.5 N / mm2 .Kapasiatas machine for chopping palm empty fruit bunches of 4.124 kg / h, while the time efficiency of 62.3% using the slinder rotation speed of 570 rpm. From the analysis of the existing water content in the spikelet, stalk, empty fruit bunches of oil to test positions on the base (basal), middle (Equatorial), tip (apical), there is a similar relationship with spikelet, on a stalk empty fruit bunches of oil after testing for three samples, weight (8.2 kg), medium (2.5 kg), lightweight (1.0 kg) more and more dry Valentine otherwise getting to the base of getting wet. From the analysis of the cost of goods for the enumeration of palm empty fruit bunches obtained by calculating working time, 24 days / month, 288 days / year, the cost of enumeration 2,165 USD / kg.

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DESIGNING AND MANUFACTURE OF RADIUS PAJI HAIRERS (PAHAT RADIUS POST) ON LATHE MACHINE FOR LABORATORY AND MODULES TEACH

Saiful Anwar[1], Rindi Genesa Hatika[2], B.Herawan Hayadi[3]

[1] Mechanical Engineering University of Pasir Pengaraian, Indonesia
[2] Teacher Faculty and physics education University of Pasir Pengaraian, Indonesia
[3] Department of Computer, Faculty of Computer, Universitas Pasir Pengarian

e-mail: [1,2,3] {saifula160,rindigenesa, b.herawan.hayadi}@gmail.com

Abstract: Along b ertambahnya ahuan penget science and discovery, in pe mesinan requires experts to create or improve machining equipment. One of them is the machining lathe (Lathe Machine), p embubutan radius on a*lathe machine* with conventional drawbacks, namely: *Contour* generated less accurate, Size *cutter radius* has its limitations, s ach turn of the size of the radius of the turner takes an average of 10 (ten) minutes, when the turning radius of the inside, the grinding chisel is quite complicated, the determination of *the start* and *end point* radius is quite complicated. This study will design and make a chisel clamp radius with *radius tool* design and create *a post* using *Autodesk software Pro-Engineering,* and after the study to draft teaching module, as material for teaching.

The research method that I use the first variant is the location of the study, a variant of the two is made three (3) *alternative design tool radius post* and the selection of the best design, variants of all three is the manufacture and testing tools, and the latter method is the analysis of the test data. Testing method is the ability to produce *surface roughnes* tool radius and the ability to produce a large *radius.* The results of the analysis will be compared with *countour radius* produced by the old system.

After getting the results of the analysis men *radius* design *tool post* the best ones will be designed and made, and Nex tnya tool for laboratories. This tool is also capable of producing large size radius of up to R100, accuracy (Rmax) tools can be reached less than 100 microns with the time required when *setting* pergant ian radius size is only 5 0 seconds.

keywords *:   L athe machine, tool radius post, Autodesk Inventor*

1. PRELIMINARY

The lathe process is a machining process to produce cylindrical machined parts employed by a lathe, the working principle can be defined as the process of the outer surface machining of a cylindrical object or a flat slurry. The lathe process can be done with lathe such as: flat spinning, drilling, edge workmanship, thrusting, tapered, thinning, extending the hole, and so forth. The problem in this research process is as follows:

a. The process of turning mainly on turning *champer* (tapered), often replacing *tools* on *toolpost,*
b. Less than average because of the need in the *center* again with the *drill,* center, and also it will lead to waste of time and is inefficient.
c. Little tangent about the *tools* the desired *post.*

Figure 1. *Toolpost* manufacture research plan.

Based on the description above problems, so we need research to make *toolpost* that effisen and cheap either from the time of installation and price. In the design will be directed to meet the design and manufacture of the main functions as a clamp and steering chisel cut *(radius tool post)* to cut or remove *(removal)* of the workpiece material in the turning radius with no need to replace the chisel.

2. LITERATURE REVIEW

The carving clip is a chisel house mounted on a slicer on a lathe. Chisel clamp serves as a lathe chisel clamp so that the lathe chisel position remains strong and the *center* of the axis of the workpiece. At the time of lathe, chisel lathe gets pressure cut very high, so chisel lathe get press load. Thus clamping chisel on *tool post* should be clamped firmly and as short as possible. The ideal size of the chisel discharge its *holder* is 2 times thicker chisel used. Installation chisel lathe on the *tool post* must be good and correct so that the results of good and precision lathing, because if there is an error in the installation of chisel lathe then the result,

1. Lathe chisel will quickly wear out.
2. Lathe chisel will be quickly broken.

3. Results turning the workpiece will look very rough.
4. Danger to the operator.
5. Based on the function and form, Tweezers chisel *(tool post)* on any kinds lathe.

2.1 Draft Concept

In the book *"The Mechanical Design Process 2nd ed"* by David G. Ullman in 1997 a concept is an idea that can be easily developed to evaluate the laws of physics and other natural laws that govern the natural behavior of an object. By setting the appropriate product function properly and with a rational consideration of future development, the idea will achieve success as desired targets. The concept also had to be repaired sufficiently to adapt technologies that will be needed, to adjust the shape and to anticipate some limitations, as well as to evaluate its production capability.

Concepts can be represented in rough sketches or flow charts, a set of calculations, or text notes an abstraction that may one day be a product. However, a concept is represented as a key point that is very important to develop the performance of the model so that the function of the idea can manifest (the book *"The Mechanical Design Process 2nd ed"* by David G. Ullman 1997).

2.2 The basic theory of machining.

Connection nuts bolts (Bolt) is widely used in a variety of engine components. Bolt nut connection is not a permanent connection, it can be assembled easily. Some keuntunga n use bolt nut connection:

1. Have a high ability in receiving the load.
2. Ease of installation.
3. Can be used for a variety of operating conditions.
4. Created in standardization.
5. High efficiency in the manufacturing process.

2.3 Basic Theory Machining

Directions n is the direction of the main movement in the form of lathe rotary motion generated by the workpiece gripped by the spindle lathes. Directions vf is the direction of the speed of movement of the workpiece feeds chisel. a is the depth of cut *(depth of cut),* r is cut angle primary *(major cutting edge angle),* $d0$ is the initial diameter of the workpiece, dm is the

diameter of the end after cutting, *f* is the movement feeds*(feed)*, *h* is the thickness growled before truncated *(undeformed chip thickness)*, *hc* is the thickness furious after truncated, *b* is the width of the cutting and *0* is the rake angle.

2.4 Basic Element Theory of Machines

1. The connection bolts and nuts

Connection nuts bolts (Bolt) is widely used in a variety of engine

components. Bolt nut connection is not a permanent connection, it can be assembled

easily. Some advantages of

using bolt nut connection:

a. Have a high ability in receiving the load.
b. Ease of installation
c. Can be used for various operating conditions
d. Created in standardization.
e. High efficiency in the manufacturing process.

2. The types of bolts used as follows:
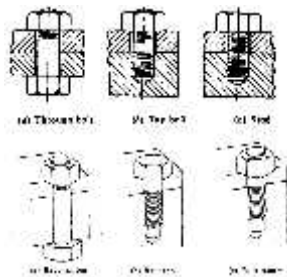
Figure 2. 1 Types of bolts

2.5 Theory of Basic Materials Engineering

1. Steel Classification

The classification of general steel and an explanation according to the *"Handbook of Comparative World Steel Standards"* (ASTM DS67B) are as follows:

a. Carbon Steel *(Carbon Steel)*

The use of carbon steel is widely used in everyday life for the common good. The standards used in carbon steel and alloys are:

1. JIS G 4051: 1979 *(Carbon Steels for Machine Structural Use)*.

2. ASTM A 108-03 *(Steel Bars, Carbon and Alloy, Cold-Finished)*.
3. JIS G 4051:1979 *(Carbon Steels for Machine Structural Use)*.
4. ASTM A 108-03 *(Steel Bars, Carbon and Alloy, Cold-Finished)*.

The division of carbon steel is as follows:

1. *Low Carbon Steel (<0.2% Carbon)* is a *low carbon* steel typically used for automobile body panels, tin plate, and wire products that require high ductility.
2. *Medium Carbon Steel (0.2 - 0.5% Carbon)* is a *medium carbon* steels are usually used in the quench and tempered condition results and are widely used as shafts, axles, gear, crankshaft, coupling, and forgings.
3. *High Carbon Steel (> 0.5% Carbon)* is a *high carbon* steel is widely used in spring and *high-strength* material *wire.* In addition to the division based on the percent carbon content above, there are carbon steel with a high manganese content *(Manganese High Carbon Steel),* which is about 1.1-1.4% Mn. This type of steel is widely used in railroad applications.

b. Alloy Steel *(Alloy Steel)*

1. *High Alloy Steel (> 8% alloying Element)* is the use of high-alloy steels typically aims to improve the properties of steel, namely: *Corrosion Resistant (Austenitic and Duplex), Heat Resistant (Austenitic), Wear Resistant (Manganese Steel).*
2. *Low Alloy Steel (<8% alloying Element)* is one example of this type are known steel is HSLA *(High Strength Low Alloy)* that uses a blend of Nb, V, Ti, and Al.

c. Stainless Steel *(Stainless Steel)*

Stainless steel is widely used in industry in the section, *chemical processing, oil* and *gas exploration and processing equipment, Marine and high chloride environments.* One example of the composition of the standardtype of *Duplex stainless steel:* ASTM A240, ASME SA-240 and SAE J405.

2.6 Basic Theory Welding Metal

Based on the definition of *Deutch Industrie Normen* (DIN), welding is a metallurgical bond in connection atu metal alloy melted and held in a liquid state.

In the manufacture of a product required the calculation of a weld strength structure (on products found the existence of welded joints). It should be taken into account to determine if the product is safe to use.

In this case I will explain in general about Arc Welding Gas. Gas Arc Welding is a welding method in which gas is blown into the welding area to protect the arc and melting metals to the atmosphere. Which is used as a protective gas is *helium* gas *(He), argon* gas *(Ag),* carbon dioxide gas (CO_2) or a mixture of these gases.

3. PURPOSE AND BENEFITS P ENELITIAN
3.1 Research Objectives

The purpose of this research is as follows:
1. To produce the draft chisel clamping radius *(radius tool post).*
2. *Toolpost* produce products that can facilitate the work.
3. *Radius tool post* can be used on conventional lathes with accuracy and maximum deviation (Rmax) of less than 0, 1 mm or 100 microns.

3.2. Benefits of research

The purpose of this research is as follows:
1. Produce from the draft chisel clamping radius *(radius tool post).*
2. To facilitate the work of *toolpost* have been made.
3. Can determine the radius *of tool post on* conventional lathes, with accuracy and maximum deviation (Rmax) of less than 0, 1 mm or 100 microns.

4. FUNCTION STRUCTURE

Design research locations *Toolpost* In Effort To Simplify progress in turning radius, a result often replace *Toolpost. Voice of the customer* (VoC) is done in the informal sector which is located in Pasir Pengaraian while rancang- wake conducted at the Laboratory of

Mechanical Engineering University of Sand Pengaraian, with the stages of the process flow as follows:
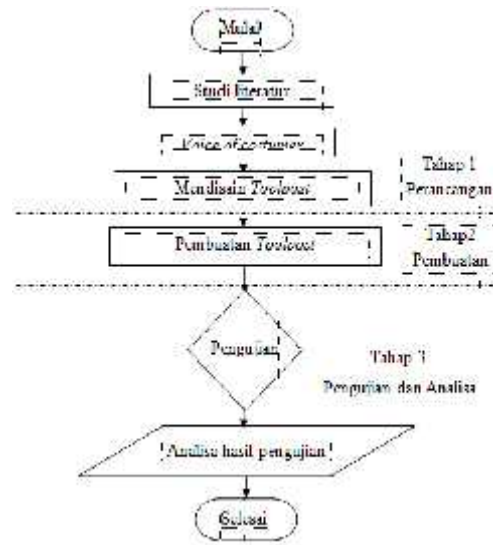
Figure 4. Scheme of research methods

4.1 Designing

The design phase begins the study of literature for literature that can support this research, followed by the *Voice of the customer* and Design *toolpost.* the method of Karl T Ulrich, Steven D. Eppinger

4.2 Manufacture and Assembly

Radius tool post consists of several main components, namely: *tool post lower, upper post tool and toolholder.*

1. *Post Lower Tool*
   Tool post lower raw material is made *of* ductile iron first size 90 X 40 mm-crafted stages of the process *of cutting,* lathe, drill, and mengetap.
   a. Process lathe
   Material gripped in *chuck,* then ends in *facing.* then made its *center* hole using a *drill, center* off the material further and issued over 120 mm. Average material then turner and its *contour* formed in accordance with the *drawing.* After the completion of the first side turner, the workpiece is reversed and proceed with the execution lathe in a *snap ring placement.*

Figure 4. 1 Processing Process

b. The process of drilling and *tapping*

Once the geometry of the workpiece has been formed followed by the manufacture of fastener holes and screw as *a post lower tool* against the bolt contained in the machine *bed.*

Figure 4. 2 The process of drilling and *tapping*

2. *Post Upper Tool*

Tool post Upper made of ductile iron *raw material* size 100 X 70 mm, treated with the stages of the process, *cutting,* lathe, planner *drill,* and *tap.*

a. Process lathe

At the turning process, this component is done with the stage of turning flat, *facing,* and turning to part *snap ring grooves.*

Figure 4. 3 Processing Process

a. Scrap process

In sekrap process aims to create a groove as a clamping *toolholder* and flatten the sides in order to facilitate the gripping moment *toolholder.*

Figure 4. 4 process menyekrap

3. *Tool holder*

Tool holder made of ductile iron *raw material* size of 84 X 24 mm done by scraping process by flattening to the four sides of the side including making the groove where sculpture cutting. After the second *part* has been shaped *toolholder* next box are both connected.

Assembling Process

Here is the assembly process:

1. Attach the *lower* to the *upper tool post tool post,* Using Kuci-L on the bolts L.

Figure 4. 5 Installing *toolpost lower* to the *upper tool*

2. P Asang *toolholder* on the *upper tool post* and lock,

Figure 4.6 Instal *toolholder* on the *upper tool post*

1. P Asang chisel at an altitude *toolholder* with regard to the *center,* tighten the bolts chisel, m ulai lathe radius.

Figure 4. 7 P Asang chisel on the *toolholder*

Figure 4. 8 K encangkan bolt chisel.

Figure 4. 9 M embubut radius.

4.3 Testing And Analysis

Radius *toolpost* that have been made must be tested to prove that the equipment is functioning properly. When your test perfomansi of *radius toolpost* not good then made further improvements to the design and manufacture of repairs done. If the test is considered well within the radius *toolpost* draft has been completed.

5. THE RESULTS ACHIEVED

The results that have been achieved on the initial activities of this research based on the methodology that has been used are as follows:

1. Study of literature on clasp of radius
2. The final design of the clasp of the radius
3. Purchase-component component part of the chisel clamp radius.
4. Design and manufacture of clasp radius clip
5. Pengucian system on the *tool post lower* and *upper tool post.*
6. The early reports, progress reports and the final report of the implementation of the research
7. Job design and manufacture of chisel clamp radius.

6. CONCLUSION

From the results of the design and manufacture of the tool *radius of the tool post* that has been described, it can be concluded as follows:

1. Design variant 1 best variant compared to variant 2 and 3.
2. K eakurasian m average surface encapai 0:03 mm or 30 microns are used to an estab conventional lathe to work like a *pulley* radius-shaped *surface, roll* the pipe, wheel gate an d others.
3. The maximum deviation (Rmax) the tool generates is 0.06 mm or 60 microns
4. *Radius tool post* capable of making a large radius of up to the size of the R 100.
5. The time required at the time of *setting* the turn radius size is 5 0 seconds.
6. At the time of cutting *mild steel* material with material *HSS* cutting *tools, radius tool post* is still stable with thick cuts of 1 mm, so that in accordance with the desired design.

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MATERIAL SELECTION ANALYSIS AND MAGNET SKEWING TO REDUCE COGGING TORQUE IN PERMANENT MAGNET GENERATOR

Sepannur Bandri[1], M. Aldi Tio[2]

[1,2]Department of Electrical Engineering, Padang Institute of Technology
Jl. Gajah MadaKandisNanggalo Padang, West Sumatra, Indonesia

ABSTRACT: Cogging Torque is a pounding (torque opposite the direction of rotator generator) when rotating the rotor that causes the rotor is difficult to rotate by hand and can interfere with the rotation of the generator at the start, causing vibrations and disturbing sounds. Cogging is a characteristic attached to a permanent magnet generator (GMP) caused by the geometry of the generator. Cogging torque may affect start ability, generate noise and mechanical vibrations when GMP is installed in wind turbines. Therefore cogging GMP should be made as small as possible (coggingless), one way is to tilt (Skewing) permanent magnet. Simulation using magnet software to know the magnitude of the cogging torque caused by the rotation of the rotor on the generator. The cogging torque simulation results are further validated by the starting torque on the GMP testing method using material changes and magnetic skewing. The best magnetic slope is achieved when the magnetic slope is 7.5 °, because in this position also the highest cogging torque (9.951905191 x 10^{-5} Nm) is found in model 3 material A skewing magnet (7.5°) with Cr-10 core material and NdFeb magnetic magnet, while the lowest cogging value (1.17512009 x 10^{-5}Nm) is found in model 3 material A magnetic skewing (7.5°) with core material M250-35A and permanent magnet NdFeb.

Keywords: Generator, Cogging, Skewing, Torque

1. INTRODUCTION

Development and research continues to be done in the field of entrepreneurship to get new alternative energy sources that are healthy, environmentally friendly, efficient and cheap. This problem also affects the need of electric energy in Indonesia which is increasingly increasing day. For that required alternative energy as a producer of electrical energy. One of them is the utilization of wind energy. This energy must be balanced with the generating technology of a generator.

The development of generator technology is dependent on the material that has high efficiency generated by existing generators. Therefore the motor / generator used must meet the standards and have a small torque even as small as small. The existence of software to design the generator to help the researchers in designing and designing so that when making the process of generator has a high success rate and able to know the cost used in 1 time the generator, but many researchers previously conducted research and generator manufacture using try and error method in other words directly make the generator which is designed manually and using mathematical calculation manually.

Cogging is a tug (a torque opposite the rotary direction of the generator) when rotating the rotor causing the rotor is difficult to rotate by hand and can reduce the efficiency of the generator, causing vibrations and disturbing sounds. Cogging is a characteristic attached to a permanent magnet generator (GMP) caused by the geometry of the generator. Cogging torque may affect start ability, generate noise and mechanical vibrations when GMP is installed in wind turbines. Therefore cogging GMP should be made as small as possible (coggingless), one way is to tilt the permanent magnet. Simulation using energy variation method to know the magnitude of cogging torque caused by magnetic rotation. The cogging torque simulation results are further validated by the starting torque on the GMP testing method using the torque arm. The best magnetic slope is achieved when the pole width is 21 mm or the inclination angle is 3.88 ° (58% of the flow range) because in this position the cogging torque and the smallest starting torque are generated.

With these problems came the idea to analyze cogging, designing and designing a generator with the help of magnetic infolityca software. Software used specifically for analyzing, designing and designing generators and motors, but this software still has weaknesses in its devices so that for the design of complex forms must use other software to perform designing such as solidwork, autodesk and autocad. The existence of this research is expected later when there is doing the making, designing and research generator and motor do simulation first so that expected result fulfilled.

2. METODOLOGY

2.1 Place and Time of Research

The author applied the previous problem when the practice at the research site and the development of renewable energy in LenteraAngin Nusantara (LAN), Ciheras, Kab.Tasikmalaya, West Java and the data obtained continued in the laboratory ITP padang, processing using magnet software and other supporting software on personal computer (PC) Asus with Intel processor spek (R), Pentium (R), Cpu 2177U, 1.80Ghz, Ram 2 GB, 64bit, windows 7 ultimate, service pack 1.

2.2 Method of Calculation

The calculation and analysis of generator design based on the basic law of generator design, where the aid of magnet software and other calculation software can facilitate the calculation. The numerical method used refers to the equation of energy stored in the air gap, where the cogging torque (Tcog) is a derivative of the amount of energy stored in the air gap W to the angle of the rotor rotation ( ) at the velocity   t. The cogging torque is analyzed on three skewing positions (magnet), ie: straight, maximum (slope of a range of grooves) and between the two positions to obtain the most optimum magnetic position at what position will be. Material selection in the design of the generator is also required by combining 2 pieces of core material M250-35A and Cr-10 and its magnetic material Ndfeb and Smco.

2.3 Prototipe Design

GMP specifications are 100 W, 220 / 380V, 10000 rpm, NdFeB magnetic type with pole number p = 18. Magnetic skewing and configuration method of combination of 2 core materials and permanent magnet. The magnetic slope (skewing) is determined in 3 positions 0º, 15º and 7.5º. One generator is formed by 3 magnetic laying shapes whose position can be shifted to obtain the optimum slope of the image (3). The main parameters used for cogging torque analysis are obtained from the prototype design specifications. The 3D design model of the GMP rotor is shown in FIG. 4 with a dimension of one magnet, length x width x thick.

Desain	Ukuran Dimensi
Di(diameter luar magnet)	65 mm
Da(diameter dalam magnet)	60 mm
Da (diameter luar rotor)	65 mm
Db (diameter luar stator)	120 mm
Dc (diameter dalam stator)	66.5 mm
De (diameter dalam lubang slot)	110 mm
Lm (tebal magnet)	7.5 mm
Lh (panjang magnet)	20 mm
La (tebal core)	40 mm
ög (air gap)	$\frac{1,5}{4} = 0.375\ mm$
P (jumlah magnet)	8 Pole
Qs (jumlah slot)	12 slot
Qc (jumlah coil)	24 turn
Ltg (jarak antara slot)	2 mm
Lt (tinggi teath)	0.5 mm
Lw (panjang teath)	20 mm

Table 4.1 Generator Dimension

3. RESULT AND DISCUSSION

3.1 Result

In this paper, the following magnetic skewing position is determined as the angle between the midpoint of the magnet and the midpoint of the stator gear in a single pole, as shown in Fig. 1,
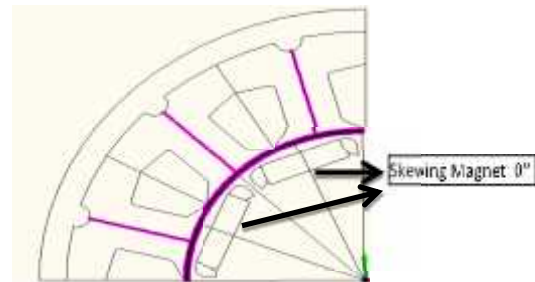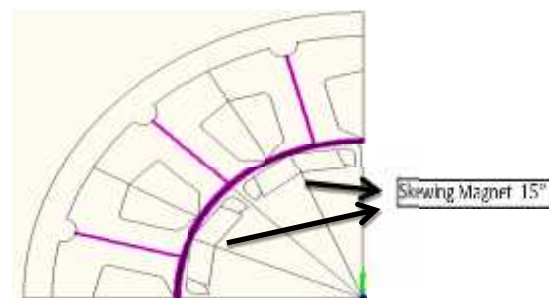

Figure 1. Magnet skewing 0^0

Figure 2. Magnetskewing 15º
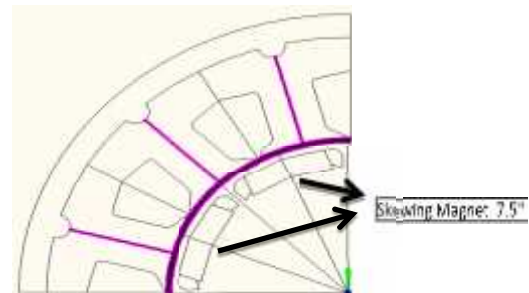
Figure 3. Magnet skewing 7.5º

The analysis is limited to the distribution of the magnetic field in the air gap in 1D (one

dimension) ie the direction of radial magnetization to the generator shaft. When stationary, position one mid-magnet against the mid-tooth of the stator in one pole. The magnet used is considered to have the same dimensions and characteristics, and its relative permeability is equal to that of air.

The result of simulation and analysis of this calculation to find out how big the cogging torque on generator design and the effect that will be generated to achieve the reduction of cogging value and the desired generator efficiency.

The test / simulation result of 100 watt generator design using infolytica magnet software with generator design specification as shown in chapter 2 obtained the results include:

3.2 Energy

The energy in the simulated generator 3 model 3 material is the energy stored or owned by each material from the core, in other words the generator before use has the energy stored in it for:

Tabel 2. Result of Energy and Co-energy

No	Parameter	Energy	Co-Energy	Satuan
1	Model 1 Material A	-9.87	9.87	Joule
2	Model 1 Material B	-7.34	7.34	Joule
3	Model 1 Material C	-9.87	9.87	Joule
4	Model 2 Material A	-9.79	9.79	Joule
5	Model 2 Material B	-7.28	7.28	Joule
6	Model 2 Material C	-9.78	9.78	Joule
7	Model 3 Material A	-9.95	9.95	Joule
8	Model 3 Material B	-7.4	7.4	Joule
9	Model 3 Material C	-9.94	9.94	Joule

The energy in the simulation result of the generator is the energy stored or owned by each material from the nucleus, in other words the generator before use has the energy stored in it, the greatest energy is in the third model that is magnetic skewing (7.5°) with M250- 35A and permanent magnetic Ndfeb of -9.95 joule energy and 9.95 joule co-energy. As for the lowest energy is the second model of magnetic skewing (15°) with core material M250-35A and permanent magnet SmCo of -7.28 joules of energy and 7.27 joule co-energy.

3.3 Result: 3 Generator Model with 3 Different Material

3.1.1 Generator model with no skewing

In this model the generator corresponds to the initial shape and specification without any skewing, but the research is done by changing the shape of core material and permanent magnet following material:

A. Corepart : M250-35A, permanent Magnet (PM) : Ndfeb
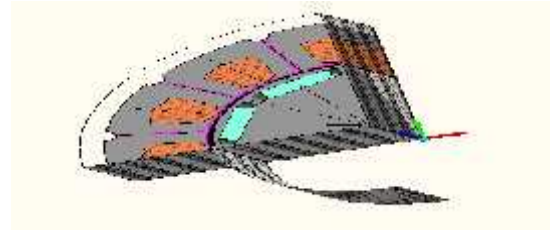
Figure 4. Model ¼ of core material generator : M250-35A, permanen Magnet (PM): Ndfebskewing 0^0

B. Core part: M250-35A, permanent Magnet (PM) : Samarium Cobalt
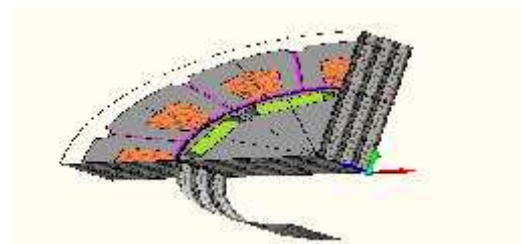
Figure 5. Model ¼ part of Core material generator : M250 - 35A, permanen Magnet (PM) : samarium cobalt kemiringan 0 derajat

C. Core part: CR10, permanen Magnet (PM) : Ndfeb
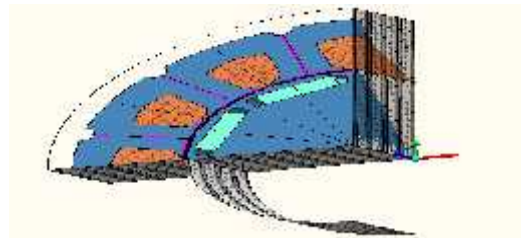
Gambar 6. Model ¼ bagian generator material Core : CR-10, permanen Magnet (PM) : NdFeb kemiringan 0 derajat

3.1.2 Generator model of 15º skewing

In this model the generator changed its magnetic position in skewing 15 degrees upward, but the research also changed the shape of magnetic material and core materials and materials:
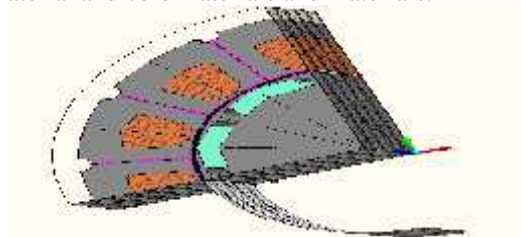
A. Core part : M250-35A, permanenMagnet (PM) : Ndfeb

Figure 7. Model ¼ bagian generator material Core : 250M-35A, permanen Magnet (PM) : NdFeb skewing 15 derajat

B. Bagian Core : M250-35A, permanen Magnet (PM) : Samarium Cobalt
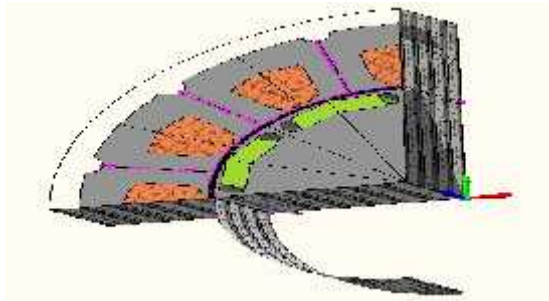
Figure 8. Model ¼ Core material generator part : M250-35A, permanen Magnet (PM) : samarium cobalt skewing 15 derajat

C. Core : CR10, permanen Magnet (PM) : Ndfeb
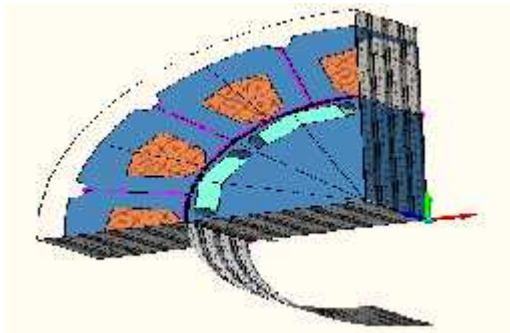
Gambar 9. ¼ Part Model of generatormaterial core: CR-10, permanen Magnet (PM) : NdFeb15^0 magnet skewing

3.1.3 Model Skewing Magnet Generator 7.5 derajat

In this model the generator changed its magnetic position in skewing 7.5 degrees upward, but the research also changed the shape of magnetic material and core materials:

A. Core part : M250-35A, permanen Magnet (PM) : Ndfeb
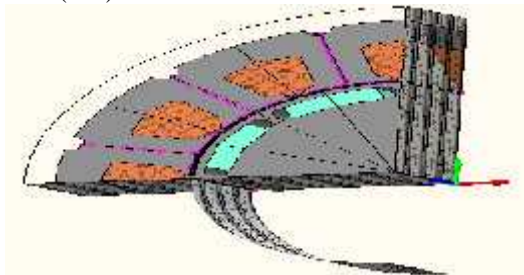
Figure 8. Model ¼ part Core material generator : CR-10, permanen Magnet (PM) : NdFeb skewing magnet 15 derajat

B. Bagian Core : M250-35A, permanen Magnet (PM) : Samarium Cobalt
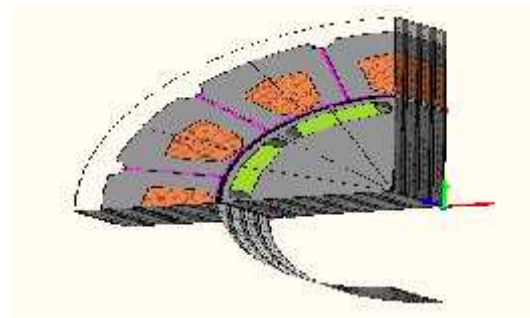
Figure 11. Model ¼ bagian generator material Core : CR-10, permanen Magnet (PM) : NdFeb skewing magnet 15 derajat

C. Core : CR10, permanen Magnet (PM) : Ndfeb
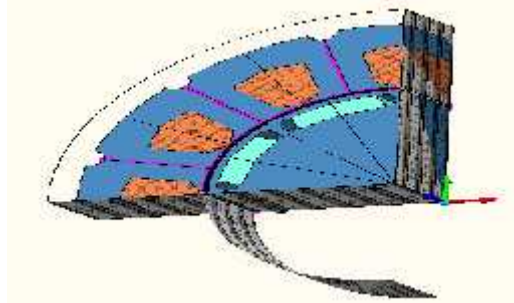
Figure 12. Model ¼ bagian generator material Core : CR-10, permanen Magnet (PM) : NdFeb skewing magnet 7.5 derajat

By using equations. In this design to find 1 peak and 1 valley cogging 12 slot / 8 pole is valid for all models 1 - 3 which has 12 slots and 8 poles because it got the formula to calculate 1 wave full of cogging

$$\theta_m = \frac{360}{12} = 30\ d$$

$$\theta = \frac{30}{8} = 3.75\ d \qquad (ha\quad w\quad)$$

$$\theta_{1w} = 3.75 \times 2 =$$

$$7.5\ d \qquad (f\quad w\quad)$$

coggingequatio :

$$T = -\frac{1}{2}\phi\frac{2}{g}\frac{t}{d}$$

3.4 Models of Generator
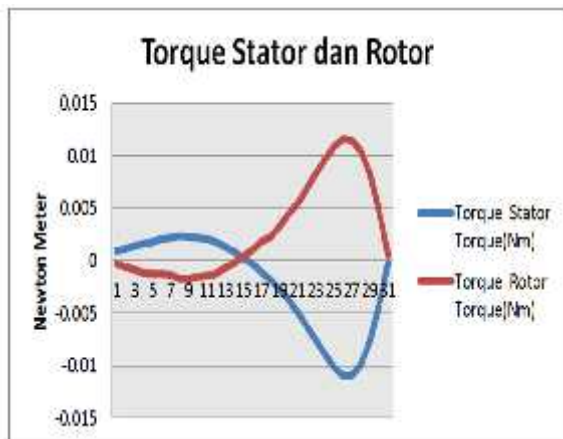
Figure 13. Grafik torsi yang dihasilkandihasilkan generator ¼ bagian material Core : M250-35A, permanen Magnet (PM) : Ndfebkemiringan 0 derajat

Figure 14. Permanen Magnet (PM) : Ndfebskewing 15°
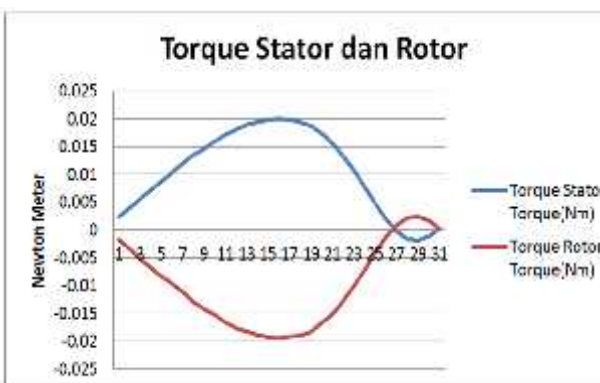
Figure 15. Core : CR-10, permanen Magnet (PM) : Ndfebkemiringan 0 derajat
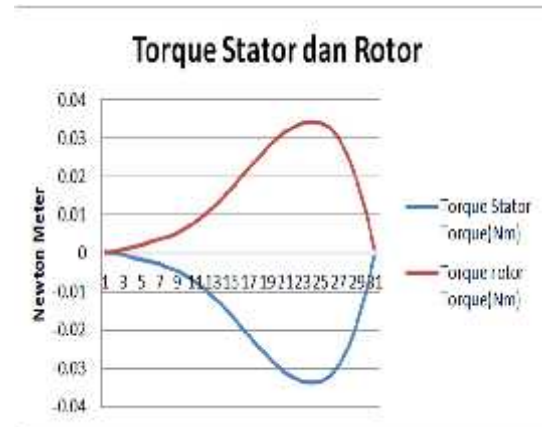
Figure 16. Core: M250-35A, permanen Magnet (PM) Ndfeb Skewing 15 derajat
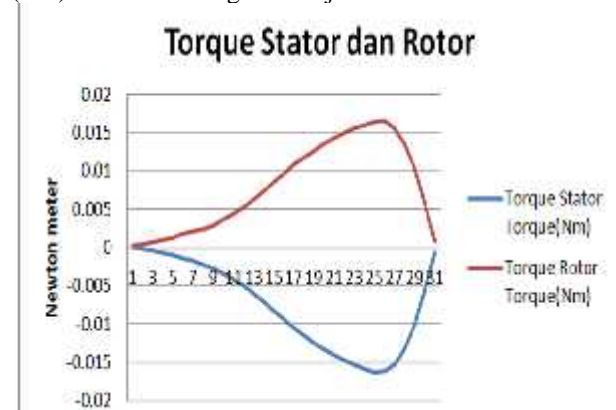
Figure 17. smartium cobalt Skewing 15°
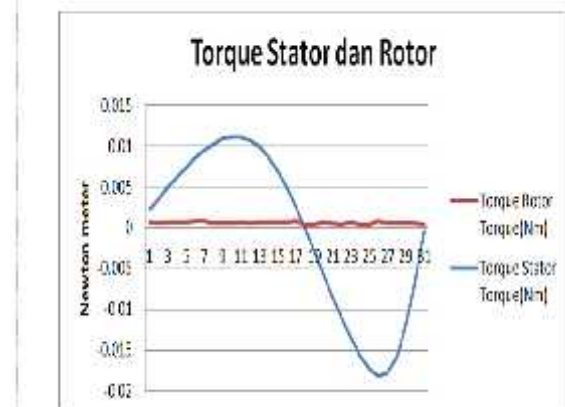
Figure 18. Core: 250M-35A, permanen Magnet (PM) smartium cobalt Skewing 15 derajat
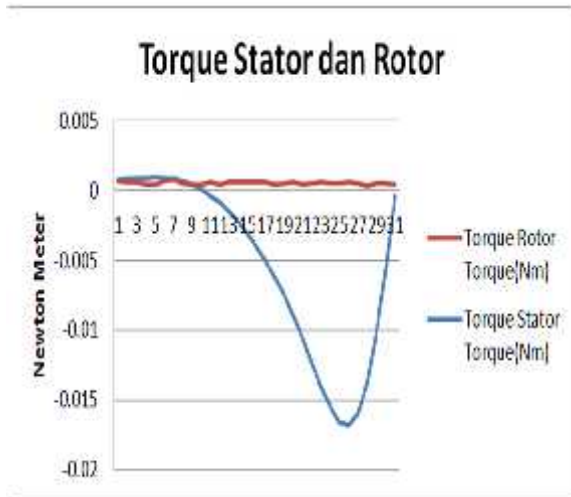
Figure 19. Core : 250M-35A, permanen Magnet (PM) : Ndfeb Skewing 7.5 derajat
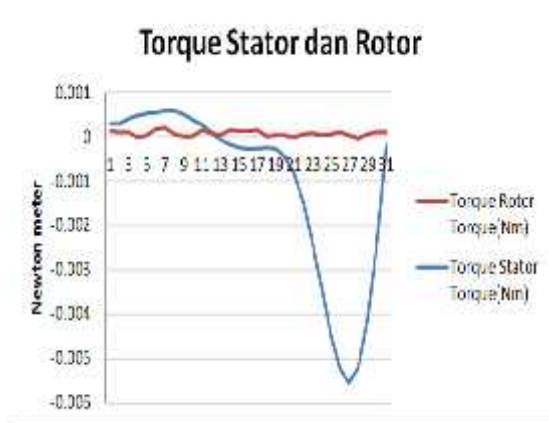
Figure 20. Core : M250-35A, permanen Magnet (PM) :samarium cobalt Skewing 7.5 derajat
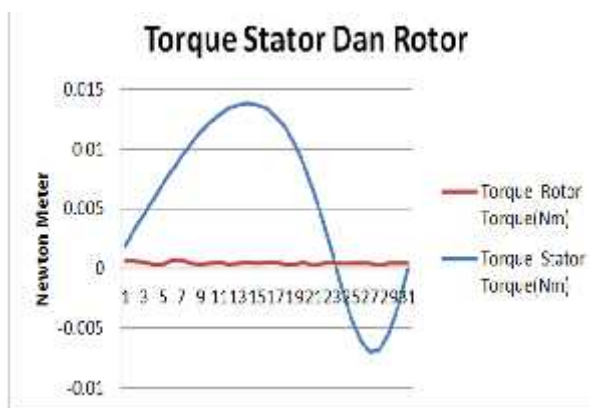
Figure 21. Core : CR-10, permanen Magnet (PM) :Ndfeb Skewing 7.5 derajat

3.5 Result of Cogging Torque

Table 3. Result ofCogging Torque

No	Parameter	Nilai	Satuan
1	Model 1 Material A	0.0005890413426	Newton meter
2	Model 1 Material B	-0.000159025706	Newton meter
3	Model 1 Material C	-0.0002049643614	Newton meter
4	Model 2 Material A	-0.000367627085	Newton meter
5	Model 2 Material B	0.0001402941656	Newton meter
6	Model 2 Material C	0.0002299853379	Newton meter
7	Model 3 Material A	−0.0003117512009	Newton meter
8	Model 3 Material B	0.0001734388814	Newton meter
9	Model 3 Material C	0.0009951905191	Newton meter

while the lowest cogging value is found in model 3 material A skewing magnet (7.5º) with material core M250-35A and permanent NdFeb magnets.

3.6 Result of Vdc Simulation Analysis of each Generator

Table 4. 32 Result of Generator Simulation

| No	Parameter	Nilai	Satuan
1	Model 1 Material A	6.358489976	Vdc
2	Model 1 Material B	5.287196159	Vdc
3	Model 1 Material C	6.797324034	Vdc
4	Model 2 Material A	7.436507027	Vdc
5	Model 2 Material B	5.755280063	Vdc
6	Model 2 Material C	7.056347779	Vdc
7	Model 3 Material A	6.585886672	Vdc
8	Model 3 Material B	4.930994666	Vdc
9	Model 3 Material C	6.35279019	Vdc

The result of the voltage between the coil obtained the highest voltage of each phase

Using the absolute value to get the value of its Vdc voltage degan the angle of 0.24 - 7.44. Then the highest value of vdc is found in the model 2 material1 is 7.436507027 vdc and the lowest value found in model 3 material 2 is 4.930994666 vdc.

3.7 ResultOf Rotor Speed (Rpm)

Because Cogging Torque does not take time to calculate the speed of play then the formula to find the rpm depends on many slots and poles on the generator because the generator models 1 to 3 have the same model then for frequency and speed of rotation (rpm) is also the same ie. Using the equation (2.61 to 2.65)..

$$\theta_m = \frac{360}{24} = 15\, d \qquad (m \qquad)$$

$$\theta_E = \frac{8}{2}\, x\, 15 = 60\, d \quad a \qquad (e \qquad)$$

$$l_R = \frac{15}{90} = 0,16667 \; s$$

In this design the rotor is rotated every 3^0 with a time of 0.16667 ms = 0.00016667 s So to rotate by $⟦360⟧^0$ takes 60ms = 0.006

$$F = \frac{1}{0,06} = 16,6667 \; H$$

$ω = 2 \; x \; 3,14 \; x \; 16,6667 = 104,6667$ rad/s atau 1000 rpm

4. CONCLUSION

4.1 Conclucion

After doing the designing and modeling system then perform testing and analysis, it can be taken some conclusions as follows:

How to reduce Cogging Torque with magnetic skewing is one way of reducing cogging torque with the magnitude of 15° and 7.5°, with M250-35A and CR-10 core materials while the Ndfeb and SmCo magnet material is permanent.

Based on the results of the analysis that the generators have different magnetic skewing and different materials have different cogging torque values. The best magnetic slope is achieved when the magnetic tilt is 7.5 °, because in this position the highest cogging torque is generated (9.951905191 x $⟦10⟧^{(-5)}$ Nm) found in model 3 material A skewing magnet (7.5°) with material core Cr-10 and permanent NdFeb magnets, while the lowest cogging value of is (1,17512009 x $⟦10⟧^{(-5)}$ Nm) is found in model 3 A magnetic skewing material (7.5 °) with core material M250-35A and permanent magnet NdFeb.

4.2 Suggestions

To get the design results and design of the appropriate generator and well should better understand the basic principles used by the generator as well as take into account everything such as magnetic slope material and generator dimensions are made. so get the appropriate diameter for the generator in the absence of a cogging torque or a coggingless call.

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COMPARISON OF DECISION TREE ALGORITHM METHOD (C4.5) AND NAIVE BAYES TO IDENTIFY STUDENT LEARNING RESULTS WITH COOPERATIVE LEARNING MODEL

Sri Restu Ningsih

STMIK Indonesia Padang

ABSTRACT: Learning process in Higher Education can affect student learning outcomes. One that affects student learning outcomes is the mtetode and learning model used by the lecturers in the delivery of materials in the classroom. Cooperative learning model is one of the learning models that can encourage students' ability to solve various problems encountered during learning and develop their potential optimally. To find out the results of student learning, especially on the ability of a student, it is necessary to process the results of learning by lecturers. By utilizing Data Mining technique we can use the method by comparing two methods namely Decision Tree (C4.5) and Naïve Bayes algorithm method in identifying student learning outcomes in the use of coopearative learning model. In this research we used the comparison of Decision Tree (C4.5) and Naïve Bayes algorithm method on student learning outcomes. The test was conducted on 50 students. Data were tested using RapidMiner on Algorithm C4.5 and using Naïve Bayes at a high degree of accuracy.

Keywords: cooperative learning, data mining, C4.5 algorithm, Naïve Bayes,

1.   INTRODUCTION

Data Mining is a technique widely used by organizations around the world to predict models with specific goals. Data Mining is used to extract and recognize useful information from a very large database. Use of Data Mining covers the business environment, education, pharmacy and so on (Sahay et al, 2016). By utilizing Data Mining techniques, we can use the method by comparing two methods namely Decision Tree (C4.5) and Na茂ve Bayes algorithm method in identifying student learning outcomes in Higher Education. Learning process in Higher Education can affect student learning outcomes. This depends on the learning model used by the lecturer.

In the world of education, cooperative learning has had a long history since ancient times, Lecturers have encouraged their students to work together on specific group tasks in discussions, debates, or additional lessons. According to some experts that cooperative learning is not only superior in helping students understand the concept of difficult, but very useful for growing critical thinking. Thus, cooperative learning is a broader concept that encompasses all types of group work including forms that are more led by Lecturers or directed by Lecturers (Navarro-Pablo and Gallardo-Saborido 2015).

Students' learning outcomes are strongly influenced by the learning process conducted between lecturers and students. Based on the writer's observation as a lecturer in the course of MPSI at the previous time, where in the learning system so far still use conventional system, that is by lecture method, lecturers explain the lecture material and the students listen to what is delivered by the lecturer. So with the learning system like this makes students less enthusiastic in following the learning process. This is seen when the lecturer asked the question, the student can not answer because the less understanding with the material of MPSI given by the lecturer in following the lecture. Decision tree is one of the most widely used algorithms in constructing decision trees (Decision Tree) that apply a set of rules in the form of large data sets divided into smaller record sets. This decision tree is built through a bunch of unclear order data and eventually forms a rule that can be expressed in some if-then pattern (Lin et al, 2015).

The Bayesian classification is a statistical classification and is based on the Bayes theorem that utilizes conditional probabilities to classify data into predefined classes. The Naïve Bayes classification can be seen as a descriptive and predictive type of algorithm. Probability is descriptive and then used to predict the membership of untrained classes (Fauzan Burdi et al, 2016).

The advantage of Bayesian classifiers is that it requires little training to classify data, easier to implement, quick to classify and more efficient (Rajeswari et al, 2017).

From the above problems, the authors are interested to conduct research with the title Comparison Method Algorithm Decision Tree (C4.5) and Naïve Bayes to Identify Students Learning Outcomes (Case Study In STMIK Indonesia Padang). Using this method is expected to get better method comparison results used in finding information about student learning outcomes.

2. METHODOLOGY

In the research methodology there is a working order to be followed. The order of this framework is a description of the steps that must be passed so that this research can run well. The framework used for this research is: 1). Define the problem, 2) analyze the problem, 3) determine the goal, 4) collect the data, 5) process the data 6) using the proposed method: (a) Decision Tree C4.5 algorithm , (b) Naive Bayes, 7) conducting experiments and testing methods, 8) evaluation of results and 9) conclusions.

In the evaluation phase of the results, after the implementation of each method using RapidMiner software, then know the results obtained by comparing the accuracy of Decision Tree algorithm (C4.5) and Naïve Bayes algorithm.

-. Accuracy

Accuracy is the degree of closeness between the predicted value and the actual value. The formula used in calculating the accuracy value as follows:

Accuracy=

$$\frac{Jumlah\ klasifikasi\ yang\ benar}{Total\ Keseluruhan\ Data\ di\ Uji}$$

………………………….....(1)

After getting the accuracy value of each method is Decision Tree (C4.5) and Naves Bayes algorithm then used to get the final result. The expected end result should be an evaluation by attributes:

using a tool in the form of software that is Rapid Miner software 5. As a tool in making comparisons of two algorithm algorithms namely Decision Tree Algorithm and Naive Bayes and display results can is used to draw conclusions.

3. ANALYSIS AND RESULT

This study will identify how student learning outcomes by using cooperative learning model during the learning process. The data used in this research is obtained from the students' values during the learning process in the course of Information System Project Management at STMIK Indonesia Padang.

3.1 Data Collection

To reach the final goal of this research has done the data collection of student learning outcomes during the learning process. In this section the data already collected will continue to group the data so as to facilitate the next analysis

3.2 Attribute Determination

The first stage done on the data of student learning outcomes and the needs of Data Mining is to determine the attributes that are only needed by selecting the data as a whole. Here's a picture of all the required

Table 1 : List of Entire Attributes

ATRIBUTE	ATRIBUTE VALUE	Type Data Class
Attitude	Active, Inactive	Binomial
Duty	Compplete, Non Complete	Binomial
Quiz	0,10,15,20,25,30,35,40,45,etc	Polynomial
Absence	Full Absence, Enough, Less	Polynomial
Exam	0,10,15,20,25,30,35,40,45,etc	Polynomial
Value	A,B,C,D,E	Polynomial

3.3 Data Processing With Decision Tree Algorithm C4.5

From the final data format to the final grade of students, it will be classified data C4.5 algorithm to form a decision tree (Decision Tree). To get the decision tree, we have to do the calculation in getting the gain value for each attribute. To select an attribute as a root, it is based on the highest gain value, so it takes entropy value to determine the highest gain.

Calculate the Entroy value of each attribute using the formula:

Entropy = log2 Pi

After doing the calculation entropy on each attribute, then got decision tree as follows:
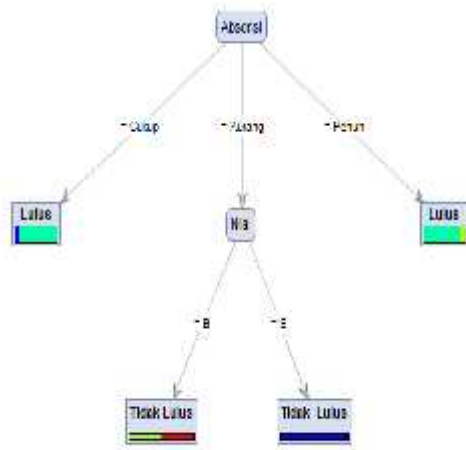
Picture 1 : Decision Tree

Evaluating the Rule of Decision Tree Results. The rules or rules formed by the last decision tree as shown in Figure 4.1 are as follows:

If Attendance = Enough then the student can be said Graduated

If Attendance = Less and Value = B then the student is Not Passed

If Attendance = Less and Value = E then the student is Not Passed.

If Absence = Full then the student can be said Graduated.

Table 2. Akurasi Decision Tree = 80%

Table 4. View of Naiva Bayes result

3.4 Data Processing With Naïve Bayes

In doing data classification using Naïve Bayes method to student data. The amount of data to be processed is 20. Attributes used there are 6 (six). In the calculation found that:

3.4.1 Probability Passed By Using Naïve Bayes Calculations

P (H = X) xP (H) / P (X) = (P (Attitude = Activity | Passed) x P (Task = Complete | Passed) x (P (Quiz = quiz> 79 | Passed) x P (Attendance = Full | Passed) x (P (Exam = test> 79 | Passed) x P (Value = B | Passed) / (P (X = Passed)= (0.833334 X 0.8125 X 0.12425 X 0.749999 X 0.600001 X 0.769231) /0.7 = **0.041602**

3.4.2 Probability Is Not Passed By Using Naïve Bayes Calculations

P (H = X) xP (H) / P (X) = (P (Attitude = Active | Not Passed) x P (Task = Complete | Not Passed) x (P (Quiz = quiz> 79 | Passed) x P (Absence = Full | Not Passed) x (P (Test = test> 79 | Not Passed) x P (Value = B | Not Passed) / (P (X = Not Passed)= (0.166667 X 0.1875 X 0.375 X 0.25 X 0.4 X 0.768923) /0.3 = **0.00300361**

Table 3. View of Naive Bayes relation
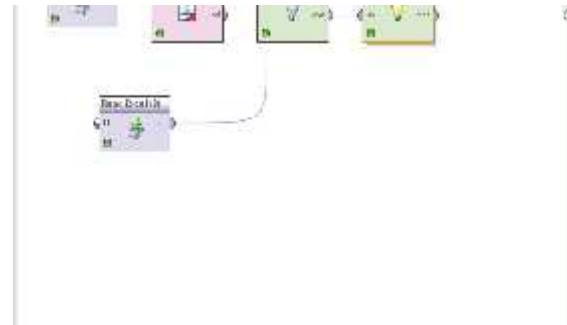
Table 5. :Akurasi Naïve Bayes = 75%

3.5 Comparison of Accuracy of Algorithm C4.5 and Naïve Bayes

After shown the result of prediction result of student learning result on Algorithm C4.5 and Naïve Bayes then do comparison of result of prediction of both method. Here comparison of algorithm C4.5 and Naïve Bayes seen in table 4.

Table 6: Comparison of C4.5 and Naïve Bayes Algorithms

Number	BP	Student Name	Studi Result	Decision Tree	Naïve Bayes
1	151400001	Roni Kurniawan	Not Pass	Not Pass	Not Pass
2	151400004	Desrial	Pass	Pass	Pass
3	151400005	Riri Suarman Pili	Pass	Pass	Pass
4	151400006	Keni Deska	Not Pass	Pass	Pass
5	151400007	Mista Kurnia	Pass	Pass	Pass
6	151400008	Hengky Ade Putra	Pass	Pass	Pass
7	151400009	Wiza Sukriyani	Pass	Pass	Pass
8	151400010	Budi Setiawan	Not Pass	Pass	Not Pass
9	151400011	Nur Anisa Rizki	Pass	Pass	Pass
10	151400012	Divi Aprillucia	Not Pass	Not Pass	Pass
11	151400013	Zelli Roza Angela	Pass	Pass	Pass
12	151400015	Bima Pratama Putra	Pass	Pass	Pass
13	151400016	Muhammad Irsyad	Pass	Pass	Pass
14	151400017	Okki Sulisman	Pass	Not Pass	Pass
15	151400018	Muhammad Syaerizal	Not Pass	Not Pass	Not Pass
16	151400019	Diana Can	Pass	Pass	Pass
17	151400020	Yavelma Ikhnadito	Pass	Pass	Pass
18	151400021	Dafri	Pass	Pass	Pass
19	151400022	Adrianto	Pass	Pass	Pass
20	151400023	Rafki	Not Pass	Not Pass	Not Pass

3.6 Pattern Evaluation

In table 4:16 can be seen comparison that there are some predictions that classification is not the same on the algorithm C4.5 and Naïve Bayes with blue marked. So to calculate the level of accuracy is as follows:

a.   Akurasi C4.5

$$Accuracy = \frac{Jumlah\,klasifikasi\,yang\,benar}{Total\,Keseluruhan\,Data\,di\,Uji}$$
$$= \frac{17}{20}$$
$$= 0,85 = 85\%$$

b.   Akurasi *Naïve Bayes*

$$Accuracy = \frac{Jumlah\,klasifikasi\,yang\,benar}{Total\,Keseluruhan\,Data\,di\,Uji}$$
$$= \frac{18}{20}$$
$$= 0,9 = 90\%$$

3.7 Knowledge Presentation

So, the calculation accuracy of Algorithm C4.5 with Naïve Bayes is 85% and 90% of which Naïve Bayes Algorithm has a higher accuracy value of 90% with the same classification 18 while for Decision tree has an accuracy value of 85% with the same number of classifications 17 data.

4. CONCLUSION

The decision result obtained "Passed" and "No Graduated from comparison method, Decision Tree C4.5 and Naïve Bayes Algorithms manually using 55 data tested shows that algorithm C4.5 is higher with 96% accuracy while for Naïve Bayes have accuracy value is 90%. Testing by using RapidMiner Software application to the development of children under five using more data that is 80 data shows that the accuracy obtained C4.5 algorithm higher than Naive Bayes. With an accuracy rate of 85%, whereas in Naïve Bayes the accuracy rate is 90.00%.

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ONLINE ASSESSMENT TOOLS FOR 2013 CURRICULUM BASE ON INFORMATION TECHNOLOGY

Suartin[1], Hambali[2], dan Oriza Chandra[3]

[123]Department of Electrical Engineering, Fakulty of Engineering, Universitas Negeri Padang

ABSTRACT: Assessment is an important component of the curriculum. It illustrates an achievement of learning objectives. Curriculum 2013 (K13) uses an authentic assessment system, which emphasizes students' learner's ability to demonstrate real and meaningful knowledge. The problem is that not all teachers master how to set up an assessment instrument, and the adoption of an authentic assessment system takes longer. This causes authentic assessment sistem not fully used by the teacher. Therefore, it is necessary to develop the 2013 curriculum assessment tool based on information technology so that it can make it easier for teachers to use it and to time their application. The sistem was developed using prototype model. The test results show that the developed system is valid and practicality is used as an authentic assessment tool.

Keywords: Assessment, Authentic, K13, Technology, Information

1. INTRODUCTION

Substitution of curriculum KTSP (2004) into Curriculum 2013 (K13), aims to anticipate the development of Information and Communication Technology (ICT) that has hit the community (kompasiana.com, 2015). However, these efforts have not produced significant changes. According to Furqon Hidayatullah, as quoted by metronews.com, the implementation of K13 still leaves a number of problems, among others: the difficulty of changing teacher's mindset, low spiritual morale, reading and researching culture is still low, lack of mastery of information technology, weakness of administrative dominance, teachers who emphasize more cognitive aspects. Meanwhile, according to Syarwani Ahmad (2014), as written in Sriwijaya Pos, the K13 training process implemented by the government is very short, the learning time has to be implemented, while the teacher is not ready yet. The training process is short and not fundamental, resulting in confusion.

The development of information technology that is so advanced should be used to overcome various problems in human life, not least the problem of time efficiency in the application of authentic assessment system as mentioned above. Educational practitioners can use information technology to facilitate the assessment process because this system can be programmed so that complicated work (if done manually) will be easy and fast (automated). The system can provide various formats and assessor aspects such as should be done in an authentic scoring system. Using an automated assessment system, the assessment process will be effective and efficient. This is as revealed by Abdallah Tubaishat, et al (2009: 51) in his article entitled "Using an automated assessment system, the assessment process will be effective and efficient." This is as revealed by Abdallah

Tubaishat, et al (2009: 51) in his art entitled "... faculty members in the college use information generated to assess curricular efficiency and to evaluate the effectiveness of the learning outcomes for each course." Stephanie, N. (2016: 1) adds:

The future of the educational system is practically determined by the development of technology. Some educators and experts are against the trends of implementing EdTech tools and apps in every single aspect of the schooling system, mainly because technology is a source of distraction for students. However, proper technology integration guides students of greater understanding of all concepts are covered in class.

Based on the above issues and the ease of being offered by information technology, it is necessary to develop an automated assessment war. The development of this assessment tool is titled "Development of The Autenthic Assessment Tools K13 based On Information Technology.**"**

2. DEVELOPMENT OF THE 2013 CURRICULUM ASSESSMENT TOOLS

Aspects contained in K13, include aspects: (1) Attitude; (2) Knowledge; and (3) Skills. The Attitude, is the most difficult aspect to do assessment. Attitudes include temperament manners, adab in learning, social and religious attitudes. The difficulty of assessment in this aspect is largely due to the fact that teachers are unable to supervise their students, so the assessment is not very effective.

The assessment of the knowledge aspect in K13 is similar to the knowledge aspect of SBC, which equally emphasizes the level of students' understanding of the subject. The value of the knowledge aspect can be obtained through: Daily Deuteronomy; Middle Exam; Final exams; and Classroom Increase Test. The fundamental

difference between K13 and KTSP is that the assessment of the knowledge aspects of K13 is not a major aspect.

While skill assessment is a new aspect that is included in the curriculum in Indonesia. Skills are an emphasis on skill or ability. For example, the ability to express opinions, berdiksusiwarah, create report files, and make presentations. Aspects Skills itself is one aspect that is quite important because if only with knowledge, then students will not be able to distribute the knowledge they have so it only becomes a theory alone.

2.1 Assessment Principles and Approaches

Principles and Appraisal Appraisal that must be considered by the teacher when conducting the assessment according to Ministerial Decree No. 66 of 2013 on the Education Assessment Standards are as follows: (1) Sahih, the assessment is based on data that does reflect the ability to be measured; (2) Objective, judgments based on clear procedures and criteria and should not be influenced by the subjectivity of the appraiser; (3) Fair, an unfavorable or disadvantageous assessment of a student simply because of differences in religious, ethnic, cultural, cultural, socioeconomic, and gender backgrounds should be avoided.

While the assessment approach K13 is the Criteria Reference Assessment (*Penilaian Acuan Patokan*). PAK is an assessment of competency achievement based on minimal mastery criteria (*Kreteria Ketuntasan Minimal*). KKM is determined by the educational unit taking into account the characteristics of Basic Competence (*Kompetensi Dasar*) to be achieved, the carrying capacity, and characteristics of learners. The appraisal principle for each of the K13 assessment aspects is described below.

2.1.1 Assessment Attitude

Assessment of attitude is an activity to know the tendency of students' spiritual and social behavior in daily life inside and outside the classroom as a result of education. Assessment of attitudes is intended to determine the achievement / development of student attitudes and facilitate the growth of student behavior according to the points of attitude value in the kd of ki-1 and ki-2.

Assessment attitude is done by using observation technique. Observations by subject teachers were conducted during the learning process during the lesson, and the observations by teacher of counseling guidance and classroom teachers were conducted outside the lesson. The result of the observation is written in the journal. The journal contains anecdotal records, incidental records, and other valid and relevant information. Journals are not only based on what the teachers, class guardians,

and bk teachers see directly, but also other relevant and valid information received from various sources figures or tables should be sized the whole width of a column, as shown in table 1 or fig.1 in the present example, or the whole width over two columns. Do not place any text besides the figures or tables nor place them altogether at the end of the manuscript.

The attitude assessment can also be done by self (self-assessment) and peer-to-peer assessment. Assessment results can be used as one of the confirmation data from the assessment of attitudes by educators. The attitude assessment scheme as shown in figure 1.
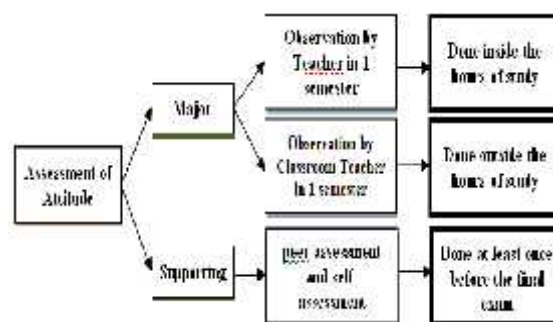
Fig. 1 Assesment Scheme of Atitude

2.1.2 Knowledge Assessment

Assessment of knowledge is the assessment conducted to determine the mastery of students, including: factual knowledge, conceptual, procedural, and low to high thinking skills. Assessment of knowledge is done by various assessment techniques. The teacher chooses assessment techniques that match the characteristics of the competencies to be assessed. Assessment begins with planning undertaken at the time of developing a lesson plan (rpp). Assessment of knowledge aims to determine whether the student has reached minimal mastery, and identify weaknesses and strength of mastery/ knowledge of students in the learning process. Assessment results are used as feedback for students and teachers to improve the quality of learning. Knowledge assessment is conducted during and after the learning process. The results are expressed in terms of numbers ranging from 0 to 100. The commonly used knowledge assessment techniques are: (1) written test, the form can be a matter of: multiple choice, stuffing, right-wrong, matching, and description; (2) oral test, is a test given by the teacher in the form of questions delivered orally and students respond to the questions verbally as well; (3) assignment, is a test by assigning tasks to students to measure and / or facilitate students acquiring or increasing knowledge; and (4) a portfolio, is a continuous assessment based on a collection of reflective-integrative information that shows the development of students' ability in a given

period.

2.1.3 Skills Assessment

Skills assessment is the assessment conducted to determine the ability of students in applying knowledge. Skills assessment can be done with various techniques, among others: (1) performance appraisal; (2) project appraisal; and (3). Porto-folio. Performance appraisal measures learning achievement in the form of process and / or product skills (product). Project appraisal measures students' ability to apply their knowledge. While the portfolio assessment assessed the best student work samples from KD on KI-4 to describe the achievement of skills competencies.

2.2 The Role of Information Techlogy (ICT) in Education

Information Techlogy (ICT) is an important element in the life of a nation and a state. The role of ICT in human life activities at this time is quite large. ICT has become a major facility in many areas of life and has contributed greatly to fundamental changes in the structure of operations and organizational management, education, transportation, health and research. Therefore it is very important for every organization to always increase its human resource capability in mastering and using information technology.

ICT is a technology used to process and convey information. The advantages of using ICT in information processing are: (1) innovative; (2) flexible; (3) quality; (4) productive; and (5) cheap (Albertin, Alberto and Rosa de Moura, 2004: 871-872). Currently many educational institutions have taken the mafaat from the benefits of ICT.

ICT for the world of education means the availability of facilities that can be used to deliver education programs and activities. ICTs can be catalyzed for a median change in the teacher's role: from information to transformation. Schools should be moderate to technologies that enable them to learn faster, better, and smarter. ICTs are the key to a better future school model. The use of ICT in developing an authentic assessment tools K13 is an attempt made to modernize education, especially education in West Sumatra.

2.3 Methods of Development and Results

Development of the Online Assessment Tools for 2013 Curriculum Base on Information Technology is a research and software development. There are two main stages of this research, namely: (1) development; and (2) testing (evaluating) of the assessment tools. The final target expected is the creation of a software (online assessment tools) that complies with K13. Therefore, the method used in developing this system is the prototyping method. This method is chosen because the development can be done in an integrated manner between the user (teacher and student), information technology experts and educational technology experts (Hanif Al fattah, 2007: 36). The software development step with this prototyping method is illustrated in Figure 2.
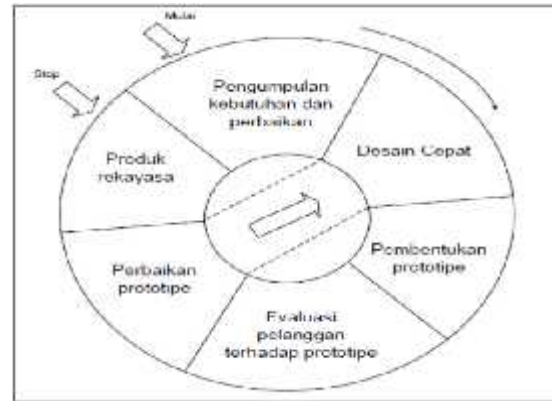
Fig. 2 Diagram of Software Development

Based on the data obtained at the stage of collecting system requirements and evaluating it, then developed its prototype. The prototype is created in the form of context diagrams, diagram of relationships between entities (Entity Relationship Diagram), and navigation menu. Context diagram can be seen in Figure 3. While the relation diagrams between entities are shown in Figure 4, and the navigation menu show in Figure 5.

The resulting prototype is then evaluated and upgraded along with potential users. If deemed appropriate, then the system is directly produced. Conversely, if there are still shortcomings / mistakes, then made improvements. The advantage of this paradigm is that if there is a discrepancy between user demand and the design done, the developer can quickly make improvements. The result is that on the prototype there is no more deficiencies and is approved by potential users.

After the prototype is received by the prospective user, the prototype is subsequently implemented into the software. The software should have facilities for assessing students based on aspects of the K13 assessment, are that assessing attitudes, knowledge, and skills, and accessible by external entities (users) using online systems.
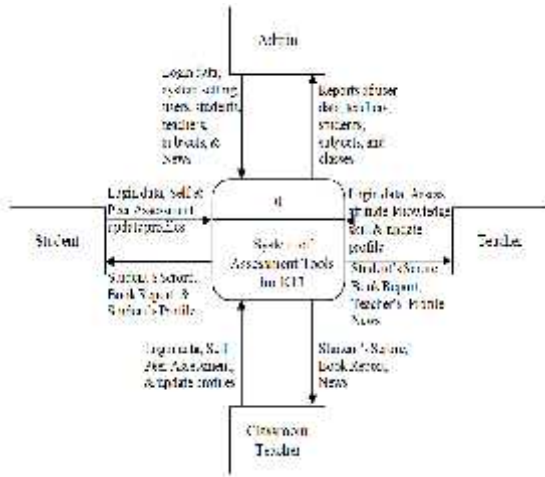
Fig. 3 Context Diagram of The System of Authentic Assessment K13 base on ICT

The software is developed and tested on a local computer (local host). Once operated (used for assesst), accordang with the rules of the K13, and no longer found error, the software is uploaded to the internet server. Further software is evaluated by experts and users.

(a)

(b)
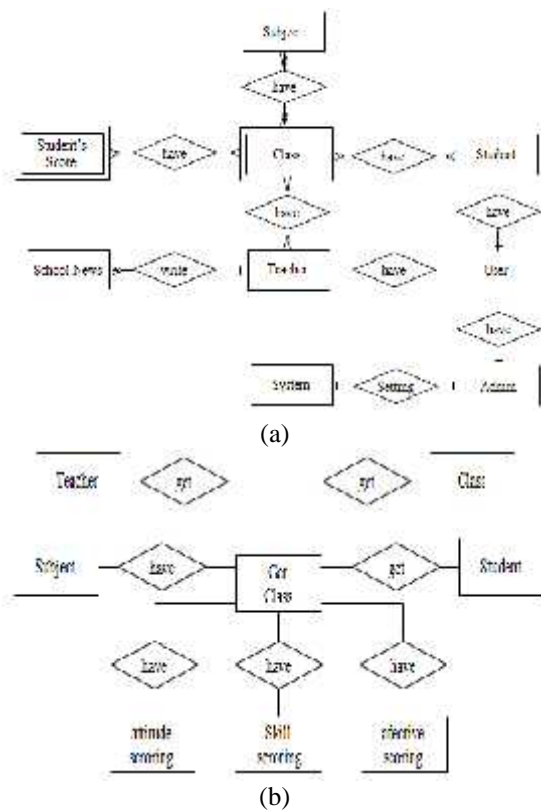
Fig. 4 (a) Diagram of The Relationship between Entities before Normalized; and (b) The Result of Normalization of Weak Entity.

There are two areas of expertise that evaluate the software assessment tool for K13, namely information technology and education technology experts. In addition, potential users also participate in this activity. Based on the results of the evaluation of improvements made, until the system developed meet the criteria and declared eligible to use.

If the evaluation results indicate that the developed software is not feasible to use or there is still a shortage (error), then the revision will continue to be done. Revisions may be made at the design and implementation stage, depending on the error. If the error only occurs in the programming syntax then the revision is only done on the implementation. If the error occurs in the design then the improvement is done starting the design and continued with the revision of the implementation phase.
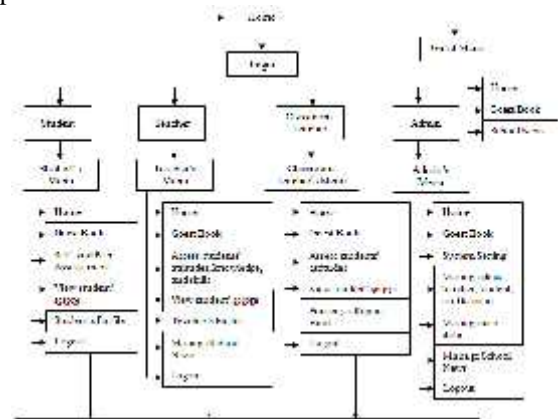
Fig. 5 Interface Design of the Onile Assessment Tools for K13

3. DISCUSSION

The instrument used to record the opinions of experts and users is a questionnaire. This study uses three types of questionnaires, namely a questionnaire of information technology experts, an expert questionnaire of educational technology, and user questionnaires. The three types of questionnaires, before being used in research first tested the validity and reliability. Test the validity using correlation coefficient formula as follows:

$$r_{xy} = \frac{N\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{(N\Sigma x^2 - (\Sigma x)^2)(N\Sigma y^2 - (\Sigma y)^2)}}$$

and reliability testing using Alpha Cronbach ( ), by the formula:

$$r_1 = \left(\frac{n}{n-1}\right)\left(1 - \frac{\Sigma \sigma_i^2}{\sigma_t^2}\right)$$

The calculated r value (for each question item) is compared with r table When the three questionnaires were distributed and the respondents tested their validity with the above formula, r calculated compared to r table at the 0.05 level of significance. The result is all the items from the three questionnaires obtained the number of correlations

above the critical value (the probability number is below or equal to 5%), then the three questionnaires are valid (worth using in the research).

Reliability test of three questionnaires using Alpha Cronbach ( ), each obtained value, namely: (1) questionnaire information technology experts of 0.67, (2) educational technology experts of 0.7 and; (3) use questionnaire of 0.72. Based on this test, the three questionnaires are considered reliable (> 0.6).

After the questionnaire declared valid and realibel, then the questionnaire is used to know the opinion of experts (Expert of Information Technology and Education Technology). Expert opinion is given after running the assessment apparatus, and observing the inside of the program. A summary of the opinion of information technology experts stated in table 1.

Through table 1 it can be seen that information technology experts assess the correctness, extendibility, and efficiency or performance indicators with excellent qualifications. Indicators of reusability, portability, verification, modularity, and readability are assessed with good qualifications. Only indicators of robustness and integrity are assessed with sufficient qualifications. Based on this data can be said that information technology experts judge good (feasible) rating tool used as an authentic assessment tool.

Table 1. Assessment Results by Information Technology Experts

No.	Indicator	Descriptor	Qualification
1.	Correctness	The ability of the autenthic assessment system in doing the tasks in accordance with the goals and specifications.	Excellent.
2.	Robustness	The ability of the system in anticipating abnormal conditions in performing its functions	Sufficient.
3.	Extendibility	Ease of system to be developed in accordance with demand demands.	Excellent.
4.	Reusability	The existence of the program to be reused either partly or entirely for other applications.	Good.
5.	Efficiency or Performance.	The ability of the system in the efficient use of resources.	Excellent.
6.	Portability	Ease of system is transferred to different hardware.	Good.
7.	Verification	Ease in tracking program failures and validation.	Good.
8.	Integrity	The ability of the system to protect themselves from illegal use and modification.	Sufficient.
9.	Modularity	Program settings in modules.	Good.
10.	Readability	Readability of the program by someone other than the programmer.	Good.

Table 2. Educational Technology Expert Assessment Results

No	Indicator	Descriptor	Qualification
1.	Objectivity	The ability of assessment tools to provide objective assessment.	Good.
2.	Validity	The validity level of the assessment tools in measuring what is measured.	Good.
3.	Practicality	The practicality of the authentic assessment tools in measuring learning outcomes of student from various aspect of assessment.	Excellent.
4.	Reusable	The ability of the authentic assessment system is re-used to assess learning outcomes across a range of subjects.	Excellent.
5.	Completeness	The completeness of assessment tools	Good

Table 3. Results of User Assessment (Teachers, Classroom Teacher, and Student)

No.	Indicator	Descriptor	Qualification
1.	Performance	The performance of the authentic assessment system according to the needs and specifications of the 2013 curriculum.	Good.
2.	Easy for use	Easy to operate the authentic assessment system.	Good.
3.	User friendly	The friendliness of the authentic assessment system in giving the user instructions..	Good.
4.	Usability	The usability of authentic assessment system for users.	Excellent.

Educational technology experts, assessing indicators of objectivity, validity, and completeness with good qualifications, and indicators of practicality and reusable are assessed with excellent qualifications. Therefore it can be concluded that educational technology experts judge the assessment tools feasible to be used in carrying out the task of learning.

Through table 3 it can be seen that users rate: performance, and ease of use, and hospitality with good qualifications. While the usability indicators are assessed with excellent qualifications.

4. CONCLUSION

Development of an online information assessment tool K13 based on information technology has been implemented and published on the internet (provided links from school website) research location. After that the experts and users do the testing in accordance with his expertise.

Based on the above test results can be concluded that: (1) Information technology experts assess the authentic assessment tools K13 base on ICT is in accordance with the specifications and criteria of ICT-based systems; (2) Experts in the field of educational technology, assess the system developed practically used to provide an assessment in accordance with the assessment system K13; and (3) the user (teacher) assess that the student is practical (has good performance, is easy to use to assesst students) in accordance with the type and format of the K13 assessment.

This authentic assessment tools can help the school, especially teachers and homerooms in storing, processing and making assessment reports. Assessment tools developed can also facilitate the task of homeroom teachers in making report cards because the device developed equipped with this facility.

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GAME BASED LEARNING TO IMPROVMENT TEACHERS KNOWLEDGE FOR TEACHING STRATEGY IN THE CLASS

Suherman

Faculty of Engineering, Universitas Negeri Padang, Padang;Indonesia

ABSTRACT: This study aims to improve learning strategies for educators in private schools in order to develop smart education in the school. Improved learning strategy is done with the help of an educational game that will be built based on Domain Student Centered Learning (SCL), so it is student-centered. System modeling using UML (Unified Modeling Language). This game are built on the windows operating system platform. This game that have been tried by 30 educators at the school. After that, we will examine the improvement of learning strategy to every Educator who has tried the game. Data collection using questionnaires distributed to each Educator. The result of the research shows that there is an increase of learning strategy perspective which is felt by SCL-based educators through game as much as 77%.

Keywords: Student Centered Learning, Game, Education, Learning Strategies

1. INTRODUCTION

Generally, the approach used in the implementation of learning in college is the "classical lecture" known as Teacher Center Learning (TCL), the lecturer "poured" as many courses as possible in the "empty bottle" of students. Students tend to be treated as objects, whereas students should be treated as subjects / actors (Student Centered). Classical learning paradigm in college as well as in elementary and middle school, it is necessary to change towards active learning based on student centered learning (SCL). Quoted from the journal RahminiHadi (2007) TCL learning system found many weaknesses, then the system needs to be changed in the direction of the learning system with the Students Centered Learning (SCL) model. In the SCL learning system, students are required to actively work on the task and discuss it with the lecturer as the facilitator.

The above statement can be strengthened from the journal ofEndangNugraheni. According to thinkers such as John Dewey, Jean Piaget, and Lev Vygotsky (Wikipedia, 2006) whose work focuses on how students learn, are responsible for the movement of learning from teacher centered to teacher-centered SCL. SCL means putting students at the center of learning activities. The movement of the concept is supported also by research on how the human brain work that says that students learn better by experiencing directly and control the learning process.

Active learning strategy based on student centered learning domains tends to make the material more memorable, which helps learners mangasah higher thinking skills than passive learning. Game is embraced as a learning media or training that is more appropriate for the means of interfaith (interfacing), which includes more techniques, images, audio so that teachers and lecturers can remember more about the material of active learning strategies. As disclosed by Wachowisz, et al. that the game becomes an important tool for raising awareness and motivation, skills training, knowledge development, communication and collaboration, as well as integration of learning experiences.

2. METODOLOGI

The framework is the stage where the problem begins and see what opportunities can form problem solving by integrating the appropriate approach in application development, where will the implementation and measurement in order to see the expected results.
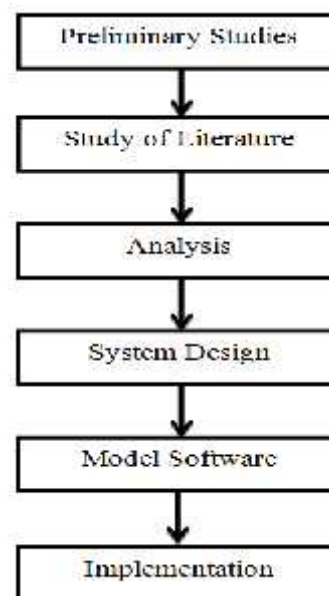
Figure 1. Framework of Research

In accordance with the above framework, each of the following steps can be described:

1. Introduction Study

The initial stage to complete this research is by studying the problem to be studied. Rungang the scope of the problem, determine and define the limitations of the problem to be solved. So this first stage is the most important start in the completion of this research

2. Literature Studies

In achieving the goal the authors see the opportunities that can solve the problem, it is necessary to study some literature that will be used in this research. Then the **literature is studied** and selected to be determined which literature will support in the study

3. Analysis

In this phase through literature studies, studies of research-related theories are used to integrate approaches in determining how to complete research, such as what applications are used and supporting theories as a solution. The author uses the game in solving problems with the Student Centered Learning Domain approach.

4. System Design

At this stage done the formation of game applications that are used to solve the problem, the method used in game development is the engineering method by using Linear Sequential ie Analysis, game design. coding to establish the rules in the game application and testing.

Stages of research can be described as follows:

a. Analysis

In the development analysis that will be used by teachers and lecturers in the research, therefore first perform the analysis kebuthan user and learning design analysis.

b. Design

In the design there are four system design, game path design, designing the main character and design design menu.

c. Coding

At this stage the game is formed using a script on Macromedia Director MX. This stage developed program modules for main programs and programs for each level (Level) used in the game.

d. Testing

Testing to be performed on the software is to find and eliminate errors that exist in the system. This test is done by analyzing the results of the kusioner spread to the object of research.

5. Model Software

The stage where the author has designed the program done, then the software model can be obtained. But at this stage will be held a trial phase first. If there is a change then it can be redesigned.

6. Implementation

This implementation stage is the last stage of the research. The program that will be used in the implementation is Macromedia Director MX 2004. At this stage is also not closed the possibility to be developed for the resulting game will be better as expected to solve the existing problems.

3. DISCUSSION

Knowledge of teachers and lecturers of the problem of active learning strategy is a competence that should be owned. The Government has affirmed the Government Regulation Number 74 of 2008, there are 4 teacher competencies:

1. Pedagogic competence which is the ability of teachers in learning pengelolahan learners at least include:
   a. Understanding insights or educational foundations
   b. Understanding of students
   c. Development of curriculum or syllabus
   d. Learning design
   e. Implementation of educational and dialogical learning
   f. Utilization of learning technology
   g. Evaluation of learning outcomes and
   h. Development of learners to actualize the various potentials they have.

2. Personality Competencies
   a. Believers and cautious
   b. Be noble
   c. wise and prudent
   d. Democratic
   e. Steady
   f. Authoritative
   g. Stable
   h. Adult
   i. Honest
   j. Sportive
   k. Be a role model for learners and the community
   l. It objectively evaluates its own performance and
   m. Develop yourself independently and sustainably

3. Social Competence is the ability of teachers as part of the Community which at least include:
   a. Communicate spoken, written, and / or polite gestures
   b. Uses communication and inlayoutation technology functionally
   c. Associate effectively with learners, fellow educators, education personnel, leaders of one education, parents or guardians of learners
   d. Associates politely with the community in a polite manner with the surrounding community by heeding the prevailing norms and value system and

e. Apply the principle of true brotherhood and spirit of togetherness.
4. Professional Competence is the ability of teachers in mastering the knowledge of science, technology, and / or and the culture that he presents that at least include mastery:

a. The subject matter is broad and in-depth in accordance with the standard content of the subject unit, and / or the subject group to be taught; and

b. The concepts and methods of discipline of relevant scientific, technological or art, which are conceptually overshadowed or coherent with the educational unit program, subject, and / or subject group to be subjected.

The First Level School Directorate of 2002 cited by Budimansyah et al in the book "PAKEM" The problem now is how to find the best way to convey the concepts taught in a particular subject, so that all can use and remember longer concepts

These competencies are translated into a competence that master and can apply various learning techniques and methods as the learning strategy itself specifically, so that the need for a training media that is easily accepted byteachers and lecturers about the strategies of active learning through educational games that including Co-operative Team Game Turnament, Problem Based, Jigsaw Cooperative, Think-Pair-Share Cooperative, Direct Learning,Cooperative Ivestigation, Co-operative Numbered-Head Together, Cooperative Student AchievmentDevision, which is expected to help teachers master active learning strategies.

Exposure analysis of competence to be achieved by the lecturer can be described in the diagram in Figure 2. Based on the stages to meet the expected goals.

Figure 2. Diagram of Active Learning Strategy Analysis

Based on the purpose of instructional media that will be designed has been set problems encountered then there are 2 groups of instructional activities are:

a. A general understanding of learning strategies is seen in activities 1 through 5.

b. As for the active learning strategy seen from activities 6 to 14

a. Curriculum Review

The curriculum used for reference to the development of educational games based on domain student centered learning is the government regulation number 74 of 2008 that teachers must have the ability to master the concepts and methods of discipline of science, technology, or relevant art, which is conceptually shaded or coherent with the program unit education, subjects, and / or subject groups that will be supported.

b. Content Game

1. Co-operative learning strategy Team Type Game Tournament

   a. Students are introduced to learning materials given directly by lecturers, discuss with classmates and lecturers as facilitators.

   b. The divided group consisted of five heterogeneous people

   c. The game is created with question-answer content to test the students' in-class knowledge of class presentations and group exercises.

   d. Students compete to collect points for their group.

   e. Competition is conducted for students from different groups with the same level of achievement based on past assessment results.

2. Problem Based Learning Strategy

   a. Lecturers motivate students to engage in selected problem-solving activities.

   b. Lecturers help students define and organize learning tasks related to the problem (assigning topics, tasks, schedules, etc.).

   c. Lecturers encourage students to collect appropriate inlayoutasi, experiments to obtain explanations and problem solving, data collection, hypotheses and problem solving.

   d. Lecturers assist students in planning to prepare appropriate works such as reports and assist them with various tasks with friends.

   e. Lecturers help students to reflect on or evaluate their experiments and the processes they use.

3. Jigsaw Cooperative Learning Strategy

   a. Students are grouped into 4 team members.

   b. Each team is assigned a different material

   c. Members of different teams who have studied the same sub-chapters meet in new groups (expert groups) to discuss their sub-chapters.

   d. After the discussion as an expert team each member returns to the original group and takes turns teaching their teammates about the sub chapters they will master and each other listens earnestly.

   e. Each team of experts presented the results of the discussion to members in the initial group.

   f. Lecturer member evaluation.

4. Cooperative Learning Strategies Think-Pair-Share Type

   a. The lecturer asks a question or issue related to the lesson then asks the student to think the question or issue independently for a moment.

   b. Students are not allowed to speak to other students at this stage.

   c. The lecturer asks students to pair up with other students to discuss what he has expected in the final stages.

   d. The lecturer asks the couple to share with the whole class what they have discussed

5. Direct Learning Strategy

   a. Lecturers present instruction in procedural inlayoutasi form

   b. The lecturers demonstrate the activities expected by the mawasiswa

   c. Students do the work and are guided by the lecturer

   d. The lecturer then examines the students' understanding of what has been learned

   e. Lecturers provide further training to students

   f. Lecturers with students do reflection and make conclusions

   g. Students are given individual quizzes

   h. The lecturer gives the task.

6. Co-operative Learning Strategy Group Investigation

   a. Lecturers divide students into groups (5 people) to be homogeneous by interest, or heterogeneous.

   b. The lecturer directs the students to choose sub topic from the common problem that has been determined.

   c. Lecturers with students formulate procedures, tasks, and learning objectives in accordance with the selected sub topic.

   d. Students conduct group investigations to complete their tasks.

   e. Lecturers monitor student work processes and help members when needed.

   f. Each group analyzes and evaluates the results of the investigation and prepares the presentation.

   g. Several groups were appointed to present the results of their investigations to the entire class.

   h. The lecturer evaluates the results.

7. Cooperative Learning Strategy Numbered-Heads Together

a. The lecturers divide the students into groups of 5 and each group member is numbered 1 to 5.

b. The lecturer asks a question to the students. Questions may vary. Questions can be specific and in sentence form Question or direction form.

c. The student unites his opinion on the answer to that question and convinces every member of his team to know the answer.

d. The lecturer calls the student with a certain number, then the student whose number matches his hand and tries to answer the question for the whole class.

8. Cooperative Learning Strategy of Student Team Achievement Divisions

a. Form groups of 4 heterogeneous people (mix by achievement, gender, ethnicity, etc.).

b. Lecturers present lessons.

c. Lecturers assign tasks to groups to be undertaken by group members. Members who have understood can explain to other members until all members in the group understand.

d. Lecturers give quizzes / questions to all students. When answering a quiz can not help each other.

e. Lecturer gives evaluation.

C. Learning Objectives

1. Lecturer knows active cooperative learning strategy Team Type Game Tournament

2. Lecturer knows the problem-based learning strategy

3. Lecturer knows Jigsaw Cooperative Learning strategy

4. Lecturer knows Think-Pair-Share Cooperative Co-operative Learning Strategy

5. Lecturer knows Direct learning strategy

6. Lecturers know cooperative learning strategy of Group Investigation

7. The lecturer knows the cooperative strategy of Numbered-Heads Together

8. Lecturer knows cooperative learning strategy Student Team Achievement Divisions

D. Game Development Place

Game development environment is done for Panca Budi Medan University lecturer.

4. RESULT

Research sample was taken at Panca Budi University Development Campus Medan, with 30 lecturers as sampling as shown in Table 1.

Table 1. List of UNPAB's Lecturers

No	Name	Unit
1	Febrillian Lestario	FE
2	Oktarini Khamilah Srg	FE
3	Heriyati Chrisna	FE
4	Nazly	FP
5	Sulardi	FP
6	Ruth Riah Ate Tarigan	FP
7	Tharmizi Hakim	FP
8	Nismah Panjahitan	FT
9	Sylvani Pujiati	FT
10	Suratno	FT
11	Frans DL Toruan	FT
12	Zuhri Ramdhan	FT
13	Darmeli Nasution	FT
14	AdiSastraTarigan	FT
15	Bhakti Alamsyah	FT
16	Hermansyah	FT
17	A. Syafi'i	FH
18	Irma Fatmawati	FH
19	Surya Nita	FH
20	Chairuni Nasution	FH
21	Sumarno	FH
22	M. ArifSyahlevi	FH
23	Sakban Lubis	FAI
24	Erwin Purba	FAI
25	Andoko	FAI
26	Jamaluddin	FF
27	Vita Cita	FH
28	Ananda Faridhatul Ulva	FT
29	Zainab	FH
30	Hamdani	FT

Unit Description:

1. FE = Faculty of Economics
2. FP = Faculty of Agriculture
3. FT = Faculty of Engineering
4. FH = Faculty of Law
5. FAI = Faculty of Islamic Religion
6. FF = Faculty of Philosophy

The research instrument used is a questionnaire that is derived from the characteristics and learning methods contained in the game-based student centered learning. Questions are asked on the questionnaire distributed to each sample, so that the results obtained can show the expected positive response.

From the results of questionnaires the results obtained that:

1. Teachers (Lecturers) see the need for the use of games to train the strategy of learning model Student Centered Learning (SCL) to be easily understood as much as 70%

2. Increased insight into SCL-based learning strategies through games by 77%.

3. SCL learning strategy material in the game, 93% of respondents stated it is good, 7% of respondents stated it is enough, and respondentsstatedit is not good as much as 0%.

From the results of the questionnaires taken from the sample shows that the game-based education domain student centered learning can be accepted by faculty (lecturer) at the Universitas Pembangunan Panca Budi (UNPAB)

5. CONCLUSIONS

Based on User Acceptance Test (UAT) test results, it can be seen that the Software built for Domain Based Education Student Centered Learning Game For Increasing Insight In Learning Strategy, can improve insight for lecturer in active learning strategy based on student centered learning. With educational games as training materials, it can help to improve lecturer's competence in active learning strategies.

6. ACKNOWLEDGMENT

The authors would like to thank the Panca Budi Development University, Medan, Indonesia, to give permission to conduct research at the university.

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LEARNING RESPONSE OF JOURNEY LEARNING COOPERATIV LEARNING AND LEARNING MODULE IN EDUCATION MEDIA LEVEL

Suparno[1], Bulkia Rahim[2], Zonny Amanda Putra[3], Junil Adri[4], Jasman[5]

[1] Majoring Of Mechanical Engineering, Faculty Of Engineering, University Of Negeri Padang

ABSTRACT: Factors of learning methods that are less appropriate in the delivery of materials and the selection of learning media causes less well-received learning objectives by students. So this study looks at the student's response to the method of cooperative learning Jigsaw Type using modules in the course Media Education. This study aims to see the response of students in the application of cooperative learning method of jigsaw type using module in educational media course. The method used in this research is experiment by disseminating the instrument to the students who take the educational media course that apply the cooperative learning Jigsaw Type and using the learning module. Research subjects are students who take courses in education media Semester July-December 2017. Data type is primary data where data obtained from result of research from student. The instrument or measuring instrument used is a questionnaire. Descriptive data analysis techniques to describe the response of students to the method of cooperative learning Jigsaw type using modules in the course Media Education. The results obtained from this experimental research are Generating an Education Media Module. Based on the findings of this study concluded that the response of students to the method of cooperative learning Jigsaw Type using modules in the course Media Education is very positive. With the application of cooperative learning method Jigsaw Type using active student module in learning.

Keywords: Student Response, Learning Method, Jigsaw Type Cooperative, Module, Education Media

1. INTRODUCTION

The mandate of Law No. 20 of 2003 states that education is a conscious and planned effort to create an atmosphere of learning and learning process so that learners actively develop their potential to have the spiritual power of spirituality, self-control, personality, intelligence, noble character and necessary skills for himself, society, nation and state. Thus education is expected to develop the potential of learners, so that learners can solve various problems faced. The higher the quality of education, it will produce a higher quality of human resources. With good education is one way to improve the welfare of the nation.

The mission of education in Indonesia is the intellectual life of the nation. This can be done in the development of education that is shown to make changes and renewal of the future kemasa. As the curriculum develops the changes and renewals are done to achieve a better level of education. Development of development of facilities to support more effective education. One of the existing education in Indonesia is Universitas Negeri Padang (UNP).

Universitas Negeri Padang (UNP) was established on September 1, 1954, which was originally named Teacher Education College (PTPG) which in 2015 consists of several faculties including: Faculty of Education (FIP), Language Faculty, Arts and Sasra (FBSS) , Faculty of Mathematics and Natural Sciences (FMPA), Faculty of Social Sciences (FISF), Faculty of

Science (FIK) Faculty of Economics (FE), Faculty of Engineering (FT) and on October 13, 2015 also has established a new Faculty namely Faculty of Tourism and Hospitality. State University of Padang as an educational institution that provides D3, S1, D4, S2 and S3 degree programs that prepare and to enter the world of work with knowledge and skills.

Faculty of Engineering (FT) is a Department of Mechanical Engineering as a master scanner and a skilled, skilled and mandatory Bachelor of Educator who needs to equip learners with the knowledge and skills in accordance with the competence of each skill. Masters of Mechanical Engineering since 2014 apply the curriculum structure of competencies related to KKNI in 2013, both S1 and D3.

Competency-based curriculum structure related to KKNI in 2013 Undergraduate Program of Mechanical Engineering Education there is the structure of subjects are: 1). MKU (General Course), 2). MKDK (Basic Course of Education), 3). MKBK (Subject Areas of Expertise), 4). MKKPP (Course Skills Process Learning), 5). MKPP (Education Development Eye). In the Learning Process Skills Course, one of them is the Education Education course which consists of 2 credits, 1 credits of Territory and 1 credits of Practice.

Some learning process of course Media Education is simple example of lecture method by relying on explanation from lecturer so less involving learners actively in learning process. The

learning process is certainly influenced by several factors that support among others learners, lecturers, facilities, environment and media teaching / education.

Educational factors that are less appropriate in the delivery of materials and the selection of instructional media causes lesson objectives are perfectly acceptable by students. Educational factors here are defined as the facilities needed in the learning process such as learning media used by lecturers. It is important that the selection of instructional media is the material needed by lecturers in interaction with the students.

Student learning process is influenced by learning media both on campus and at home. Generally students only focus on campus course, after at home focus their learning is reduced due to other factors such as working to play and others. This affects the learning process of students, understanding of students in deepening the discussion of learning so that the impact on student learning outcomes.

Lack of teaching materials or learning resources is one part of the cause of the not maximal understanding of students in the learning subjects Media. For that need to add references and reproduce teaching materials Media Education to support the ability of students in understanding the lesson. The result of the Semester of July-December 2016, which has two sections of the Education Media course, the student's competence achieved is still not maximal as shown in Table 1.1.

Table 1.1. Value Semester Course Media Education Semester July-December 2016.

| No | Section Code | Education Media of Course | | |
	Numeric Value Interval	Letter Value Interval	Frequency (f)	Percentage (%)
1	0 – 39	E	5	8,47
2	40 – 49	D	0	0,00
3	50 – 54	C-	1	1,69
4	55– 69	C	5	8,47
5	60 – 64	C+	5	8,47
6	65 – 69	B-	13	22,03
7	70 – 74	B	13	22,03
8	75 – 79	B+	11	18,64
9	80 – 84	A-	6	10,17
10	85 – 100	A	0	0,00
	amount		59	100,00
	Small Value 64, Value under B-		16	27,12
	Great Value 65, Value above C +		43	72,88

Based on Table 1.1. of the 59 students, only 43 students (72.88%) who scored 65 upwards or B-upwards. Of the students under 65, there are 16 students (27.12%), actually one-third of the first semester students of class of 2014 who are under 65 and below 40 or E score as much as 8.47%

Students of Mechanical Engineering Department come from various high school (senior high school) such as: Senior High School (SMA) both from the Department of Natural Sciences (IPA) and come from the Department of Social Sciences (IPS), Vocational School (SMK) both from Department of Mechanical Engineering, Electrical Engineering, Electronic Engineering, Building Engineering and others and Madrasah Aliyah (MA). Students find difficulties in understanding the material given so as to maximize and overcome the slow understanding in the course then the students need other references to improve understanding in learning Media Education. Origin of Mechanical Engineering Department students of 2016 to take the media education courses Semester July-December 2016 can be seen in table 1.2.

Table 1.2 Data Department of student origin in the course Media Education Semester July-December 2016.

No	Major	Number of Students	Percentage (%)
1	IPA	58	61,05
2	Multimedia	1	1,05
3	Technical Information	2	2,11
4	Light Vehicle Engineering	8	8,42
5	Mechatronics	2	2,11
6	Machining Technique	10	10,53
7	Welding Technique	1	1,05
8	Automotive Engineering	7	7,37
9	Mining Engineering	1	1,05
10	Computer network Engineering	3	3,16
11	Motorcycle Engineering	1	1,05
12	Building Image Technique	1	1,05
	amount	95	100,00

Based on Table 1.2. from 95 students, there were 58 students or 61.05% came from SMA IPA. Students who come from SMK Engineering Department of Engineering 10 students or 10.53%. Students who come from SMK Welding Engineering Department 1 student or 1.05%. The rest of SMK other majors, it can be concluded that students of Department of Mechanical Engineering sebahagian not familiar about Mechanical Engineering, especially in the learning media education. So much needed media support for learning

The learning process will be done in the previous locale using the lecture method which resulted in the lack of student activeness. The strategy in teaching determines a student's success in learning locally. To overcome these symptoms and problems researchers try to use learning methods that make students more active. To support the students' activity increased, the Jigsaw cooperative learning method was used. Researchers choose cooperative learning method Jigsaw model because in the learning process students can develop themselves in groups, mutual opinion, not only fixated in one group as in other methods and in this Jigsaw model all students in groups are required actively so that not dominated one or two students only. Another factor that makes researchers choose Jigsaw learning model is:

a. This learning model can encourage students to express their ideas verbally and compare with their friends' ideas. This is especially meaningful when in the troubleshooting process.
b. This learning model can train students to express opinions, improve communication skills.
c. This learning model can help motivate students and improve the ability to think creatively in interacting during group learning.

(1) states that, "Jigsaw is one type or model of flexible cooperative learning". Much research has been done in relation to the cooperative learning model on the basis of Jigsaw. The research has consistently shown that the students involved in this Jigsaw Model Cooperative learning achieve better performance, have better and more positive attitudes toward learning, in addition to mutual respect for differences and opinions of others.

Based on the background of the above problems researchers want to see the response of students in the application of cooperative learning jigsaw and learning modules in the education media.

2. HEADINGS

2.1. Response

(2) the response is an activity (activity) of the organism is not merely a positive movement, every type of activity (activity) caused by a can also called a response. In general, responses or responses can be interpreted as a result or impression gained from observations about the subject, event or relationships obtained by summing up information and interpreting messages

(3) the term response in communication is a communication activity that is expected to have results or in after communication called effect. A communication activity that gives effect in the form of response from communication to message launched by communicator

2.2. Learning Jigsaw Model

This model was developed and piloted by Elliot Aronson in Rusman. In this jigsaw model was published in 1978. The meaning of Jigsaw in English is a jigsaw and some even call it by the term puzzle that is a puzzle composing pieces of images. Cooperative learning jigsaw model takes the pattern of how to work a saw (zigzag), ie students do a learning activity by working with other students to achieve common goals.

Cooperative learning Jigsaw is one model of cooperative learning that encourages students to actively and assist each other in mastering the subject matter to achieve maximum performance. As expressed by (4) that, "Cooperative learning Jigsaw model is a model of cooperative learning by means of students learn in small groups consisting of four to six people are heterogeneous and students work together positive and responsible each other independently and responsibly."

Jigsaw model cooperative learning model of this student has many opportunities to express opinions and process information obtained and can improve communication skills, group members are responsible for the success of the group and the completeness of the material part that is learned and can convey information to other groups.

2.3. Education Media

Educational media is a medium whose use is integrated with the purpose and content of teaching that is usually intended to optimize the achievement of a teaching and learning activities (Santoso S. Hamidjojo).

Learning media media contains material about communication theory and learning, media concepts and principles, types and kinds of media, learning media characteristics, organizational systems and media selection, advantages and disadvantages, two-dimensional non-projection learning media, print media, three dimensional media / model , projection media, photography, computer-based media, Audio Visual media, and interactive multimedia. Designing, creating and displaying media learning

Learning using modules is similar to conventional learning. In conventional learning, learners can only information or material lessons from teachers while on learning using the module, learners can be two sources, namely the first of the teacher and the second of the existing module. So the learning using the module is teacher-centered and supported by the use of learning modules, learning is obtained from teachers and in addition to the modules already provided. If learners forget about the material can learn from the existing module. This means that learning by module

learners can learn or can learn from the teacher and from the module.

(5) conventional learning method is a traditional learning method or also called lecture method, because since this method has been used as a means of oral communication between teachers and students in learning and learning process. In learning history the conventional method is characterized by a lecture accompanied by

explanations as well as the division of tasks and exercises.

Learning on conventional methods, learners listen more to the teacher's explanation in front of the class and carry out the task if the teacher gives the exercise questions to the students. Commonly used in conventional learning include lecture method, question and answer method, discussion method, assignment method.

3. RESEARCH METHOD
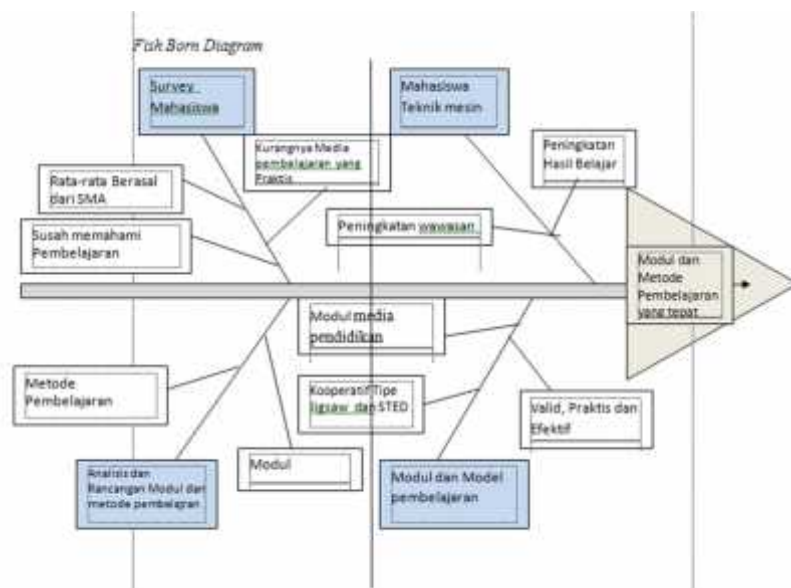
Gambar 3.1. *Fishbone Diagram*

4. RESEARCH FINDINGS

This data is obtained through a questionnaire given to students to see the response of students learning media education cooperative jigsaw and learning modules. The results obtained as shown in Table 4.10. the following:

Table 4.1. Student Response Data of Jumbsaw Cooperative Learning and Learning Module on Education Media Course.

No	Rated aspect	Average	Information
1.	By using this model jigsaw model cooperative learning module I can know the purpose of learning that I do.	4,85	Strongly agree
2.	I can learn jigsaw model cooperative education medium with module.	4,24	Strongly agree
3.	Using a jigsaw type cooperative model module can help me learn independently.	7,27	Strongly agree

No	Rated aspect	Average	Information
4.	I easily use this jigsaw model cooperative learning module	1,21	Strongly agree
5.	Explanations / drawings / tables in the module can make it easier for me to understand the concept of learning activities.	4,85	Strongly agree
6.	I easily read the text and sentences that exist in this jigsaw type cooperative learning media education module	2,42	Strongly agree
7.	I easily understand the language used in this jigsaw type cooperative learning media learning module.	1,82	Strongly agree
8.	Jigsaw model cooperative model	3,64	Strongly agree

No	Rated aspect	Average	Information
	modules are designed according to the material.		
9.	The jigsaw type cooperative model module developed can improve my reasoning to understand the learning materials	6,06	Strongly agree
10.	This jigsaw type cooperative learning model helps me make it easier to understand educational media materials.	3,03	Strongly agree
11.	This jigsaw type cooperative learning model motivates me to learn educational media.	1,82	Strongly agree
12.	This jigsaw type cooperative learning model attracted my interest to learn the media of education.	2,42	Strongly agree
13.	This jigsaw model cooperative learning module makes me more active in learning	83,03	Strongly agree
	Percentage of Assessment	3,59	Strongly agree

Table 4.1. obtained the average result of student responses to learning cooperative jigsaaw learning module in the education media course that is 83.59%, so it can be concluded that the student response to learning kooperativ jiqsaaw and learning module in the media education is very positive.

5. DISCUSSION

Based on the result of research data analysis, it was found that student's response to jigsaw cooperative learning and positive learning module, because with jigsaw cooperative learning model and learning module can increase students' knowledge in group learning and self study

Another factor that facilitates lecturers is by cooperative jigsaw method and learning material module contained in the learning module is in accordance with the characteristics of students and the concept of Synopsis and SAP. The easy-to-use process, both for lecturers and students, is likely to increase the effectiveness and efficiency of time in the learning process so that learning will be easy to implement, interesting and fun for students. This means the implications of cooperative learning jigsaw and this learning module can be used to convey and improve the understanding of lecture materials in the educational media courses.

The importance of applying jigsaw cooperative learning and learning module in the learning process of educational media course, because the developed method can foster creativity, innovation of educator in creating a fun learning atmosphere, foster interest and desire of student to learn by lecturer direction.

6. CONCLUSION

Based on the result of research data analysis, it was found that student's response to jigsaw cooperative learning and positive learning module, because with jigsaw cooperative learning model and learning module can increase students' knowledge in group learning and self study.

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NEED ANALYSIS APPLICATION ON THE FEASIBILITY STUDY OF THE HYDROELECTRIC POWER SELECTION (CASE IN SOLOK, PESISIR SELATAN, AND SIJUNJUNG REGENCY)

Suryadimal[1], Edi Septe[2], Wenny Martiana[3], Fahmi Rizal[4], Nizwardi Jalinus[5]

[1,2,3] Doctoral Student S3 Faculty of Engineering State University of Padang
[1,2,3] Lecturer of Mechanical Engineering Faculty of Industrial Technology Bung Hatta University
[4,5] Lecturer of S3 Faculty of Engineering State University of Padang

ABSTRACT: This study aims to determine the criteria of data and information needed to be related to the selection of the ideal location of the potential of hydroelectric power from several rivers namely; Batang Lembang Solok, Batang Bayang Pesel, Batang Sukam and Batang Kuantan in Sijunjung Regency, Designing technical works such as Mechanical, Electrical and Civil Works of a Minihydro Power Plant at the selected potential point. While the benefits of this research are to obtain complete information and valid data in the selection of locations and design of hydroelectric power plants for several investors and local governments concerned. Stages of this research are to arrange systematic framework of thinking using needs analysis. The systematics of the framework contains the work sequence that guides the preparation of the feasibility of the Hydro Power plant in 3 planning locations in Sijunjung, Solok and Pesel regency. Followed by field survey, identification of data collection of water debit and height fall (head). Design and installation studies, Turbine and Generator types as well as civil works covering water retrieval doors, ducts, tranquilizers, garbage screens, generator houses to drainage channels. The results of this study selected location data input is in Solok district as follows; discharge design is 5,431 m3 / s, high difference available is 29 m. The length of the measuring channel is approximately 1150 m until it reaches the tranquilizer and power that can be raised at 1.1 MW or 1250 kVA and type of turbine type Francis.

Keywords: Need Analysis, Hydroelectric Power, Feasibility Studies, Mini HydroPower

1. INTRODUCTION

Need Analysis is a way to facilitate people in conducting analysis and review a problem. One method of need analysis is often used in the field of science is Concept Mapping.

According to Ryan Watkin etc in the book A Guide to Assessing Needs, Concept mapping is a way of visualizing hierarchy and the relationship between propositions, ideas, and information. There are three main phases of the concept mapping technique is planning, gathering information, analyzing and interpreting

Related to the selection of power plant sites located in three districts in West Sumatera, by applying Concept Mapping to get one of the best-selected locations based on various criteria of valuation of important aspects as well as related supporting factors in feasibility studies such as technical, mechanical electrical, social, legal, economic.

Technically the region of West Sumatra is famous belief rough consisting of mountains (hills) and the valley. This valley is generally a watershed (DAS) that can be used for electricity generation, to replace the alternative energy that has been a deficit in the last few years due to the growing demand for electrical energy.

There are several watersheds that have been utilized by the community just for the needs of lighting by using simple technology. In addition, several PLTMH (micro hydro power plants) have also been built, however, about 80% of existing MHP is no longer operational because of the entry of PLN network and technology simply. Electricity generating capacity up to 2028 is estimated at 9,757,507,038 KVA consisting of domestic needs of 7,392,050,786 KVA and for general infrastructure 2.36 MW. (Source Esdm Sumbar, 2014)

The objectives and targets of this study using the method of need analysis in the selection of generating sites in the study of the preparation of Feasibility Study Investments of Hydro Power Plant (Mini Hydro) is to provide accurate data and information to potential investors regarding the condition of supporting facilities and infrastructure for the development of PLTMH in selected areas later on.

BASIC THEORY

In support of the preparation work process of FS Hydro Power Plant (Mini Hydro), need to compile systematics framework. The systematics of the framework contains the work sequence that guides the preparation of FS Power Hydro (Mini Hydro) in 3 planning locations in Sijunjung, Solok and Pesisir Selatan districts. More details about the framework for the work of FS Hydro Power Generation (Mini Hydro) Development can be seen in Figure 1. following.

• Preparation Step
• Implementation of the Survey
    o Secunder Survey
    o Primary Survey
• Identification, Compilation and Basic Analysis

Site selection the criteria on the potential feasibility of the MHP must meet: a). The length of the distribution point network location of the plant to the receiver power (load) radius of 5 km for medium voltage 20 kV and 2 km radius for low voltage.b). The presence of potential customers who are around the plant.c). Potential power generated sufficient power according to micro-hydro standard with power 1 MV d). Availability of river flow throughout the year.e). The access road to the location can be reached or can be reached with inexpensive technology.f). The site of the plant does not damage the environment and/or be in a nature reserve or culture in accordance with the applicable provisions

In the execution of work, the basic approach pattern used for this work is the conceptual approach. The pattern of conceptual approach is the mindset of approach concerning policy, strategy, philosophy framework or basic concept that will be used in formulating, selecting and setting strategy and recommendation in the formulation of investment feasibility for development of Hydro Power in District.

1. Approach to Literature and Development Policy: This approach is aimed to find out the various study literature studies and studies that have been done related to the feasibility study of investment on the development of hydroelectric power.

2. Resource Approach (Resources Base Approach); The Resources Base Approach is an approach that relies on the availability of resources or local potential that can be used or needs to be supported by its development through the implementation of a plan or program.

3. Participation Approach (In Participation Approach) In many cases during this time the community is like a spectator who witnessed the implementation of development in the region. This happens because the nature and format of its development are "Top Down". The point is from planning, implementation to operation without the community or local government involved. Even if they look just as workers. This, in turn, makes the further distance between the development itself and society. Approach with the involvement of stakeholders (Participant Approach) area determines the successful implementation of development programs.

According to Suad Hasan and Suwarsono (1994: 7) in the feasibility study it is necessary to know the characteristics of the project (scope of activities, means of activity, evaluation of the aspects that determine the success of the required facilities, the results of the activities and the costs to be paid for obtaining the results.

• **The Importance of Feasibility Study**

According to Prof.Dr.Niswardi Jalinus MPd on lecture Need Assessment (2016), Before a new business starts or developed in advance should be held research on whether the business will be pioneered or developed will be profitable or not. If profitable, whether the benefits are adequate and can be obtained for a long time. Technically it may be feasible, but economic and social are of little use.

According Suryana (2000: 139), explains that "Business feasibility study or business analysis is also called business is a study on whether or not a business is carried out by continuous profitable".

Further Suryana (2000: 145) states that parties who need and concerned with business feasibility studies, among them are:

a. Entrepreneur party (Company Owner).

Starting a business or developing a business that necessitate a considerable sacrifice and faced with uncertainty. In entrepreneurship, a business feasibility study is essential so that its business activities will not fail and experience profits over time. Similarly, for funders who require certain requirements such as bankers, investors, and the government.

b. Investors and funders

For investors and funders, a business feasibility study is essential to select the most profitable type of investment and as a guarantee of capital invested or lent it. Whether the investment does provide a guarantee of an adequate investment return or not. By investor, a feasibility study is often used as consideration whether or not a feasible investor.

c. The community and the government

Parties to the feasibility study community are necessary especially as a matter of study whether the business established or developed beneficial to the surrounding community or otherwise even harmful forever. How are positive and negative environmental impacts? Likewise, for the government, it is very important to consider the business license or the provision of other facilities.

METHODOLOGY

The methodology required in site selection activities in the preparation of Feasibility Study of Hydro Power Plant (Mini Hydro) is based on:

1. Identification of Spatial Use Utilization

This stage is done by analyzing the carrying capacity and space capacity of the utilization plan. In

addition, specifically to identify the development of space and activities, then analyzed the contents of space planning which then overlaid with the existing condition of the area. The results of the analysis of the feasibility of space/land area planning.

2. Identification of Typology of "Profile" of the Watershed

In this stage, secondary surveys and primary surveys are conducted. A secondary survey was conducted to identify the functions and characteristics of the Watershed (DAS) of the planning area.

3. Identification of Existing Condition of Planning Area

Steps in this stage are to mapping the physical and environmental hue directly. The tools used include the GPS, Theodolite and the camera as a tool for field documentation. The results of the observations will be analyzed to identify the planning area (Batang Bayang watershed (South Pesisir), Batang Lembang in Solok and Batang Kuantan districts in Sijunjung District).

A.Preparation Stages

The preparation stage is the initial stage of this work. The method used is to prepare all the needs related to the work Feasibility Study Investment of Hydro Power Plant (Mini Hydro), among others:

a). Administration preparation.,b). Provision and Mobilization of experts.,c). Preparation introduction to the initial condition of material and location of planning review,d). Preparation of survey needs (design survey, cameras, questionnaires, interview sheets) and Preparation of literature and legislation

B.Data Generating Stages

The data were collected using two methods namely secondary data collection method and primary data collection method. This stage is a follow-up of the commencement of the Feasibility Study Work Process of Hydro Power Plant (Mini Hydro), which at this stage will be done two forms of activities namely:

C.Secondary Data Collection

The technique of collecting secondary data was done by conducting literature study from the publication of statistical data of West Sumatera BPS, BPS of Sijunjung District, Solok District, Watershed Data from PSDA of West Sumatera Province and PSDA of Sijunjung Regency and Pesisir Selatan Regency.

The types of secondary data collected include a).

Data Sumatera Barat In Figures (time series),b). Sijunjung District Data In Figures (time series),c). South Pesisir Regency Data In Figures (time series),d) Data Number of electricity customers of West Sumatra, electricity customers Pesisir Selatan District and Sijunjung District,e). Rainfall Data, Average Rainfall, Water Discharge of Batang Bayang Watershed, Batang Sukam and Batang Kuantan,f). Data Land use area around the watershed Batang Bayang, Batang Sukam and Batang Kuantan,g).Population and economic data of West Sumatera Province, Pesisir Selatan Regency, Sijunjung Regency, Solok Regency and planning area covering such as: {Population level,Level of community heterogeneity,Accessibility of location from the center of village, sub-district, city / district activities, road conditions and availability of modes of transportation,Availability of energy services and patterns of use,Level of electricity consumption, Availability of public infrastructure.}, next h). Data of Water Resources of Batang Bayang In Pesisir Selatan Regency, Batang Lembang and Batang Kuantan in Sijunjung Regency, and Batang Lembang, i).Data of Batang Bayang River Basin, Batang Sukam and Batang Kuantan,j).Topographic and Geological Map of Batang Bayang Watershed Area, Batang Lembang, and Batang Kuantan. These maps are on a mapping scale of 1: 50,000, k).. Hydrogeology Map of Batang Bayang Watershed Area, Batang Lembang and Batang Kuantan,l). Map of Electrical Service Area of West Sumatra, Kab. Pesisir Selatan and Kab. Sijunjung,m. Related studies/studies that have been done.

Primary data collection is done through observation, observation and measurement of location/planning area (Batang Bayang in South Coastal District, Batang Lembang in Solok and Batang Kuantan Regencies in Sijunjung Regency). The primary survey data comes with documentation. In this primary data collection will be done Measurement of the planning area. Measurements made using modern equipment such as GPS, Theodolite and other perceived tools will help the field survey process.

1) Preliminary Survey

The preliminary survey was conducted to determine the initial location as a prospective location for the construction of the MHP. The target data sought in the form: a). Data and Maps of Study Areas, b). Location Planning Position Data, c). Accessibility,d). Characteristics of the River such as River straightness, River Materials, River Sedimentation, Watershed, and River normalization.

2) Selected Site Survey

The selected location survey is a follow-up survey of the PLTM development plan, the survey of

the selected locations is conducted on the location chosen for the implementation and in-depth assessment of the MHP. The survey conducted in the form, as: a).Measurement of river conditions, like as Potential water and its quantity (water discharge), Height of rainfall, Climate change, High waterfall and can be used (head) and Speed, b). Land use around river area, c). Geological conditions like as; Land movement due to rain, Movement of the earth due to the earthquake, Soil types and rocks, d). Land status, e). Availability of power grid, f). Social impact like as; Technical Operations and Environment, and g). Community Response.

3. Stages of Identification, Compilation and Data Analysis

To know the condition of the planning watershed area (Batang Bayang, Batang Lembang, and Batang Kuantan), we must first know the general description of the area in general (macro) ie Sijunjung, Solok and Pesisir Selatan. Analytical methods used are quantitative analysis and qualitative analysis. Qualitative analysis was conducted on feasibility analysis of hydroelectric development in Sijunjung, Solok and Pesisir Selatan districts.

4. Stages of the Feasibility Plan Formulation

The phase of the feasibility plan for the Hydro Power Plant (Mini Hydro) refers to the results of previous analyzes. In this stage, a feasibility plan for hydro power plant (Mini Hydro) development will be formulated at the Selected Location, which will function as one of the suppliers of electricity needs for West Sumatera Province.

LOCATION SELECTION ANALYSIS

a.Alternative Candidate Location of PLTM

In the preparation of Investment Feasibility Study of Hydro Power Plant (Mini Hydro) has been limited to 3 candidates in 3 regencies: Batang Bayang River is located in Pesisir Selatan Regency, b) Batang Kuantan River in Sijunjung Regency, c) Batang River Sumani Hulu in Solok District.

b.Election Of PLTM Location

Mini Hydro Power Plant works by altering the kinetic energy of the water when it flows down to rotate the coupled turbine with the generator as a Power Plant. In order to obtain sufficient water level at a short flow distance, a Dam is created. Water is directed to a rapid pipe that leads to the turbine to turn the turbine, rotate the electric generator, to generate electricity. Some important aspects of the development of Mini Hydro Power Plant (PLTM)

related to Water Resources are Climate and Rainfall, Watershed, Evapotranspiration, Available water debit and Head.In addition to aspects related to water resources itself, there are also non-technical aspects that are not less important, namely:
1. The principle of location usage principle (in some location of prospective PLTM, permit principle of location usage already owned by another developer).
2. The proximity of location of prospective PLTM with the nearest power grid
3. Utilization of the river for other activities.
Based on the above aspects, it can be prepared the criteria needed to select one location from three candidates for the location of the development of the MHP. For the determination of the selected location, we use the scoring method (weighting), the weight of 1 (one) for the lowest criteria up to 4 (four) weights for the best criteria. Here are the criteria and scores for each of the criteria:

Tabel.1 Site Selection Criteria

No.	Criteria	Scoring			
		1	2	3	4
1	Whether the location status (principle permit) is already owned	80% - 100% of locations already have a principle license	60% - 80% have a principle license	40% - 60% have a principle license	0% - 40% have a principle license
2	Location distance from the nearest power grid	>5 KM	3-5 KM	1-3 KM	<1 KM
3	as the river been utilized for other activities	mine	PLTM (H) & Irrigation is simple	Permanent irrigation	untapped
4	Accessibility to location	Far and difficult to achieve	Close but the terrain is difficult	Far away but easy access	Close and easy access
5	Water discharge	Very small	small	medium	Very large
6	Climate and rainfall	Very small	low	medium	large
7	Watershed	Damaged	broken	good	Very well
8	Head	Very low	low	medium	Very large

Based on the criteria and the results of the site survey, the findings in the field in three candidates are as follows (see table 2 below):

Tabel 2.Scoring of location assessments

No.	Criteria	Sungai Batang Bayang (Painan)	Sungai Batang Kuantan (Sijunjung)	Sungai Batang Sumanik (Solok)
1	Whether the location status has been owned by another party	2	4	4
2	Distance location from the nearest electrical network	3	3	4
3	Has the river been utilized for other activities	2	1	3
4	Accessibility to location	2	2	4
5	Water discharge is available	4	2	3
6	Climate and rainfall	4	4	4
7	Watershed	2	1	3
8	Head	3	1	4
	Total weight	*22*	*18*	*29*

The result of weighting above Sumani river has the highest score of 29 points, followed by the river shadow stem with a score of 22 points and the lowest rivers of Kuantan with 18 points score. From the results of scoring analysis above can be concluded that the ideal location for development is Batang Sumani Hulu River with a score of 29 points. So that the follow up of this location selection is done further study on Sumatera upstream rods in the form of field measurement using theodolite, instantaneous debit measurement using the current meter and manual discharge data and feasibility study on Sumani rivers. Meanwhile, the results of field surveys conducted on the stem rivers Sumani in Solok District showed the following results:

1. Location of Batang Sumanik river still not developed professionally for PLTM (H). This location is still pure and can be used as the location of PLTM.

2. Distance location with power grid is close enough, estimated less than 1KM.

3. Sumanik Batang River has been utilized for permanent irrigation. Approximately 1.2 KM from the location of the planned PLTM (in the upper river) has been built permanent irrigation, and the construction of this MHP does not interfere with the irrigation, because the PLTM is downstream.

4. The location point of the PLTM is located in the city development area, close to public facilities, access to the location is quite easy. About 0.5 km from the public road to the location.

5. While the available medium water discharge. Compared to Batang Bayang River, this river has a smaller discharge, but the water discharge is sufficient for the development of micro power plants with a capacity of 100KW - 1MW.

Calculation of turbine generated power based on a calculation of empires from the head and debit technical data as in table 3 below.

Table 3. Turbine Generated Power

Technical data				
Head	Available head	29	m
	Head Loss	1.3	m
	Head Net	27.7	m
Turbin			
	Design Flow	5.41	M^3/s
	Head Net	27.73	m
	Power output	1176	kW
	Turbin Type	francis	
	Turbin Speed	500	rpm
	Specific Flow	93	rpm
	Runner diameter	0.4	m

Turbine power calculation results in the above table are 1176 kW then the generator output power can be completed as follows:

$$P_{out\,generator} = P_t . \pi_{transmisi} . \pi_{generator}$$

It is planned that the efficiency of transmission and efficiency of generator 95% and 90% so that the generator output power is as follows;

$$P_{out\,generator} = 1176\,kW . 0.95 . 0.90 = 1\,MW$$

Assume power factor = 0.8, then kVA generator can be determined as follows namely

$$kVA_{(generator)} = \frac{1000\,kW}{0.8} = 1250\,kVA$$

3. CONCLUSION

From the results of the discussion that the location used as the location of Hydro Power Plant (Mini Hydro) is located in Kanagarian Koto Gaek Solok District, precisely located on the River Batang Sumani Hulu. In conducting an analysis of the feasibility of investments to the Hydro Power Plant which is the indicator of its feasibility consists of technical feasibility (site selection for civil building facilities, availability of water debit, civil facility planning, mechanical electrical facilities planning), economic and financial feasibility, feasibility towards social culture, and environmental feasibility. From the results of field, calculations obtained that the location of Upper Batang Sumani River obtained the actual head of 29 meters.While the parameters

which are also the main consideration is the discharge of the instantaneous discharge at upstream rivers Sumani rivers carried out the data of debit obtained measurable discharge 15.44 m3/s.

From the result of physical analysis to civil building that it got :

1. The location for the intake channel is at coordinates 00.56,40.6 LS and 100.36.25.3 BT where the irrigation dam is located which was established during the Dutch colonial period with the width of the weir 50 m with the height of the weir of approximately 1.2 m from the bottom of the river.

2. The length of the conductor channel after field carrying along 1150 to the tranquilizer with the cross section is planned to be a trapezium-shaped open channel with a slope of 1: 0,5 using stone pairs.

3. A tranquilizer is a planned building to reduce turbine flow before the flow into the penstock, the tranquilizer also serves as the final filter before the water enters the pipe and eventually enters the turbine.

4. Pipe rapid (penstock) is a pipe that serves to drain the water from the sedative pond to the turbine, the size of the pipe is planned to have a diameter of 2 m, with a length of 182 m.

5. Water power generated turbine 1176 kW and generator power 1 MW or kVA generator 1250 Kva

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DEVELOPING SOFT SKILLS LEARNING MODEL
FOR MECHANICAL ENGINEERING STUDENTS OF VOCATIONAL
HIGH SCHOOL

Suryo Hartanto

Universitas Riau Kepulauan Batam, Indonesia

ABSTRACT: This research was based on the very low competency of soft skills acquired by graduates of Mechanical Engineering of Vocational High School performed at workplaces. The objectives of the research were to identify specific soft skills that should be mastered by students of Mechanical engineering and to develop instructional models to teach the soft skills. The research consisted of two parts: (1) to identify soft skills needed by students of Mechanical by using engineering survey and questionnaire, (2) to develop instructional models to teach soft skills, followed a modified Borg & Gail design through R&D research design. The instructional models were called six principles of soft skills instructional models, or MP2S6P. The effectiveness of the model of an experiment was conducted through a posttest-only control group design. Based on the research findings, there are 27 soft skills that should be mastered by students of Mechanical Engineering. The application of the developed MP26P model resulted in significant achievement which was better than by using conventional instruction towards the students at Mechanical Engineering Department. The teachers and students have positive perceptions about the MP2S6P model. Based on the results, it can be recommended that MP2S6P should be developed and used in teaching necessary soft skills in Vocational High Schools.

Keywords: Soft Skills, MP2S6P, Research and Development

1. INTRODUCTION

Soft skills play a dominant role supporting someone's work and career development [15].Future career success of students supports employers' opinions that some soft skillsare a better predictor of adult success (Salaries, graduation rates, home ownership) than technical skills. Appropriate soft skills play an important role in a successful career as well as during social interactions in the society. Also Reviews These skills are highly sought after by employers recruiting fresh graduates "[10]. The low soft skills of graduates of vocational greatly affect the absorption of labor vocational school graduates. Preliminary Survey of the study indicated problems of soft skills that are not optimal by employees of vocational school graduates, i.e.; a). low attitude of responsibility in the work and tasks, low achievement of employment targets, lack of desire to learn and improving their career, high lost time due to human error, lack of work discipline, lack of understanding of safety, lack of independence, lack of integrity, lack of work ethic as well as the less scrupulous in work. The following table shows workplace accidents due to the lack of understanding of workplace safety, and b) Increased customer claim.

Table 1. Accident Employee

No.	Year	Human Error	Tool Error	Number
1	2010	60	9	69
2	2011	67	9	76
3	2012	30	8	38
4	2013	68	5	73
5	2014	50	5	55
TOTAL		**275**	**36**	**311**

PT.BSB. 2012-2014. [6].

Vocational teaching and learning processes tend to rely on the ability of hard skills while the world of working requires a workforce that is efficient, effective and service-oriented to quality standards. Essentially learning soft skills should be directly integrated with work processes that shape the experiences of hard skills and softskills in the learning process. Soft skills are character traits, attitudes, and behaviors-rather than technical aptitude or knowledge."[18], [6]. The purpose of this study was to reveal the coveragesoft skillsneeded and very important needed by industry to be taught to students of Mechanical Engineering Department of Vocational high school (SMK) as well as to determine the validity, effectiveness, and practicalities of the developedsoft skills learning model.

Learning the hard skills and soft skills in vocational students should be balanced. Soft skills are as important as cognitive skills[6].Soft skills of the individual to meet the world of work is needed in

the future, "the future of the occupational structure in the Industrialized world is to Eliminate more and more such unskilled jobs and to put an increasing premium on higher levels of reading, computation, communication, or reasoning and problem-solvingskills In essence. The skills Learned in school and the skills learned on the jobs will be Increasingly seen as complementary and interactive"[7].

The learning model is a structured procedure used to achieve the learning objectives of effective, practical and efficient in theprocess learning to achieve optimal student competence [14], [20]. MP2S6P is a learning model that is integrated with the world of work and it is developed based on the needs of the soft skills of industrial jobs. Identifying the soft skills used as a basis to develop methods, approaches, and strategies suitable for the use in teaching soft skills. MP2S6P compiled systematically taking into account the needs of student competence, assessment, and evaluation of soft skills. MP2S6P is integrated with the strategy of work shadowing and provides meaningful learning. Reference [19], intelligence and creativity can be formed from the neighborhood and school. Soft skills with work shadowing refer to the six principles of approaches: learning by doing, learning by participating, exemplary, disciplined, habituation and contextual teaching-learning where it obtained through a mentoring process with experts in the industry in accordance with the machines competences. Work shadowing gives students the opportunity to learn and feel instantly becoming part of the work did [5], [6].
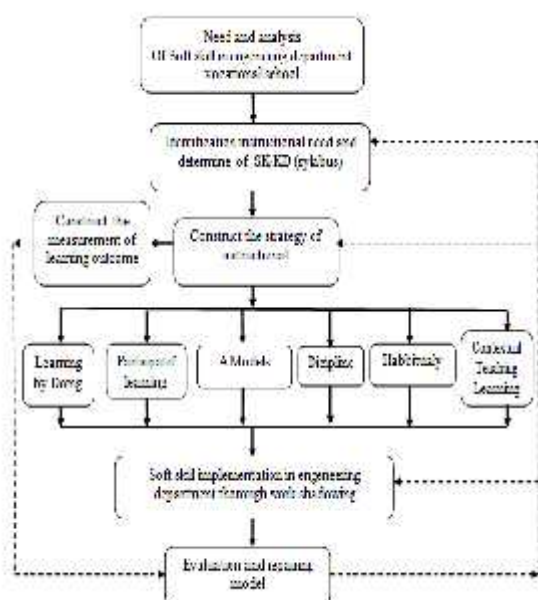
Figure 1. Six Principles of Soft Skills Instructional Model

2. RESEARCH METHOD

This study consisted of two stages. First was the analysis of needs (need analysis) through an approach DACUM (Developing curriculum) [12], [6].The second was using research & development (R and D). It was through the design of the modified by Borg and Gall, with a four-step process: (1) Perform analysis of the product to be developed, (2) Develop initial product, (3)Validation experts and revision, and (4) The field trials and the final product.

The samples of needs analysis were 50 respondents: the machining industry practitioners, teachers, and experts Machining vocational training fields of human resource development in the Province of Riau Islands. Likert scale questionnaire instrument used categories of; Very Important, Important, Less Important and Not important. Results of needs analysis were being as the basis for a second study with the results of the product are MP2S6P to support learning model books, guidebooks instructors, teachers, and students.

The second research product was the validity, effectiveness, and practicalities of the product. Test of the validity was using content validity, through a questionnaire, by five experts selected who are appropriate in the relevant field. The validity test results were delivered in a descriptive form and Interclass correlation. Test of the effectiveness of the learning model MP2S6 was delivered through the actions of the experiment, where the sample and population were students of XI grade student of SMK at Batam. Samples were selected by using random cluster samplingtechnique where the students, who are conducting industrial work practices, are divided into two groups. The control group was students who perform with a conventional industry practice without using the strategy work shadowing and learning soft skills. The experimental group was working students practice industries using learning model soft skills six principles (MP2S6P) with strategy work shadowing. Test of the practicalities of the perception of teachers and students to MP2S6P after the industrial working practices conducted as measured using a questionnaire, the experimental group students, and teachers in Engineering machine. Data were analyzed using descriptive quantitative.

3. RESULT AND DISCUSSION

Based on the results of the first study, there are 27 items of soft skills in machining work. Soft skills that must be possessed by students of Mechanical Engineering Department of SMK [6], in the general categories, namely: (1) Demonstrate a willingness to develop a career, (2) Shows the communication ethics, (3) Demonstrate interpersonal relationships, (4) Demonstrate cooperation, (5) Demonstrate a high

work ethic, (6) Showing actions solve the problem, (7) Maintaining timely attendance, (8) Demonstrate high initiative, (9) Demonstrate honesty, (10) Observe all the rules of work, (11) Demonstrate a responsible attitude on the job, (12) Shows adaptation of work. [6] of soft skills Special machining the workforce, namely: (13) Trying to comply with appropriate design of work processes of production, (14) Trying to adhere to production quotas, (15) Shows being supportive, caring for and maintaining the company's success, (16) Motivated to follow self-development training, (17) Shows appropriate operational planning and product specs, (18) Always demonstrate Warming up machines, (19) Indicates operational readiness of equipment, checking the engine unit (20) Shows, (21) setting the machine according to the specifications, demonstrating (22) material handling, (23) Demonstrating health and safety, (24) Showing prudence in operating machines, (25) Indicates maintenance and engine maintenance, (26) Demonstrate checking the work, turn off the engine, and (27) Demonstrate appropriate procedure.

Based on the results of research and development, the validityof theexpert judgment, using a Likert scale questionnaire with the assessment, it was declared that the product was valid. Test of effectiveness was by assessing learning outcomes of learning soft skills by the students at the experimental action. Soft skills assessment was conducted by instructors on industrial working practices with instrument rating action. Effectiveness test was aimed to see the results of hypothesis in the following Table 2:

Table 2. Hypothesis MP2S6P

		Scores of Control Group
Test Value =0	T	39.017
	Df	14
	Sig.	(2-tailed),000,
	Mean Difference	74.400
	95% Confidence Interval of the Difference	Lower	70.31
		Upper	78.49

Based on Table 2, number t_{count} = 39.017 for the control group, whereas for $t_{count}$of experimental groups was 31.439 with the t_{table}at df = 14 significance at 5% = 1,761. Thus, if the mark of t_{count} >t_{table}, (39.017 > 1.762 and 31.439 > 1.761), the$H_0$was rejected and Ha was received (significantly). Based on the meandifferenceon the chart of a control group of 74,400 and 81,000 for the experimental group, the application of learning model soft skills for six principles are effectively

improve learning outcomesof students' soft skills at Mechanical Engineering Department of SMK.

Test of practicalities was conducted by identifying the perceptions of students in the experimental group and teacher of Mechanical Engineering at SMK. Based on the data obtained, calculation of practicalities was 86.8% for teachers and 80.6% of students' respondents, with the categories of "Good". Then, test the practicalities of learning model soft skills for six principles stated as the Good category.

Table 3. Distribution of Perception Data of Teacher and Student

Respondents	Teacher	Student	Respondents	Teacher	Student
Sample	12	15	Variance	82.932	72.352
Mean	143.25	148.27	Minimum	123	137
Median	142.00	148.00	Maximum	157	166
Mode	142	137ᵃ	Sum	1719	2224

Soft skills provide an important role in the field of machining work, [1], [18], which is a necessity in the face of the working world of the 21st century, [17],communication, relationships and collaboration, critical thinking and decision making, and initiative and self-direction. Soft skills possessed by the individual in the learning process will be interconnected to support the field of employment. [4].1).Introduce students to basic people skills so they understand how to get along with people.2) Segue to teaching essential customer service skills. 3).Foster student understanding by facilitating a problem-solving discussion based on real-life situations. 4). Have students demonstrated the people skills they have learned using role-play exercises in a mock business setting. Student learning outcomes can be influenced by several factors, among others, is the accuracy of teachers choose learning model that results will improve understanding and experience of the students in learning. [13], [2], learning model, a blueprint in teaching for a teacher who provides structure and guidance to teachers in the learning process. MP2S6P provide concrete learning experiences that correspond to the learning needs of school learning with the learning process directly on the specialist field of mechanical engineering.[11], [16], [8]. Learning is integrated with the world of work, provide experience to students and build bridges between school education with the world of professional work to combine the theoretical capability in education direct application in the world of work. MP2S6P is an effort to prepare

individual learners to have the ability in certain areas of work.[3].

4. CONCLUSION

There are 27 soft skills in Mechanical Engineering of vocational high school found through needs analysis; 12 soft skills for the general category and 15 soft skills for specific machines categories. Through the technique of Learning Model of Soft Skills of Six Principles, the 27 soft skills taught to students. Results of research and development with the soft skills learning model towards the students of Mechanical Engineering Department of SMK was declared valid, effective and practical.

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IMPACT OF WORK-BASED LEARNING OF CONCRETE STONE WORK PRACTICE ON DIPLOMA-III CIVIL ENGINEERING STUDENTS

Syafiatun Siregar

Faculty of Engineering, Universitas Negeri Medan, Sumatera Utara, Indonesia.

ABSTRACT: The practice of stone and concrete work is one of the existing courses in the third semester of Diploma-III Program of Civil Engineering. One part of the working practice of stone and concrete is the work of ceramic installation. The competent workforce in a ceramic installation is able to produce high finance compared to other concrete stonework. The purpose of this research is to measure students' competence in the ceramics installation with work-based learning. The research method is done by direct observation conducted by the researcher on the student activity level. Learning is done with a work-based learning model, where students directly practice such as conditions in the field work. The results of the study have an impact on the improvement of students' competence in the installation of ceramics with work-based learning. The improvement was also seen from the result of student learning done with pre-test and post-test.

Keywords: Work-based learning, Practice of stone and concrete work, ceramic installation

1. INTRODUCTION

Concrete stonework on building construction is a science that underlies the development of technological development of infrastructure, especially buildings. Concrete stonework itself has various types that must be controlled by construction workers such as foundation work, wall work, column work, beams and plates and finishing work. The finishing work consists of the dewatering work, ceramic installation, molding/relief techniques and others. Technological developments in such a rapidly building construction work that requires the competence and expertise of construction workers to obtain a strong building, sturdy and aesthetics. Therefore, workers engaged in building construction must have adequate competence/expertise before entering the world of work. Concrete is a standout amongst the most generally utilized development materials in the execution of current building structures. Solid innovation is an all-inclusive science that underlies the improvement of present-day innovation and is essential in an assortment of controls and builds up the energy of human idea (S.Siregar, 2017)

Department of Building Engineering Education (PTB) Faculty of Engineering Unimed overshadowing three courses of study programs namely Building Engineering Education (Pendidikan Teknik Bangunan), Diploma-III Civil Engineering and Strata-1 Civil Engineering. Each course of study has basic vocational practice subjects: namely concrete stone work practices, woodworking practices, plumbing and sanitation practices, land measurement practices, and others. The practice of stone and concrete work is a practice class with 2 credits weight that is implemented in semester 3 every academic year. The contents of the syllabus include learning materials of stone and concrete vocational practice whose competence is very much needed in the world of construction work. During this time in the Department of PTB especially in the practical courses of stone and concrete work, the coverage of the contents of the syllabus has long been not harmonized with the development of building construction. Where learning practices practiced in workshops are not in accordance with conditions of employment. This condition is no longer aligned with the development of working technology of stone and concrete in the world of work. Some of the implications of technological development can be seen with minimal skills and knowledge, teamwork skills, use of tools and materials and others related to the construction of the building. For that, we need to do a learning activity that aims to improve the skills and knowledge of Civil Engineering students. And will eventually increase the competence of graduates in entering the world of work of building construction.

Implementation of vocational education in PTB should continue to be done so that the quality of graduates according to the demands of the job market. During this time the learning done in the working practice of stone and concrete is a direct learning. The material given by the lecturer has been prepared based on the syllabus in SMK. Constraints that occur in students in stone and concrete work practices are lack of understanding, low ability to recognize tools and materials, lack of communication between teamwork and so on. The low ability and knowledge have an impact on the learning outcomes obtained. This is marked by the doing of pretest by the researcher. Therefore it is necessary to create a model of learning that can improve the cognitive, affective and psychomotor aspects of students.

The study of concrete stone work practice on vocational education Diploma-III Civil Engineering with Work-Based Learning approach (WBL), where WBL is considered as the right learning because it makes learning atmosphere equal to the work field. Work-based learning emphasizes the importance of creating an atmosphere of practice similar to the working world of the Diploma III graduate in Civil Engineering. because of work-based learning. Students who get direct learning are expected to easily capture learning and easily do it in the world of work.

2. LITERATURE REVIEW

Technological advances and workplace dynamics, the challenges of the working world with increasingly high work competencies require vocational education institutions to anticipate and cope with the changes that occur by utilizing the capabilities and capacities of the candidate workplace location. The quality of vocational education results D 3 Civil Engineering both in terms of process and product is strongly influenced by the learning approach used in organizing vocational education. Implementation of vocational education cannot be without cooperation between educational institutions with the business world and the industrial world, especially building construction work. Theories of experiential learning, context teaching and learning, and work-based learning become highly relevant in the organization of vocational education. The development of vocational education implementation model with various theories is done to improve the quality of learning which ultimately affects the quality of learning outcomes and the quality of graduates. Work-based learning (WBL) is a learning approach that utilizes the workplace to structure workplace experiences that contribute to the social, academic, and career development of learners and be a supplement to learning activities. Workplace learning experiences are applied, refined, expanded in learning both on campus and at work. With the WBL, learners develop attitudes, knowledge, skill, insight, behavior, habits, and associations from the experiences of both places and allow learning to occur associated with real-life work activities (Lynch & Harnish, 1998).

Recent studies have concluded that the use of Work-Based Learning Approach (WBL) in education has a positive influence on achievement, motivation and continuing education (Bailey & Merrit, 1997). Research and evaluation studies on the WBL show a correlation between outcomes (outputs of learning outcomes) and outcomes of graduates with learning structures that schools and industry provide the workplace experience. When program objectives, workplace-based curriculums, and experiences are designed and applied with adequate staff support and are properly evaluated, the program will have a positive impact (Lynch & Harnish, 1998; Fallow &

Weller, 2000; Braham & Pickering, 2007; Garnett, 2008).

The role of D3 program of Civil Engineering which prepares to execute staffs with the quality of graduates in accordance with the job market is examined by applying the WBL implementation model to improve the quality of learning outcomes and the quality of the graduates include: 1) to know the impact of work-based learning on vocational education program D3 Teknik Civil to the quality of learning outcomes, 2) knowing the output (output) aspects of the quality of learning outcomes WBL. Learning is done by giving treatment with the WBL Model in a group of students who take courses Practice of concrete stonework.

The WBL model operates a concrete stone practice program at a civil engineering workshop that is ultimately jointly between vocational education institutions and building construction work. The objective provides an experience of how the field works directly and the application later in the world of industry/work world. Vocational Education D3 Civil Engineering is a vocational education that produces semi-professional D3 level workers with a spectrum of skills covering finishing work. The core of WBL's activities is the experience of working according to the work field in which there are processes: communication, information, and learning/training; facilitation; mentoring/mentoring; mentoring; monitoring/supervision; and evaluation.

3. METHODOLOGY

This research was conducted on D3 Civil Engineering students majoring in PTB FT. Unimed with the number of respondents as many as 30 participants. The place of research was conducted in Civil Engineering Workshop of Building Engineering Department. The study was conducted by conducting preliminary tests to determine the students' basic skills in stone and concrete work practices. Furthermore, researchers will observe the behavior of students in accordance with the affective, cognitive and psychometric. To conduct research, researchers prepare some supporting instruments. Instruments are based on the results of the literature, discussions with some experts and input from lecturers of course lecturers. The research is done through 2 cycles and each cycle 2 times meeting with finishing materials that are ceramic installation and molding technique.

The implementation of WBL learning does not have to be the same stage, but this stage is adapted to the type of training, organizational readiness, facilities and infrastructure facilities, funds, human resources available. The steps that must be implemented in a WBL are the preliminary stage, the implementation stage, the observation stage and the pre-planning phase. The detailed steps are as follows: 1) identify the needs; 2) formulate objectives; 3) design instructional analysis; 4) developing methods;

5) determine the evaluation pattern; 6) implement the program and; 7) measure learning outcomes.

The data in this study consists of qualitative and quantitative data. Qualitative data obtained through observation, direct observation, interview with instructors about the learning done. Quantitative data obtained from the validation of the model summarized by validation instrument. To obtain these data, then the data collection techniques will be tailored to the type of data required

3. RESULT

The results of the implementation of this research activity are described in accordance with the stages in the form of learning cycles conducted in the process of learning in the classroom. Each cycle consists of four stages: planning, execution, observation/ reflection, and re-planning. The planning stage is done by planning the process before the learning such as identification of needs, formulate goals, design instructional analysis, preparation of learning tools, group determination, materials, and others. The implementation stage is done with three meetings for plastering wall, ceramic installation and molding technique which is done by introduction stage, core stage, and closing stage. The preliminary stage is to pre-test the participants. The core stage is by giving the material by the structure and explaining the learning that will be done. Observation stage where the instructor records all activities during the learning process while at the end of the learning evaluation.

Table 1 Aspects assessed in the WBL

No	The measured aspects	Percentage %				
		Before WBL	After WBL/Meeting			
			I	II	III	IV
1	The ability to recognize tools	50,00	56,67	66,67	83,33	100,00
2	The ability to recognize materials	60,00	66,67	43,33	93,33	100,00
3	The ability to use tools	46,67	60,00	70,00	83,33	90,00
4	Ability to compose materials	43,33	50,00	73,33	86,67	93,33
5	Communicating and participating well in group	56,67	66,67	73,33	80,00	90,00
6	Listening to the instructor's direction	46,67	50,00	56,67	63,33	86,67
7	Providing ideas/opinions	50,00	56,67	66,67	73,33	86,67
8	Responding to the opinions of others	33,33	46,67	53,33	60,00	80,00
9	Ability to carry out work	33,33	43,33	53,33	63,33	83,33
10	Paying attention to fellow members of other groups	40,00	50,00	66,67	76,67	83,33
11	Making a summary of the study	43,33	53,33	66,67	80,00	86,67
	Average	45,76	54,55	62,73	76,67	89,09

Table 1 shows the aspects assessed in the WBL and Graph 1 is the percentage graph of aspect appraisal of WBL participants. The x-axis shows the measured aspect of the WBL participants consisting of 11 aspects ie 1) The ability to recognize tools, 2) The ability to recognize materials, 3) The ability to use tools, 4) Ability to compose materials, 5) Communicating and participating well in group, 6) Listening to the instructor's direction, 7) Providing ideas/opinions, 8) Responding to the opinions of others, 9) Ability to carry out work, 10) Paying attention to fellow members of other groups, and 11) Making a summary of the study. these eleven aspects were assessed at the beginning of learning before using the WBL and were assessed after getting the WBL through 4 meetings. At the beginning before using the WBL, the participants' liveliness is low from the various aspects measured. Especially on the aspects of responding to the opinions of others and carry out the work that only 33.33%. This aspect is low due to the nature of students who are still not able to accept the opinions of others (friends). Similarly, with the aspect of carrying out the work, it is still very low, because the students' initial ability in the practice of concrete stone is still low. Of the four meetings conducted there was a significant increase. This means that there is the progress of knowledge and attitude of students who have got WBL. This concern is marked by group members helping each other to be able to do the finishing work. Overall, the percentage of the nine aspects measured increases after WBL.

At meeting 1 shows an increase in almost all measured aspects. A sharply increased percentage can be seen in 'the ability to recognize tools and materials'. The ability to recognize student tools and materials is very low prior to the WBL. Students tend to be less familiar with tools and materials for finishing work. The ability to recognize tools and materials continues to increase until the end of the meeting. The end result shows 100% of students are able to recognize tools and materials used for finishing work.

The ability to compose materials for finishing work also increased. The pretest initiation made by tool composition was only 46.67% and the end of the meeting increased to 93.33%. This suggests that students are better able to understand how to make the composition of a mixture with guidance from a lecturer. The ability to recognize tool, materials,

using tools and composing materials is supported by the ability or courage of students in expressing their curiosity in the learning process. Aspects of 'Communicating and participating well in group', is an aspect that increased the percentage of 56.67% to 90%, meaning that all participants are very communicative in the learning process. This communication is characterized by group members helping each other to be able to do the finishing work. Overall, the aspects measured in WBL learning activity are increased before using.

Research activities with WBL conducted have shown success in the implementation. One of the advantages of WBL that experts have discovered is to increase the liveliness of participants in the learning process. Therefore, Figure 2 above shows the results of the liveliness distribution of the participants examined during the WBL execution.
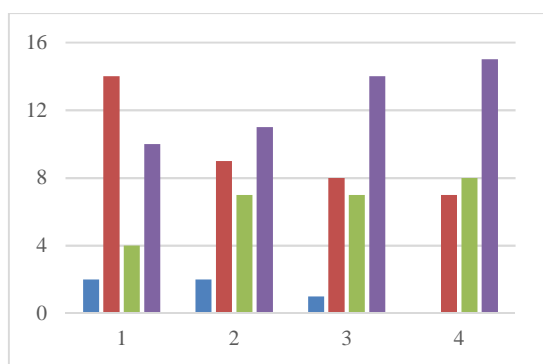
Fig. 2 Total level of activity of students with WBL

Students who are given work-based learning in Civil Engineering workshops are something new for the students themselves. Generally, participants have never had a learning experience that suits the workplace. Figure 2 shows the level of activity of WBL participants observed during the learning process. At the beginning of the meeting, the students tend to be passive and wait for instructor instruction (lecturer), with a low level of activity and participation in the learning process. Initially, the number of passive participants by 40% (12 people) along with the WBL given, then the number of passive students is reduced to 0% (0 people). WBL participants, amounting to 30 people are a very active role in the learning process. Furthermore, with the WBL learning, there is a significant increase in each meeting. Increasing student activity is expected to have implications on the results of the final value or evaluation of the competencies of each participant.
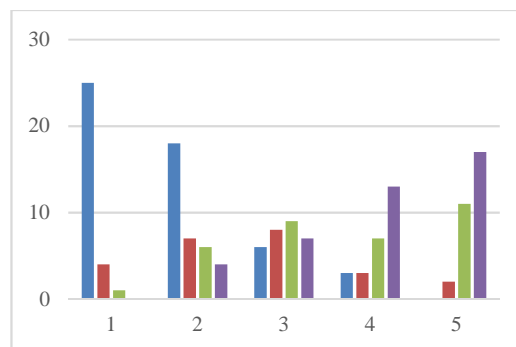
Fig. 3. Recapitulation of learning outcomes students

Figure 3 shows the evaluation of learning outcomes of the WBL process undertaken. The Y-axis is the number of WBL participants, whereas the X-axis is the learning outcome of the WBL participants. Initially, a pretest (diagram 1) was conducted to participants who produced an incompetent 96.67%. The next meetings (second, third and fourth) have been conducted by the WBL and the results can be seen in diagrams 2, 3 and 4. Along with the WBL implementation that provides increased competency of participants at the end of the meeting, there are 0% not competent. From figure 3, there is a significant increase from before doing WBL and after doing WBL.

4. DISCUSSION

From the results of research in the first cycle, shows that there are a change in cognitive understanding (competence) participants in doing finishing work. with WBL. From Figure 1, the difference between pretest and posttest averages of the first meeting is 45.76 and 89.09 at the end of the meeting. The difference in scores has not shown a big change when it is associated with the expected competence value.

To improve such changes through the WBL it is necessary to undertake learning that is truly appropriate to the workplace. Implementation of WBL can be continued by doing training in the workplace so that the knowledge obtained is more directed and useful well. Training in the workplace will help D3 Civil Engineering students about the real world of work. By implementing a guided WBL, where each participant is active in communicating and participating in the finishing work, the understanding will be much improved compared to without the WBL. The impact of work-based learning that has been done can increase the activity of students. Furthermore, WBL can also be done not only for vocational students but also for construction workers. Providing WBL in the classroom will further enhance the competence of students who will enter the world of work. The next meeting found the difference in value between the pre-test and post-test has risen significantly, where the average final score

is obtained at 89.09.

Furthermore, with the WBL in addition to obtaining the results of the participants' competency evaluation also obtained the result of evaluation activity level of the student during a learning process. Before implementing WBL, the participant's average activity was 45,76 (pre-test). While after implementing WBL the average value of activity level increased significantly from 54,55 (meeting 1), 62,73 (meeting 2), 76,67 (meeting 3) and finally increased to 89,09 (meeting 4). From the description, it can be concluded that the need for WBL to be given to participants before they enter the workforce they want.

Implementation of WBL conducted in the workshop can be continued by conducting training in the workplace. Workplace training will help construction workers about the real world of work. By implementing a guided WBL, where every participant is active in communicating and participating in finishing work, understanding will be much improved compared to without WBL. Finally, WBL can also be done not only for construction workers but for vocational education students. Providing WBL in the classroom will further enhance the competence of students who will enter the world of work

5. ACKNOWLEDGMENTS

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DEVELOMPENT OF WEB-BASED DECISION SUPPORT SYSTEM FOR SCHOLARSHIP RECIPIENTS SELECTION USING ANALYTICAL HIERARCHY PROCESS (AHP) METHOD

Titi Sriwahyuni[1],Dedi Irfan[2],Ika PharmaDewi dan Hanny Maharani

[1]Department of Electrical Engineering, Fakulty of Engineering, Universitas Negeri Padang
[2] Department of Electrical Engineering, Fakulty of Engineering, Universitas Negeri Padang

ABSTRACT: The goal of this research was to produce a decision support system to solve a semistructured problem that was a determination of scholarship receiver. The system developed a Web-based Decision Support System, using the PHP programming language (PHP Hypertext Preprocessor) and based CodeIgniter Framework and MySQL as a Database Management System (DBMS). The method used in this system development is Analytical Hierarchy Process (AHP). This method will make a decision by breaking the problem into its parts, develop criteria into a hierarchy, determines the priority value of each criterion in the form of pair wise comparison matrix, performing synthesis to obtain the overall priorities, and measure the hierarchy ratio. From these steps will get the value of the priority criteria and sub-criteria that used to calculate the points students. Students with the highest points will be recommended by the school to get the scholarship.

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Keywords: Decision Support System, Analytical Hierarchy Process (AHP), Scholarship, PHP, CodeIgniter

1. INTRODUCTION

Education has a very important role in life. The development of a nation can not be separated from the education system, because a good education system will bring progress for the nation. With human education has knowledge, values, and attitudes in doing to participate to support the growth and development needed by himself, society, nation, and state.

The government realizes that education is very important for the community. So the government supports every citizen to achieve education with the declaration of 9-year compulsory education. Not only that, even the government also provides assistance in the form of scholarships to free education.

The scholarship is one of the government programs, private companies, embassies, universities, and educational institutions or researchers to improve the quality of education in Indonesia. Gerdon (2011: 165) states that "the scholarship is the income for the receiving and the purpose of the scholarship is to help ease the burden of tuition fees of students or students who get". With the scholarship program is expected to ease the economic burden of achieving students but economically disadvantaged to be able to continue education.

Scholarship grants are still using different variables/indicators in each agency. So it is not uncommon to see a child who has the same poverty level but with different priorities in receiving scholarships. It is this that underlies the decision support system developed to help semiterstruktur problems that often occur. Where the problem always recurs with an unclear settlement. So it requires an accurate decision by the leader or middle-level manager. With this decision support system will be given recommendations for middle managers/managers to be able to make decisions appropriately.

SMKN 2 Padang is one of the SMK N under the Education Office of West Sumatra Province. In 2015, the number of students SMK N 2 Padang as many as 1141 students, with the number of male students as many as 373 people, and women 818 people. Of the 1,191 students, as many as 583 students expressed less able. Along with the number of underprivileged students, then the distribution of scholarships by certain institutions or companies. The scholarships are classified as scholarship type of achievement and less capable types.

Registration of scholarship in SMKN 2 Padang still using manual way of filling sheets form by students obtained from student waka through their respective homeroom. Once the form is filled in, it is then returned to the homeroom to

be checked for the accuracy and completeness of the data. Then the list of students whose data has been completed will be forwarded to the administration to be selected based on predetermined criteria. After going through the selection process, it will get the data of the final scholarship recipient who the data will be submitted back to students affair for further processing.

Design of Decision Support Support System This scholarship produces a decision support system that can manage the selection process of scholarship in SMK N 2 Padang starting from registration to get some students who declared legitimate get scholarship.

Analytical Hierarchy Process (AHP) is a method for solving a complex, unstructured situation into several components in a hierarchical arrangement, giving subjective values of the relative importance of each criterion, and defining which criteria have the highest priority to influence the outcome of the situation the. Basically, the decision-making process is choosing an alternative. AHP's main tool is a hierarchy enabling the breaking down of complex or unstructured problems in sub-issues, then compiling them into a hierarchy.

In solving the problem with AHP there are several principles that must be understood, among them are:
1. Create a hierarchy

Complex systems can be understood by breaking them into supporting elements, hierarchically arranging elements, and combining them or synthesizing them.
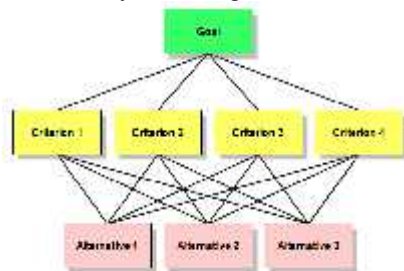
Figure 1. AHP Method Hierarchy

2. Criteria and alternative assessment

Criteria and alternatives are done by pairwise comparisons. According to Saaty (1988), for various issues, the scale 1 to 9 is the best scale for expressing opinions. The value and definition of the qualitative opinion of the comparison scale can be measured using the analysis table as shown in Table 1 below.

Table 1. Saaty's Comparison Scale

Scale i,j	Information
1	Both criteria are equally important.
3	Criterion i is rather (weakly) more important than criterion j.
5	Criterion i is strongly (strongly) important from criterion j.
7	Criteria i is very (very strongly) important from criterion j.
9	Criterion I has an extreme interest (absolutely) from criterion j.
2, 4, 6, 8	Criteria i and j have a middle value between two adjacent decision values.
Reverse ($i,j = 1/ j,i$)	Criterion i has more importance than criterion j, then criterion j has reversed value.

Based on these criteria values can be compiled a pairwise comparison matrix A as follows:

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} & \cdots & \cdots & \cdots & a_{1,j} \\ a_{21} & a_{22} & a_{23} & \cdots & \cdots & \cdots & a_{2,j} \\ a_{31} & a_{32} & a_{33} & \cdots & \cdots & \cdots & a_{i,j} \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \\ a_{11} & a_{12} & a_{13} & \cdots & \cdots & \cdots & a_{i,j} \end{bmatrix}$$

I, j represents the matrix element A of the thirteenth row of the column.

3. Synthesis of priority (determining priority)

For each criterion and alternative, a pairwise comparison (Pairwise Comparisons) is required. The relative comparative values of all alternative criteria can be adjusted to the predetermined judgment to generate weight and priority. Weights and priorities are calculated by manipulating the matrix or by solving the mathematical equations.

4. Logical Consistency (Logical Consistency)

Consistency has two meanings. First, similar objects can be grouped according to uniformity and relevance. Secondly, it concerns the level of inter-object relationships based on certain criteria.

5. DESIGN AND ANALYSIS SYSTEM

4.1 Analysis of AHP Method

The criteria considered in the selection of scholarship recipients in SMK N 2 Padang are:

1) The Scores of Progress Report (R)

It is a criterion that relates to the students' appraisal conducted within a certain period. In this case, the value of report cards used is the value of the last semester report card. The higher the value of the report cards of the scholarship recipients, the greater the opportunity to obtain scholarships.

2) Academic Achievement (PA)

It is a criterion related to student achievement of scholarship recipients, such as academic achievement that students achieve at school, city/provincial and national levels. The higher the level of academic achievement of the scholarship recipients, the more chance of getting a bigger scholarship.

3) Non-Academic Achievement (PNA)

It is a criterion related to academic achievement outside the academic that is extracurricular either at school, city/province, and national level. The higher the level of non-academic achievement of the scholarship recipients, the more chance of getting a bigger scholarship.

4) Parent's Earnings

Assessment criteria for this parent's income amount include the amount of salary received by the parents of the candidates receiving the scholarship for one month. The lower the income of parents of prospective scholarship recipients, the opportunity to get a scholarship is greater.

5) Number of Parent Dependents

Assessment of the criteria of the number of dependents of this parent includes the number of children owned by the parents of the prospective scholarship recipients. The more the number of dependents of parents, the greater the opportunity for scholarship recipients to get scholarships.
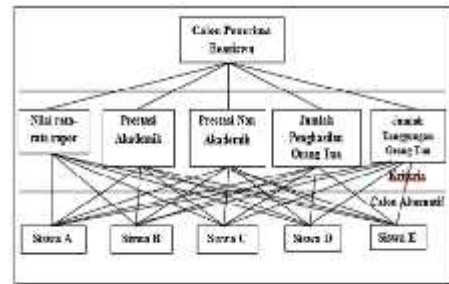
Figure 2. Structure of the Criteria Hierarchy

In figure 2 above, as for the objective of the decision support selection system, this scholarship is looking for the Scholarship Recipient Candidates. Criteria used are the Value Report, Academic Achievement, Non-Academic Achievement, Number of Parents and Total Parental Growth. While the alternative is the choice of scholarship applicants in SMK N 2 Padang.

Each alternative (prospective scholarship recipient) has different values and conditions for each criterion. hence it is necessary to convert the criterion value of the scholarship applicant's score to get a comparison of scoring scores among selected criteria.

1) The Scores of Progress Report (R)

Table 1. The Scores of Progress Report Value Parameters

Scores	Value
R > 80	SangatBaik
45< R <=80	Baik
70< R <=75	Cukup
R < = 70	Kurang

2) Academic Achievement

Table 2. Academic Achievement Parameter

Academic Achievement	Value
Nasional	SangatBaik
Provinsi / Kota	Baik
Sekolah	Cukup
Tidak Ada	Kurang

3) Non-Academic Achievement

Table 3. Non-Academic Achievement Parameter

Non-Academic Achievement	Value
Nasional	SangatBaik
Provinsi / Kota	Baik
Sekolah	Cukup
Tidak Ada	Kurang

4) Parent's Earnings

Table 4. Parent's Earnings Parameter

Parent's Earning (P)	Value
P < = Rp. 1.500.000,-	Kurang
Rp. 1.500.000 < P < = Rp. 2.000.000-	Cukup
Rp. 2.000.000 < P < = Rp. 2.500.000,-	Baik
P > = Rp. 2.500.000,-	Sangat baik

5) Number of Parent Dependents

Table 5. Number of Parent Dependents Parameter

Number of Parent Dependents (T)	Value
T >5	SangatBaik
T = 5	Baik
T = 4	Cukup
T < = 3	Kurang

After getting the priority then determined the comparison matrix

1) Determining the Matched Comparison Matrix Between Criteria (Level 0) For Award Type Scholarship

Table 6. Matched Comparison Matrix Between Criteria (Level 0) For Award Type Scholarship

Criteria	R	PA	PNA	P	T
R	1	3	3	4	5
PA	0.33	1	2	3	4
PNA	0.33	0.5	1	2	3
P	0.25	0.33	0.5	1	2
T	0.2	0.25	0.33	0.5	1
Jumlah	2.11	5.08	6.83	10.5	15

2) Determining the Matched Comparison Matrix Between Criteria (Level 0) For Less-Capable Scholarships

Table 7. Matched Comparison Matrix Between Criteria (Level 0) For Less-Capable Scholarships

Kriteria	P	T	R	PA	PNA
P	1	3	7	8	9
T	0.33	1	5	6	7
R	0.14	0.2	1	2	3
PA	0.13	0.17	0.5	1	2
PNA	0.11	0.14	0.33	0.5	1
Jumlah	1.71	4.51	13.83	17.5	22

After determining the comparison matrix between the criteria, the next step is to determine the matrix of criteria, the matrix of the comparison of each row, and calculate the consistency ratio of the criteria.

The next step is to determine the matrix of comparison between sub-criteria, the sub-criteria value matrix, the matrix of comparison of each sub-criterion line, and the sub-criteria consistency ratio in the same way. So for the final result is entered into a result matrix as below:

Table 7. Result Achievement Scholarship Matrix

R	PA	PNA	P	T
0.44	0.24	0.16	0.1	0.06
Sangat Baik	Sangat Baik	Sangat Baik	Sangat Baik	Sangat Baik
1	1	1	1	1
Baik	Baik	Baik	Baik	Baik
0.46	0.44	0.43	0.6	0.6
Cukup	Cukup	Cukup	Cukup	Cukup
0.2	0.28	0.26	0.36	0.34
Kurang	Kurang	Kurang	Kurang	Kurang
0.13	0.13	0.15	0.15	0.21

Table 8. Matrix of Underprivileged Scholarship Results

P	T	R	PA	PNA
0.52	0.29	0.09	0.06	0.04
Sangat Baik	Sangat Baik	Sangat Baik	Sangat Baik	Sangat Baik
1	1	1	1	1
Baik	Baik	Baik	Baik	Baik
0.6	0.6	0.46	0.44	0.43
Cukup	Cukup	Cukup	Cukup	Cukup
0.36	0.34	0.2	0.28	0.26
Kurang	Kurang	Kurang	Kurang	Kurang
0.15	0.21	0.13	0.13	0.15

To determine the point of the scholarship recipients, the method is to multiply the students' scores with priority criteria and priority sub criteria based on the student's score.

After calculating each student score, then the scholarship candidates with the highest point will be eligible for a scholarship.

4.1 System Design

System design is done to illustrate, and sketch or arrangement of some separate elements into a unified whole. This design is the result of the transformation of the analysis into the design that will be implemented.Context Diagram can describe in general the flow of data from within the system interact with each other. Context Diagram of the decision support selection system in SMK N 2 Padang scholarship is as in Figure 3.

Figure 3. *Context Diagram*

Database design requires Entity Relational Diagram (ERD) to describe entities (actors) that play a role in a database and the relationship between actors who play the role. The following ERD of Decision Support Selection System Scholarship:
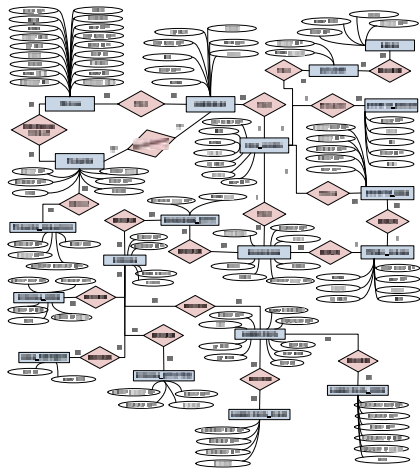
Figure 4. Entity Relational Diagram (ERD)

5. RESULT AND DISCUSSION

The implementation of the interface is to translate the layout that has been made on the interface design into the form of the system interface display intact. Login page is a page used as an intermediary to enter the system for schools that already have access rights

Figure5. Login Page View

On the Login page shown in Figure 5, it contains the username and password fields that must be filled in order to enter the system and use the features provided by the system.

Administration is an actor in charge of adding scholarships, checking the completeness of the requirements of scholarship participants, and conducting scholarship selection. In addition, Administration also served in adding majors and classes as well as add user homeroom.

Page admin menu is a page that displays some menus that can be accessed by the administration, including the menu Scholarships, Matrices, Participants, Selection, Types of Scholarships, Guardian Class, Department and Class. These menus are the way to access other administrative pages. Here is a page view of the administration menu:
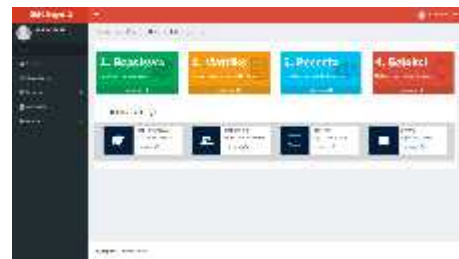
Figure 6. Page View Menu Administration

1) All Scholarships Page

All Scholarships Page are pages that are still on the scholarship menu. The page of all scholarships is used by the administration to see all the scholarships currently active. Here is an overview of all the scholarships:

Figure 7. Page Views All Scholarships

In Figure 7, we can see there are several buttons that will bring administration to a different page, such buttons include "Add Scholarship". Here is a page view that will appear when we select the button"Add Scholarship":

Figure 8. Page Views Add Scholarship

In addition to the "Add Scholarship" button there is also a button "Scholarship Walk" and "Scholarship Completed". The Button serves to showcase active scholarships and scholarships that have been completed / closed. Then still in picture 7, beside scholarship title there are some button, including Criteria button, Document, Edit and Delete. Button Criteria serves to add scholarship criteria. The appearance of the scholarship criteria page when the administration chose the Criteria button is as follows:

Figure 9. Scholarship PageViews

Figure 9 above shows the scholarship criteria page, to add the scholarship criterion simply by typing the criteria name in the criteria name field, then clicking the "Add" button, then the criteria will be added and will automatically be entered on the list of criteria that are in the column next to it.

After adding some scholarship criteria it will show some more buttons, namely button Parameter, Edit, and Delete. The following is a page view of the criterion of scholarship criteria when the administration chooses the button parameter:

Figure 10. Page View Add Parameter Criteria

Back to the picture 7, in addition to the Criterion button there is another button that is the Document button. Here is the look of the scholarship document page if the administration chose the "Document" button:

Figure 11. Document Document Scholarship View

Figure 11 is a page view of a scholarship document if the administration chooses a document button on one of the scholarships, in this case is Baznas Achievement Scholarship. To add the scholarship requirement document is by filling the form added document, then determine whether the document is mandatory or not.

2) Page Matrix Scholarship

Page Matrices The scholarship allows the administration to determine the matrix of pairwise comparison scholarship criteria (level 0). This matrix is the ratio of importance between a criterion and other criteria. Here is the pageview matrix comparison matched pair of scholarship criteria:

Figure 12. Page Views Matrix Comparison Pair Criteria Scholarship (Level 0)

In Figure 12, after determining the degree of importance between criteria when the administration chooses the "SimpanKriteria" button, the matrix of pairwise pairs of criteria is stored. In addition to the "SimpanKriteria" button there are 2 other buttons. Among the "LihatMatriks" button, this button serves to see the matrix of criteria values, the matrix of the sum of each line, and the calculation of the consistency ratio. While the "View

Sub Criteria" button serves to view the sub criteria matrix. Here is a page view of the sub criteria matrix:

Figure 20. Page View Matrix Comparison Subcriteria (Level 1)

3) Student Scholarship Page

Page Participants Scholarship is a page that is used to check the data of scholarship participants. In this case the administration checks the criteria requirements data of the participants with supporting documents of the requirements. The page views of scholarship participants are as follows:

Figure 21. Participants' Pageviews

The purpose of checking the participant data is to avoid any fraud or data error before the selection process. If there are errors or less data, the administration can send messages directly to the students concerned. The message will appear when the students login to use their respective accounts.

4) Page Process Selection of Scholarship

The scholarship selection process page is the page used for the scholarship value calculation process. After all student data is checked by administration, then administration is entitled to start value calculation process. The look of the scholarship selection process page is as follows:

Figure 13. Page Views of the Scholarship Selection Process

Figure 13 is the result of calculating the value of scholarship participants, the values are obtained from the criteria values that have been entered by each student.

The value in the total column is the sum of all the values of each criterion. The value is derived from the student's score multiplied by the priority value of each subcriteria described in chapter III. Student data will be automatically sorted by the system from the highest value to the lowest value, the student with the highest score is eligible for a scholarship.

5) Page Add Class Guardian

The homepage page is a page used by the administration to register a homeroom user in order to gain access to the system. Here is a page view add homeroom class:

Figure 14. Page View Add Class Guard

6) Page Add School

Page added majors is a page that used administration to input data majors that exist in SMK N 2. Here is a page view added majors:

Figure 15. Page View Add Program

7) Page Add Class

Page added class is a page used by the administration to add the existing class in SMK N 2 Padang. Here is a class page view:

Figure 16. Class Add Page View

a) Page of Students Affair

Students Affair is an actor who has limited access rights, which is to see the result of calculating the value of the scholarship participants and print it in the form of report to be submitted to the scholarship dealer.

1) Scholarship Selection End Selection Page

The scholarship selection selection page is a page that allows students to determine the final recipient of the scholarship based on the calculation of the value performed by the previous administration. In this system, student affairs have a managerial position, so the final decision is in student affairs, not in value calculations because decision support systems are only used to support decisions, not substitute decision makers in making decisions. Here students will choose students who are eligible for a scholarship based on other considerations beyond the criteria used previously. Here is the final selection of scholarship recipients:

Figure 17. Final Beneficiary Selection Page Selection

b) Report of the Scholarship Recipient's Report

The report page of the recipient of the scholarship is a page that allows students to print the results of the calculation of the scholarship value of the scholarship recipient in the form of the scholarship report to be submitted to the scholarship dealer. The report page views are as follows:

Figure 18. Report of the Scholarship Recipient's Report

To print the report of the scholarship recipients, the students choose the submenu of the scholarship achievement, whereas if they want to print the report of the recipients of the underprivileged scholarship then the student chooses submenu of the underprivileged scholarship.

The appearance of reports of recipients that are ready to print are as follows:

Figure 19. Views of the Scholarship Recipient Report

6. **CONCLUSION**

The conclusions that can be drawn from the Development of Decision Support System Selection Scholarship Using Analytical Hierarchy Process Based WEB method is as follows:

a. With the use of Personal Home Page (PHP) programming language and Codeigniter Framework we can develop a decision support system such as scholarship selection selection system.

b. Using the Analytical Hierarchy Process (AHP) method can facilitate the selection process based on the sum of the weights of each criterion.

c. With this system can help Waka Student and Administration in conducting the process of selecting scholarship type of achievement, less able and so on in SMK N 2 Padang.

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EFFECT OF ENGINE TEMPERATURE CHANGES ON INJECTION TIME OF FUEL AND GAS EMISSION OF GASOLINE ENGINE

Toto Sugiarto[1], Dwi Sudarno Putra[2], Wawan Purwanto[3]

Teknik Otomotif, Fakultas Teknik, Universitas Negeri Padang
totosugiarto@ft.unp.ac.id, dwisudarnoputra@ft.unp.ac.id, wawan5527@gmail.com

ABSTRACT: This paper aims to reveal the effects of changes in engine temperature on the injection time of fuel and the exhaust gas emissions produced by gasoline motors. Engine cooling temperature is measured by engine temperature sensors sent to the computer, which will regulate the time of spraying of fuel by the injector, this will affect the exhaust gas emission content. The data of cooling water temperature change and duration of injector work were measured using scan tool, and the exhaust gas emission data was measured using four gas analyzer. The test data shows that there is a correlation between the change in engine temperature received from the engine cooling temperature sensor with the injection time of fuel spraying and the exhaust gas emission produced by the gasoline motor.

Keywords: Injection Time, Exhaust Gas Emissions, Scantool, Four Gas Analyzer

1. INTRODUCTION

Electronic fuel injection system with electronic control (Electronic Fuel Injection; EFI) uses the concept of mixing air and fuel occurs in the intake manifold by using an injector to spray the fuel in the intake manifold. The injection time pattern during spraying of fuel into the intake manifold is regulated by an Electronic Control Unit (ECU). ECU will get several sensors to spray fuel with the right amount and time according to engine speed. Comparison of the appropriate amount of fuel and air will cause perfect combustion to produce optimum power and environmentally exhaust gas emissions.

Before the engine running when the ignition switch is on, the ECU receives signals for data reads such as; cooling water temperature (ECT sensor), incoming air temperature (IAT sensor), intake pressure (MAP sensor) and throttle valve position (TP Sensor) to determine the ratio of the first gasoline-air mixture. During the engine running at start, the ECU sends the pulse to the injector based on the rpm reference pulse (engine speed). When the engine temperature is lower, the injection time pulse width is longer and there is the enrichment of the air-gasoline mixture ratio. If the engine temperatures rise, the injection time pulse width becomes shorter and the air-to-gas fuel mixture becomes thinner.

In cold engine conditions (especially low temperatures), especially in the morning, the combustion chamber requires conditioning in such a way that ideal engine heat is achieved immediately. The engine coolant water temperature sensor becomes one of the sensors whose information is referred to as the conditioning determinant. What happens to this conditioning is to increase fuel injection into the combustion chamber.

The present study will reveal the relationship of changes in engine coolant temperature to the duration of fuel spraying and the exhaust gas emissions produced by gasoline motors.

2. ELECTRONIC FUEL INJECTION (EFI)

The beginning of the method of fuel entry into the combustion chamber in the 1970s to 1980 fuel intake system into the combustion chamber using carburetor system. The carburetor system mixes the air and the fuel takes place inside the carburetor. Along with the regulation of exhaust emissions, the process of mixing air and fuel has improved the regulation pattern. Beginning in the 1970s, air and fuel mixing systems gave birth to a new generation of regulatory patterns called Electronic Fuel Injection (EFI) (TTA: 2010).

Gasoline fuel injection system with electronic control more popularly known as Electronic Fuel Injection (EFI), electronically controlled injection time and an injection volume of the fuel injector. The base of this system has undergone many developments and is also widely used in various brands of vehicles, both European, Japanese and American output vehicles. The operation of fuel spray injectors is governed by an Electronic Control Unit (ECU) better known as ECM (Electronic Control Module) (Daihatsu: 2010).
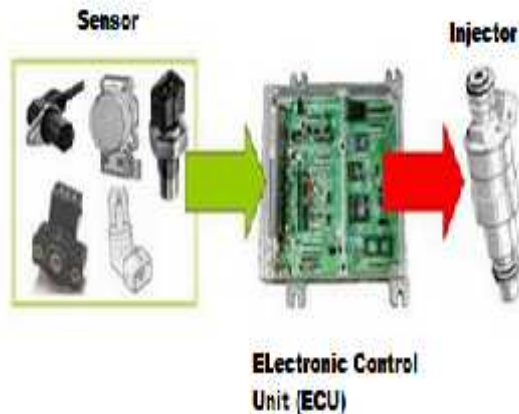
Fig 1. Electronic Fuel Injection Scheme (EFI)

2.1 Engine Cooling Temperature Sensor (ECT)

Engine Cooling Temperature Sensor (ECT) is made of the thermistor, which is a variable resistor that is affected by temperature. ECT work is the same as IAT, just a different detection function. ECT serves to detect the engine cooling water temperature as an ECM input to correct the amount of injection of gasoline in the injector.
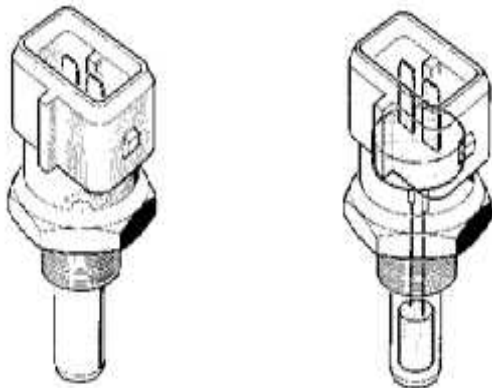
Fig 2. Engine Cooling Temperature Sensor

ECT also serves as a temperature control engine cooling water to the driver through temperature gauge on the instrument panel. The machine cooling water temperature sensor is a variable resistance with NTC (Negative Temperature Coefficient) properties that serve to inform ECU about the cooling water temperature of the machine. With this NTC nature then; The cooling water temperature is low, the sensor resistance value is high. The cooling water temperature is high, the sensor resistance value is low.
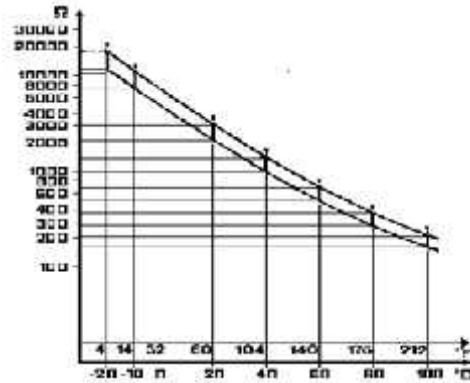
Fig 3. Graphic Characteristic of Engine Cooling Temperature Sensor

2.2 Exhaust Gass Emissions of Gasoline Engine

Gas exhaust gas is much more dangerous than the diesel motor, the gas exhaust gas is generally not visible to the eye but very dangerous for human survival.
1) The motor gasoline more dominant element of CO, HC, and Pb.
2) The diesel motor is more dominant element SO2 and Carbon element causing the density of exhaust smoke.

2.2.1 Carbon Monoxide (CO)

Carbon monoxide (CO) emissions from internal combustion motors are controlled mainly by air/fuel ratio. The maximum CO is generated when the motor operates with a mixture of greases, such as when the motor starts to be turned on in cold conditions or when accelerating. CO (Carbon monoxide) is colorless and flavorless, this gas occurs when the fuel or element C does not get enough bond with O_2 means the air entering into the cylinder space is less or excessive fuel supply.

2.2.2 Hydro Carbon (HC)

The formation of hydrocarbon emissions (HC) influenced the original component of the fuel, the geometry of the combustion chamber and the motor operating parameters. If HC emissions enter the atmosphere, some of them are carcinogenic (carcinogenic) as the cause of cancer. HC (Hydro Carbon) color is black and scented quite sharp, this gas occurs when the combustion process in the combustion chamber is not going well or excessive fuel supply. Disturbance in the main symptom ignition system. This gas can cause irritation of the eyes, nose, and throat (ISPA) and eventually lead to serious illness

2.2.3 Carbon Dioxide (CO2)

The higher the CO2 substance in the exhaust gas is to identify the burning in the motor. Conversely, lower levels of CO2 in the flue gas indicates that the combustion efficiency is not good and also means the engine performance is not good. Other effects: CO and HC levels rise and fuel consumption increases. CO2 levels are measured in% volume units. Average CO2 levels on motor 4 not in normal condition: motor with carburetor: 12 - 15 vol%, motor with EFI: 12 - 16 vol%, EFI motor with catalytic converter: 12 - 17% vol.

3. RESEARCH METHODS

This research uses descriptive research design. This research was conducted to describe the role of engine temperature sensors by analyzing the data obtained during the test. This research uses engine EFI type L with data collecting instruments such as thermocouple digital, engine scan tool, and four pass emission analyzer.

Testing is done in the morning when the machine is still in cold conditions. Data retrieval is done with data retrieval scheme as shown in Figure 4.
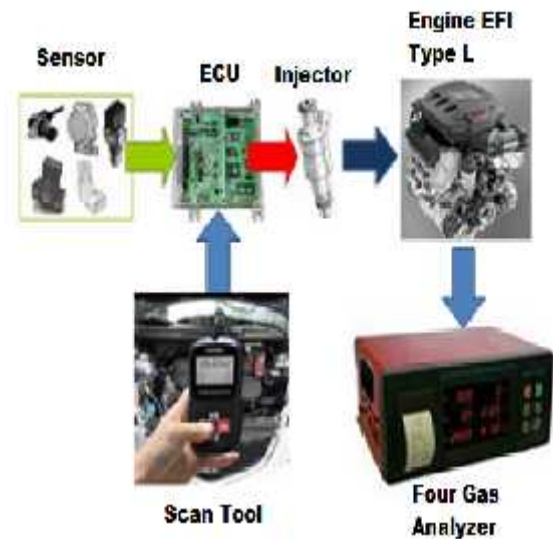
Fig 4. Schema of Research Data Retrieval

4. RESULTS AND DISCUSSION

The data obtained is then tabulated in table 1

Table 1. Test Results on Gasoline Engine EFI Type L

No	Engine Temperature (°C)	Engine Speed (Rpm)	Injection Time (μs)	Injection Volume (ml)	Exhaust emissions			
					CO (%)	HC (ppm)	CO_2 (%)	O_2 (%)
1	30	1730	3,20	0,15	3,04	596	9,4	1,51
2	35	1495	2,82	0,14	1,12	235	12,7	0,75
3	40	1350	2,82	0,13	0,43	140	13,5	0,79
4	45	1234	2,82	0,13	0,41	132	13,5	0,75
5	50	1117	2,69	0,13	0,42	131	13,6	0,73
6	55	976	2,69	0,13	0,42	150	13,7	0,63
7	60	964	2,69	0,12	0,36	154	13,8	0,59
8	65	947	2,56	0,12	0,26	141	13,9	0,45
9	70	880	2,56	0,12	0,20	126	14,1	0,29
10	75	813	2,56	0,12	0,16	110	14,1	0,33
11	80	789	2,43	0,11	0,08	98	14,2	0,13
12	85	725	2,30	0,11	0,04	81	14,3	0,07
13	86	703	2,30	0,11	0,03	69	14,3	0,04

4.1 Engine Temperature and Injection Time

The data from table 1 then made a graph of the relationship between engine temperature and fuel injection time in order to obtain graphs as shown in Figure 5.
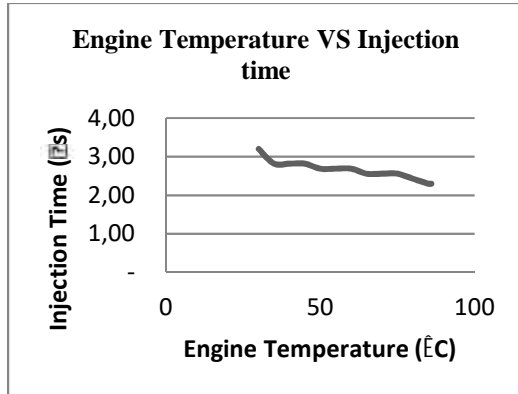
Fig 5. Graph of Changes in Engine Temperature to Changes Injection Time

Based on figure 5 above, there is a tendency of the relationship between engine temperature and fuel injection time on the injector. The tendency is that the higher engine temperature will increase the time of the injection.

4.2 Engine temperature and injection volume

Furthermore, from the data table 1 then made a graph of the relationship between engine temperature and the duration of injection volume of the injector to obtain graphs like Figure 6.
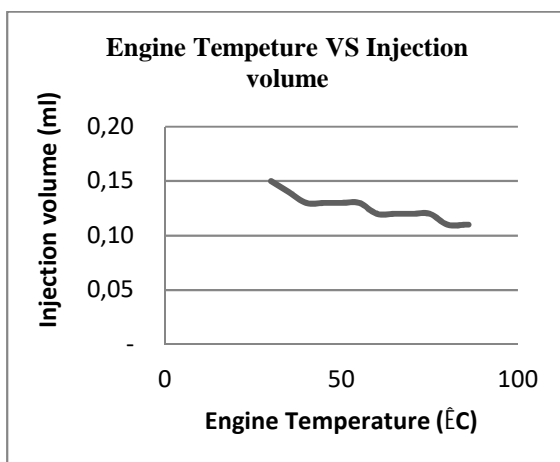
Fig6. Graph of Changes in Engine Temperature to ChangesInjection Volume

Based on figure 6 above there is a relationship between engine temperature and volute fuel injection by injectors. The tendency is that the higher engine temperature decreases the volume of injection.

4.3 Engine Temperature and Exhaust Gas Emission

Based on the data from table 1 then graph of the relationship between engine temperature and exhaust gas emission of gasoline motor, which is the content of CO (Carbon Monoxide) emission and the emission content of HC (Hydro Carbon), for clarity as in graph of figure 7 and figure 8.
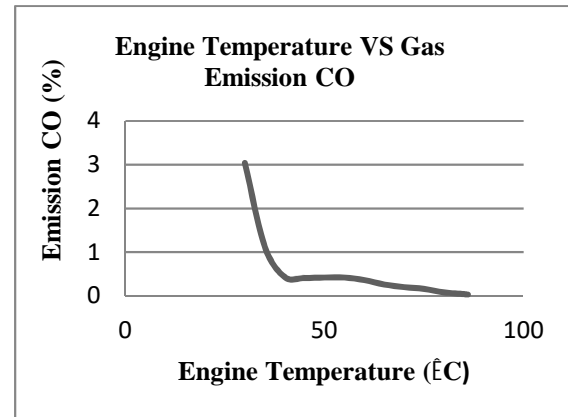
Fig 7. Graph of Engine Temperature on CO Emission

Based on Figure 7, there is a tendency of the relationship between engine temperature and CO content of the gasoline gas exhaust gas. The tendency is that when engine temperatures are still low the CO emissions are high, while the engine temperature is hot and reaches the ideal engine temperature (80 - 90 °C) the gas emission contents are small.
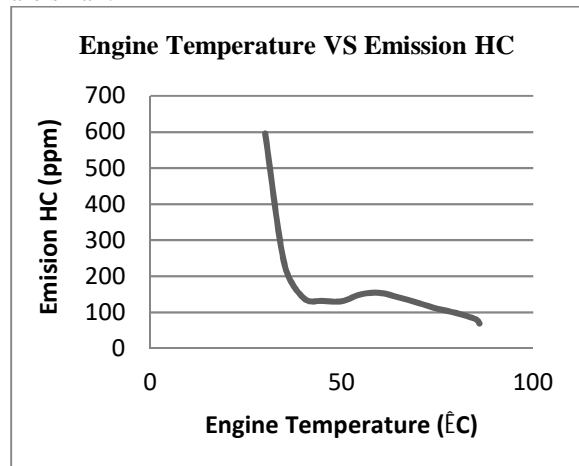
Fig 8. Graphs The Engine Temperature of the HC Emission

Based on figure 8 above, there is a relationship between engine temperature change and HC exhaust gas emission content on gasoline motor. The tendency is when the engine temperature is still low. HC emissions tend to be high, while the engine temperature is hot and reach the engine temperature. ideal (80-90 °C) HC

exhaust emissions contents are small. High levels of HC exhaust emissions in vehicles cause a foul odor from exhaust gasoline gas emissions, this happens in the morning when new vehicles are turned on.

5. CONCLUSION

The results prove that the heat of the machine detected through the cooling water temperature sensor has a relation to the time of injection time of injection time. The fuel injection time will affect the volume of the injection volume, this will affect the combustion process inside the cylinder. The longer the fuel injection time will increase the exhaust gas emission content. This is evident when the time of injection long exhaust emissions tends to be high (bad content).

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EARTHQUAKE AND TSUNAMI DISASTER MITIGATION TRAINING FOR ELEMENTARY SCHOOL STUDENTS IN THE COASTAL AREA OF PADANG PARIAMAN DISTRICT WITH KYOTO INTERNATIONAL DISASTER PREVENTION SCHOOL METHOD

Totoh Andoyono[1] Fitra Rifwan[2] Revian Bodi[3] Prima Zola[4] Annisa Prita[5]

Engineering Faculty, Universitas Negeri Padang, Indonesia

ABSTRACT: Sumatera Barat is located in the earthquake-prone area. In 2009 the West Sumatera earthquake (7.9 on the Ritcher scale) caused 1,117 people dead, 2 were missing, 1,214 were seriously injured and 1,688 were slightly injured. The disaster also caused damage to community homes, with details of 114,797 heavily damaged, 67,198 moderately damaged and 67,838 slightly damaged. This earthquake was caused by fault movement passing through the coastal area of West Sumatra namely Indo-Australian fault. Based on the disaster vulnerability index, the areas along the coast of West Sumatra (Pesisir Selatan, Padang, Padang Pariaman, Agam and Pasaman Barat), have high levels of disaster vulnerability. Padang Pariaman regency is one of the districts which has a coastal area with a coastline along the 60.5 km stretching up to the cluster of Bukit Barisan. The condition of the Padang Pariaman district is potentially affected by the tsunami, as some of the cities with populations and public facilities are located near the coast. This condition is very apprehensive and makes this city need more shelter and tsunami evacuation path. Until now, the Government of Padang Pariaman district and supported by the provincial government of West Sumatra as well as the private sector (NGO) has made various mitigation and earthquake mitigation efforts such as mitigation training. However, the training has not reached all the people, especially elementary school students who do not have basic knowledge of earthquake and tsunami and have not been able to independently evacuate and mitigate. Until now, the Government of Padang Pariaman district and supported by the provincial government of West Sumatra as well as the private sector (NGO) has made various mitigation and earthquake mitigation efforts such as mitigation training. However, the training has not reached all the people, especially elementary school students who do not have basic knowledge of earthquake and tsunami and have not been able to independently evacuate and mitigate.

This mitigation training is expected to optimize disaster prevention activities to achieve the objectives of Disaster Preparedness School (SSB). Disaster Preparedness School (SSB) is an effort to build school preparedness for disaster in order to awaken the awareness of all elements in education both individually and collectively in school and school environment before, during and after a disaster. Targets of training activities on earthquake and tsunami mitigation of the Kyoto International Disaster Prevention School (KIDS) method at elementary schools in coastal areas of Padang Pariaman District by providing basic understanding to elementary school students about earthquake and tsunami, and adequate socialization to improve the ability of elementary school students, especially on the theory of fast and simple mitigation theory to earthquake and tsunami that can be understood and implemented later and disseminate simple earthquake and tsunami mitigation pamphlets to elementary school students and target schools as a reference for future evacuation activities.

Keywords: Earthquake, tsunami, evacuation, mitigation, training, disaster preparedness school, Kyoto International Disaster Prevention School (KIDS) method

1. INTRODUCTION

Based on the disaster vulnerability index, the areas along the coast of West Sumatra (Pesisir Selatan district, Padang City, Padang Pariaman, Agam and Pasaman Barat districts) have high levels of disaster vulnerability. Padang Pariaman regency is one of the districts that have coastal areas with 60.5 km of coastline stretching up to the Bukit Barisan cluster. Geographically located adjacent to the epicenter (Mentawai Megathrust) which has the potential to experience earthquake and tsunami disaster.

Until now, the Government of Padang Pariaman district and supported by the provincial government of West Sumatra as well as the private sector (NGO) has made various mitigation and earthquake mitigation efforts such as mitigation training. However, the training has not reached all the people, especially elementary

school students who do not have basic knowledge of earthquake and tsunami and have not been able to independently evacuate and mitigate.

2.HEADINGS

This mitigation training is expected to optimize disaster prevention activities to achieve the objectives of Disaster Preparedness School (SSB). Disaster Preparedness School (SSB) is an effort to build school preparedness for disaster in order to awaken awareness of all elements in education both individually and collectively in school and school environment before, during and after a disaster.

One of the most intense organizations conducting disaster mitigation training is the Kyoto International Disaster Prevention School (KIDS). KIDS is a mitigation organization composed of Japanese Japanese university students. KIDS has been conducting mitigation activities in Indonesia since 7 years ago to elementary school students (SD). The training and socialization focused on ways of early evacuation in various conditions and places. This is important because this area is known as earthquake and tsunami hazard zone.

2.1. Method Used

Based on the existing issues and taking into account the inputs of teachers and related parties, a commonly agreed step is taken:
1. Collaborate with schools in terms of permits and partners on training activities as well as evaluation of these activities for program sustainability.
2. Cooperation with the parties in the primary school to be visited in the form of training facilities and infrastructure.
3. Implementation of in-school training in every school is 6 hours with no disruption of the existing learning implementation activities (PBM).
4. Method of implementation is begun by giving direct counseling allocation used in each school is 3 hours. The time allocation is as follows:
a) The first 30 minutes are used for friendly meetings with school leaders.
b) In the next 30 minutes is the opening by the committee chairman of UNP Civil Engineering Department and welcome from the school.
c) In the next 60 minutes is the giving of materials about earthquake, tsunami and simple mitigation that is local by 2 speakers.
d) At 30 minutes later was Sopo Jarwo's drama staging on the earthquake and tsunami mitigation.

e) In the next 30 minutes is a group game of material conclusions in terms of students' level of understanding.
5. For the next SD as it is in accordance with the schedule of visits that have been set.
6. Training methods are made interactive using existing local approaches.

To achieve the maximum goal based on existing problems and with the consideration of teachers and related parties, take a step agreed upon as the method used, namely:
1. Giving material
Give explanations to the students of SDN No. 01 Ulakan Kabupaten Padang Pariaman and SDN 8 Kota Pariaman about what is meant by earthquake and tsunami, earthquake and tsunami mechanism based on existing keilmuaan and explanation about mitigation to earthquake and tsunami, that is how to rescue, and what and how what if earthquake and tsunami disasters, including the readiness of objects / goods that may be brought in the rescue.
2. Drama
The drama is conducted to provide a real explanation for how to mitigate in case of earthquake and tsunami. Characterization of the drama is based on the story of Adit Sopo Jarwo and friends (a familiar figure), the goal is that the students of SDN No. 1 Ulakan district Padang Pariaman and SDN 8 Pariaman city can understand well and easy to remember
3. Quiz and group stage
The quiz grading is done to evaluate the extent to which the students (the training targets) understand the material given by the speaker. The quiz activity is preceded by group game activity from participants who are divided into groups in discussing material conclusions in terms of the level of understanding.

3.TABLES, FIGURES, AND EQUATIONS

3.1. Figure

Fig 1. Giving of materials at SDN 01 Ulakan Pariaman

Fig 2. Staging drama at SDN 08 Kota Pariaman

Fig 3. Quiz

4.CONCLUSION

The results obtained through the implementation of community service activities are as follows:

1. Implementation of Earthquake and Tsunami Disaster Mitigation Training of SDN 01 Ulakan Kabupaten Padang Pariaman and SDN 8 Kota Pariaman was successfully conducted on 19-20 September 2015, with 38 participants and 6 teachers.

2. Students and companion teachers gain knowledge about the earthquake and tsunami disaster mitigation are simply understood and applied. It is beneficial for them in responding quickly to the situation and conditions in the event of the earthquake and tsunami.

3. Students and accompanying teachers obtain evacuation guidelines are local to achieve effective mitigation objectives in urban areas.

In general, trainees (students and companion teachers) can be said to be enthusiastic about the delivery of training materials because it adds knowledge to those who mostly reside on the beach.

Implementation of Earthquake and Tsunami Disaster Mitigation Training of SDN 01 Ulakan Kabupaten Padang Pariaman and SDN 8 Kota Pariaman has been successfully conducted on 29-30 September 2017, the outcome that has been achieved in this community service activity is:

1. The management method of implementing early earthquake and tsunami disaster prevention training in the form of mitigation. The training was delivered in the form of staging drama to attract more students of elementary school, as well as in the form of delivery of materials directly by the speaker.

2. Produced a pamphlet/banner containing simple and easy-to-understand, simple, local mitigation practical guidelines for elementary school students. The pamphlet is directly assigned and paired with each SD. Publication of results of this activity in local scientific publications (journals) and proceedings

3. As a material evaluation, also produced kuisoner filled by students who participated in this training.

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FUNCTIONAL MEMBERSHIP ANALYSIS OF FUZZY INFERENCE SYSTEM SUGENO IN ANEMIA CLASSIFICATION

Tri Monarita Johan[1]

Students of the Doctoral Program of Vocational and Technology Education Universitas Negeri Padang

ABSTRACT: Determination of anemia classification based on morphology will make it easier to diagnose the disease of a patient further because each classification also has many possible types of illness. The concept of fuzzy logic is very flexible and has a tolerance to data that is not appropriate and based on natural language to determine a result. There is still often a mistake in determining the classification of anemia resulting in a miscarriage in the patient. Therefore we need a system as a tool in determining whether a patient entered on which classification of anemia with the concept of fuzzy logic. The input of fuzzy set in this research is data of laboratory result of routine blood examination from 40 patient samples conducted in one laboratory. The method used is Sugeno's fuzzy inference system in the classification of anemia.
Keywords: fuzzy logic, fuzzy inference system, Sugeno

1. INTRODUCTION

Anemia is a decrease in the number of measurable red blood cells per millimeter cell on the slide or by volume per 100 ml of blood. A person is said to be anemic if hemoglobin or hematocrit values are more than 2 standard deviations below normal. The lower limit varies depending on age and gender. The main cause of anemia is the loss of red blood cells without the destruction of red blood cells or due to reduced red blood cell production and also because of the increased destruction of red blood cells after production.

This can lead to reduced red blood cell deposits required by the body resulting in anemia. Simple checks for anemia that can be used include hemoglobin (Hb), hematocrit (HT), erythrocyte size, reticulocyte, erythrocyte morphology, complete feces, and ferritin. From the examination results of anemia, the panel will be classified based on the morphology of red blood cells such as microsites anemia, normokrom anemia normositer or macrositer hiperkrom anemia.

Determination of anemia classification based on morphology will make it easier to diagnose the disease of a patient further because each classification also has many possible types of illness. The concept of fuzzy logic is very flexible and has a tolerance to data that is not appropriate and based on natural language to determine a result. There is still often a mistake in determining the classification of anemia resulting in a miscarriage in the patient. Therefore we need a system as a tool in determining whether a patient entered on which classification of anemia with the concept of fuzzy logic.

The use of the system can be implemented easily into the machine language and by using fuzzy logic. Fuzzy logic is a logic that has the concept of partial truth, where fuzzy logic allows membership values between 0 and 1. While classical logic states that anything can be expressed in the value of truth 0 or 1. In theory, there is already a way to calculate the components and the formation of classification determines anemia, but the calculation and determination use the set crisp (assertive). On a firm set, a value has a membership level of one if the value is a member in the set and zero if the value is not a member of the set. This is very rigid, because with a small change of value results in different categories.

The fuzzy set is used to anticipate this since it can tolerate values so that a slight change in value will not make a significant difference. The method that can be used in applying fuzzy logic in determining the classification of anemia is the Sugeno method. The creation of a fuzzy expert system is usually based on the domain of certain knowledge for a particular expertise that approaches human reasoning and reasoning in any one field. Generally, the fuzzy expert system tries to find a satisfactory solution that is a good enough solution for the work to run even if it is not an optimal solution.

2. RESEARCH METHODS

The purpose of this research is Sugeno's fuzzy inference system in determining the classification of anemia. Based on the basic concept of fuzzy logic is the theory of fuzzy set, where membership value is as a determinant of the existence of elements in a set is very important. The membership value or membership function is the main characteristic of fuzzy logic reasoning when compared with the firm set that in fuzzy logic something proposition can be equally true or equally wrong at the same time. Fuzzy inference system draws conclusions from a collection of fuzzy rules.

3. RESULTS AND DISCUSSION

The results of the fuzzy inference system Sugeno analysis in determining the accuracy of anemia classification that follows the rules of fuzzy inference system Sugeno or in other words the process begins with penginputan data results of the laboratory until the defuzzification process. The author also compares the accuracy of system results using two different membership functions with expert readings from the same manual input. The input of fuzzy set in this research is data of laboratory result of routine blood examination from 40 patient samples conducted in one laboratory.

3.1 Fuzzy Set Assembly Degrees Process

From input laboratory results such as Figure 4.4 then the next step is the formation of fuzzy membership degree for each variable. The formation of fuzzy membership degree is selected according to the curve. Here's a picture of the formation of fuzzy membership degrees for the trapezoid curve.

3.2 Analysis of Results

After inputting the data of the laboratory results to the decision result based on predicate rules using the system then the next comparison of decision results that membership function is different. This comparison uses 40 samples of the same laboratory input data as well as with the results of each classification based on anemia's existing blood morphology.

The linguistic decision result is obtained by determining predicate rules and defuzzification so that the results are presented in a linguistic form as well. The resulting decision result is obtained by using the membership function of the trapezoidal fuzzy set based on predicate rules and defuzzification.

Decision results are obtained from predicate rules that have been established based on variables HB, RBC, MCV, MCH and MCHC with fuzzy inference Sugeno even if there is a decision that shows a patient anemia meaning the patient is not anemic. Further, the decision results based on the predicate rules for the membership function of the fuzzy set of triangle curves as follows.

With 40 samples obtained 55% result is Hypochromic Anemia Microsite, 37.5% Normochromic Normochromic anemia and 7.5% Anemia Macroperitic Hyperkrom. It can be seen that there is a difference of result of comparison of analysis of decision result from two different membership function on the classification of Hypochromic anemia Microtiter equal to 7.5%, Normal Normokrom Normal anemia 10%, and Hyperkrom Makrositer Anemia 2.5%.

This difference is caused by changing the distance between a standard value used in a certain membership function so as to produce a different decision. The author also found an out-of-rule result so the decision result for an input does not exist.

This classification involves all blood morphological variables that can not be taken or read-only because the MCV, MCH and MCHC variables affect each decision result.

4. CONCLUSION

As a result of research that the authors do, it can be concluded several things including:

1. Determination of classification using trapezoidal membership function and triangle membership function.

2. The result of the analysis of the membership function of the triangle curve with the trapezoid curve in the classification of anemia indicates that the decision result obtained with the trapezoid curve membership function is better because it approximates the actual result of an expert. While the membership function of the triangle curve found results of a decision that does not exist on the basis of the rules.

3. The result of the decision is limited to determining the classification of anemia only.

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DEVELOPMENTAL OF MEDIA LEARNING BASED ON TUTORIAL VIDEO AT CHARACTER MAKE UP SUBJECT IN SMKN 6

Tyas Asih Surya Mentari[1], Murni Astuti[2], and Linda Rosalina[3]

[1,2,3] Faculty of Tourism and Hospitality, Padang State University; Indonesian

ABSTRACT: Education will produce knowledgeable, intellectual and technological human resources, which are assets to enhance competitiveness. Character makeup is one of the basic compentence of a beautian. There are still limitation in learning character makeup in vocational high school. Students are still having trouble mastering the basic concept of makeup and have not been able to apply materials and cosmetics properly and design makeup for character makeup. This research is to develop a learning media of tutorial video on character Makeup subject. This is developmental research using 4-D method (define, design, develop, and disseminate). Validity and practicllity is observed in teachers, student and practical proffesionals. The results showed as follows; (1) The validity of the tutorial video as media is valid (2) The practicalities of video as media is very practical based on the lecturer and students response after trial (3) The effectiveness is effective in improving student learning activity with excellent category and student learning outcomes before and after using tutorial video as media. Based on the findings of this study concluded that the tutorial video as media is valid, practical, and effective to be used as a media of learning in character makeups subject in SMK N 6 Padang.

Keywords: Tutorial Video, Makeup Character, practical, and effectiveness

1. INTRODUCTION

Education will produce knowledgeable, intellectual and technological human resources, which are assets to enhance competitiveness. Therefore, the development of national education in the future to build a complete Indonesian man who can actualize the potential and human dimension optimally.

As in the national education system of Indonesian is known for formal education. Vocational High School or vocational school is one of the formal education of secondary education in the city of Padang, which seeks to provide quality education. SMK N 6 Padang is a tourism school that has Expertise Field of Arts and Tourism Arts. Program of Beauty Department at SMK N 6 Padang is one of competency skill field at SMK N 6 Padang which has 2 (two) Skill Competence which are: 1) Skin Beauty, 2) Hair Beauty.

Learning Character Makeup Character is one of the compulsory subjects that exist in the Study Program of Beauty Expertise, especially the Competence of Skin Beauty Expertise at SMK N 6 Padang. Standard Competence makeup character has one of the Basic Competence is to makeup of characters according to the theme and design desired. Character facial makeup is needed students in the readiness to enter the world of work in the industry and readiness in taking a productive exam at the end of school exams, especially on Skin Beauty Expertise Competence.

The facial makeup competence of the material characters is the most difficult for students to understand because of the dense material, the inability of students to define the theme and the character makeup design, as well as the lack of facilities and infrastructure to enhance the learning process on the character makeup.

In Character Makeup learning character, the character act makeup step is described in job sheet and also explained through the demonstration method. Learning Makeup Character The characters that have been carried out so far are using lecture, question and answer, discussion, demonstration and practice methods. The medium used in learning is limited to white board media, power points and print media such as textbooks and job sheets. But the learning process is done by using the available media, has not been able to optimize the learning process of students. Students are still having trouble mastering the basic concept of makeup and have not been able to apply materials and cosmetics properly and design makeup for character makeup. This can be seen from the results of makeup less than the maximum character.

Based on the experience of the author when the observation on August 19, 2015 makeup subject character interviews with teacher makeup character mentions the presence of weaknesses in the students make up the character face because students have not fully master the basic concepts of character makeup and less able to apply materials and cosmetics appropriately. Some of the work done to help students is by repeatedly explaining the concept of character makeup and re-demonstrating the basic techniques of individual character makeup. This causes the time required relatively long or less effective so that the learning process does not take place in accordance with the syllabus prepared. In

the competence of Makeup Character, the students often experience difficulties in facial makeup learning activities, such as determining theme on makeup character, applying materials and cosmetics on makeup character, and suitability of makeup design on character makeup application. This is because students perceive that the character makeup is difficult and boring.

Based on the observation and discussion of some teachers of the faculty of learning character makeup, it is expected that the character makeup learning is more optimal, it is necessary to have instructional media that can be used as teacher guideline to direct student activity in learning and as learning resource for students. In accordance with the opinion expressed by Azhar Arsyad, 2007: 2. that the use of learning media in the learning process can generate new desires and interests, generate motivation and stimulation of teaching and learning activities and even bring psychological influences of students.

One of them is by utilizing the video tutorial media in the development of Information and Communication Technology (ICT) which has touched in all aspects of human life. In the teaching and learning activities Makeup is especially on Makeup Character The use of video tutorials can be used as a learning material. Video tutorial is one of the learning media that can display moving images with voice. According to Anderson in Prastowo (2011: 55), "excess video tutorials among others can re-show certain movements so that students can imitate in accordance with the activities being aired. In addition, video tutorials are an independent learning activity, where students learn at their own pace. "

Video tutorials can be expected to interest students to see it and if Video Tutorial is applied in character makeup learning can increase students' interest in understanding and studying the competence of Character Face Makeup. Making Video Tutorial is made as interesting as possible to increase student interest in learning Makeup Character, so that students of SMK N 6 especially Beauty Beauty students, motivated in understanding and studying the character makeup material that had been considered difficult to understand.

In this case the role of a teacher as a science developer is great for choosing and implementing appropriate and efficient learning for students. Good learning is supported from a conducive learning atmosphere and communication relationship between student and teacher can run well. Therefore the teacher should make the learning atmosphere to be communicative and interesting. The purpose of this research and development is to produce learning media using valid video, practical and effective for the subject of Makeup Character Face in Study Program Skin Beauty of SMK N 6 Padang

2. METHOD

Use at most This research uses research and development method (Research and Development). The development research model used is a 4-D development model (four D) with stages: define, design, develop and disseminate (Thiagarajan, et al, in Trianto, (2009: 189).

Prosedur pengembangan yang dilakukan sebagaimana terlihat pada Gambar 1.
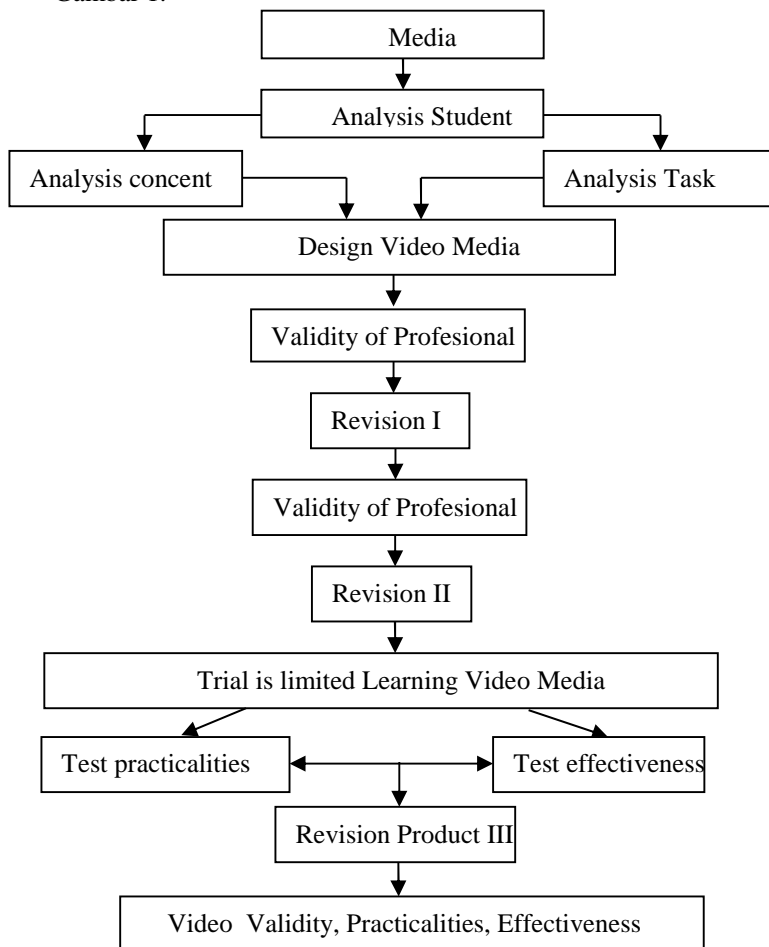
Picture1. Procedur Research learning Media
Sumber: dimodifikasi from Trianto (2012: 1990)

The subjects of the test are the students of Beauty Care Competency Competence Study Program of Skin Beauty SMK N 6 Padang which is following the subject of Makeup of Character Face. Sources of data in this study are:

1. Media validation data is obtained from instruments filled by content / content experts and constructs consisting of 5 expert lecturers.
2. Practicality data media obtained from the data implementation video tutorial media and the

exposure of video tutorial media. The video tutorial video presentation data is obtained from the instrument filled by the observer by observing the implementation of video learning media during the lesson. While the practice of video media, obtained from the data response of students and teachers.

3. Media effectiveness data obtained from student learning activities and student practice results after learning using video tutorial media.

The data that have been obtained in this research are analyzed to know the feasibility of the learning device developed. Data analysis is done in the following way:

1. Media validation analysis

$$\text{Validity value} = \frac{S \quad g}{M \quad S} \times 100\% \quad \text{…... (1)}$$

2. Analysis of media practicality data

The value of practicality $= \dfrac{N_1 \quad o \quad a \quad S_i}{M \quad S}$ x 100% ………………………………….... (2)

3. Analysis of media effectiveness data

2.1 Normality test

Normality testing is a test about the normal distribution of data. Data is otherwise normally distributed if the signification is greater than 0.05. By using Kolmogorov-Smirnov method can know the normal distribution of data by looking at the value of Asymp. Sig (2-tailed). If the value of Asimp.Sig (2-tailed) is greater than 0.05 then it can be concluded that the data is normally distributed.

2.2 Homogeneity Test

$$F = \frac{S_1^2}{S_2^2}$$

Explanation :
S1 = Variance of control class learning outcomes
S2 = Variance of experimental class learning
     Result
F = Variance group

2.3 Normality test

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\dfrac{SD^2 X1}{N_1 - 1} + \dfrac{SD^2 X2}{N_2 - 1}}}$$

Explanation :
t   = Average difference X-X
$\overline{X}_1$ = Average experiment group
$\overline{X}_2$ = Average control group

SD^2 = Standard Deviation
N_1 = Number of experimental groups
N_2 = Number of control groups.

3. RESULTS AND DISCUSSION

3.1 Research Results

The result of making video tutorials produces 4 make-up characters in the making of facial makeup video tutorials, the make-up of grandmother's character, make-up of mini mouse characters, make-up of devil characters and makeup of skull characters. Character facial makeup tutorial videos in addition to showing the character's makeup process, the introduction of tools and materials are also shown on the character's face dressing tutorial video.
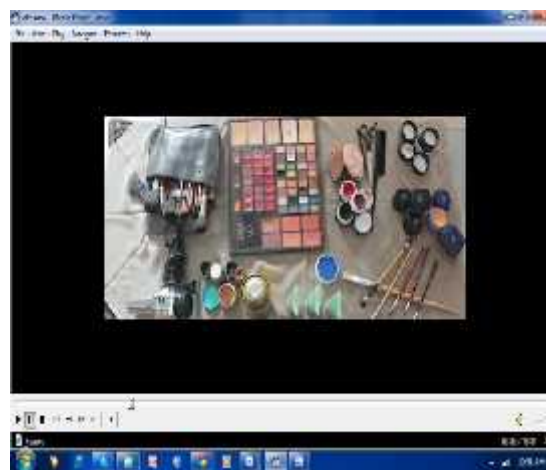
The above view is a display when introducing materials and equipment needed for the process of character makeup. The introduction of the tool introduction video is awaited by the instrumental, writing and dubbing sounds to clarify. Furthermore, the video tutorial display explains the work process of the various makeup character, namely: the process of makeup mini mouse character, makeup of old characters, makeup of character and the makeup of skull characters skull characters. Each character's character makeup process is accompanied by strains of instrumental music, voice and writing dubbing to clarify the sound dubbing.

The picture above shows the image display on the mini mouse face makeup. Each work process is accompanied by soft instrumental music, sound dubbing and writing effects to clarify the sound dubbing that explains the steps of the mini mouse makeup process.

Display the image above is a process view of the work step of the old character makeup. The old character makeup movements process is done with video shoot sequentially and systematically.

Display the picture above is the display of the demon character makeup. The process of stepping up of the demonic character makeup is done by shoot video sequentially and systematically.

Display the picture above is a display of character skull makeup. The process of skull character makeup works is done with sequential and systematic video shoots.

Media Video Learning Validation Results Tutorial.

Media criteria	Validasi					Rata-rata	kategori
	V1	V2	V3	V4	V5		
Tearm of content/materi	89,29	96,43	96,43	85,71	92,86	92,14	Very valid
Contruksi tearm	87,50	87,50	81,25	90,63	93,75	88,13	Valid
Looking tearm	92,86	92,86	89,29	75,00	89,29	87,9	Valid
Rata-rata						89,38	

Results of Practical Media Assessment of Teacher Learning Videos.

No	Indikator	Average (%)	Categori
1.	Ease of media users	81.25	Practical
2.	Tie spent in execution	81.25	Practical
3.	Easy interpertation	87.5	Practical
4.	Have the sane ekivalensi s	75	Practical
5.	Ganerate interest	81.25	Practical
	Average	81.25	Practial

Results Practical Media Assessment Learning Video Tutorial Makeup Character By Student.

Effectiveness test can be seen on experimental research test result, where the research was conducted on four meetings. To get the conclusion from result of research, hypothesis test by using t test. Before conducting t test, firstly tested normality and homogeneity test toward final test result. Normality test results show that classes that do not use video tutorial media with classes that use video tutorial media show that the distribution of normal data.

From the result of homogeneity test, the second test of the samples obtained the price of F0 (Fhit) = 0.883 while Ftab = (2.60) at the real level = 0.05 with the dk of the numerator = (13) and dk denominator = (13), because Fhit <Ftab it can be concluded that both groups of samples have homogeneous variance.

After homogeneity test and normality test then continued to test hypothesis with t-test, test result with t-test.

No	group / reasult	Reasult class average	t hitung	T tabel o,o5
1	Control	76,28	16,25	2,160
2	Eksperimen	84,74		

It can be concluded that there is a significant difference of the students' learning outcomes between control classes that do not use instructional video tutorial media compared with the experimental class using video tutorial learning media.

3.2 Discussion

Development of learning media video tutorial on makeup subject character based on the needs of students of SMK N 6 Padang. According to Hamalik, 2005: 57. that learning is "A combination that consists of human elements, materials, facilities, equipment, and procedures that affect each other to achieve learning objectives". Thus, it can be said that learning character makeup is a process done by teachers in giving materials to students to acquire knowledge, skills and attitudes through the elements of human knowledge, materials, facilities and equipment to achieve the goal of character makeup learning.

Problems that occur in character makeup learning is not yet optimal learning process students. Students are still having trouble mastering the basic concept of makeup and have not been able to apply materials and cosmetics properly and design makeup for character makeup. This is because the media used by the teacher is still limited, the character makeup learning that is implemented so far is by

No	Indikator	Rata-rata %	Kategori
A.	Easy user media video	100%	Very practical
B.	Time spent in execution	92,31%	Very practical
C.	Media appeal	100%	Very practical
	Average	97,44%	Very practical

using lecture method, question and answer, discussion, demonstration and practice. The medium used in learning is limited to white board media, power points and print media such as textbooks and job sheets.

Development of instructional video tutorial media designed according to the needs and problems in research, at this stage the researchers compiled a detailed program that includes all components of the video tutorial, which is to collect the character facial video makeup. Then, make the video smaller, from the size of MB to KB and bring all the videos into a video that is worth watching for the character makeup steps. Each video is distinguished like the introduction of the tool, the material, the linen and the cosmetics used, the video of the character's makeup process works in accordance with their respective portions.

Media video tutorial comes with video, voice dubbing and text making it more interesting. Media video tutorials that have been designed in accordance with the character facial makeup and equipped with instructions for use for teachers and students. The process of making this video tutorial video created in adobe premiere pro CS6 application. Thus, there is an interesting video tutorial learning media. The video that has been made is sounded to be easily understood by the students of the steps in progress.

Cheppy Riyana, 2007: 2. states "media video learning is a medium that presents audio and visual containing learning messages both containing concepts, principles, procedures, application theory for understanding of a learning material". So it can be concluded that the video tutorial is a series of live images displayed by a teacher containing learning messages to help the understanding of a learning material as a guide or additional teaching materials to a small group of learners. In the video tutorial, the information is presented in a unified whole of the modified object so as to appear mutually supportive portrayals that seem to be alive. This can be proven from the students' ability after using the media to be more improved.

Based on the validity test Media tutorial video learning obtained average score percentage of 89.38% with a category very valid from the

validator. In the opinion of Arikunto, 2006: 63. that validation is a measure that indicates the level of reliability or validity of a measuring instrument. The spread of validation sheets to five validators consisting of educational experts with 20 assessed aspects of the assessment. Thus, it can be said that learning video tutorial media can improve students' ability in learning.

The above data also comes with a test of practicability that has been done to see the practicality of instructional video tutorial media on the character makeup eye, with predefined indicators. So, for the practicality given by teachers through questionnaires, the result shows that the average score of percentage for all aspects of the assessment of two teachers obtained calculation of 81.25% with the practical category. Meanwhile, the analysis of practicality based on the students' assessment through questionnaire obtained the average percentage scores for all aspects of the assessment of all students are in the percentage score of 97.44% with very practical category. Oktaviandy (2012) argues that to measure the practicality of the media is to see whether the teacher (and other experts) consider that the facial makeup learning media is easy and can be used by teachers and students. Thus, practicality relates to the convenience of teachers and students in using products that have been developed to be implemented in the classroom.

Results of data Test the effectiveness of tutorial video learning media is known through the assessment of improving student learning outcomes before and after using the video learning tutorial. Then the average score of student learning outcomes after using the media is analyzed to see the level of learning achievement on the subject of character makeup, by way of data analysis with normality test, homogeneity test, and hypothesis test on the control class or classes that do not use video learning media tutorials with experimental classes or classes that use instructional video tutorial media. In the hypothesis concluded that there is a significant difference of the students learning outcomes between the control class and the experimental class.

4. CONCLUSIONS AND SUGGESTIONS

4.1 Conclusion

Based on the results of research and discussion it can be concluded as follows:

1. Learning media has been produced using the appropriate tutorial video for the subject lesson of Character Face Makeup where the audio-visual display of the media displays real motion, sound and picture, making it easier for students to understand the basic concept of the implementation of the Character Makeup Practice.
2. Learning video tutorial media on the subject of Makeup Character has been tested and valid valid of 89.38% in the category of valid, practical with a value of 81.25% in the category of practical and effective use as a medium on learning Makeup Character.

4.2 Suggestions

Suggestions that can be delivered in developing a video tutorial video learning are as follows:

1. For the subject teacher makeup beauty character beauty SMK N 6 Padang, it is advisable to utilize learning media video tutorial on the subject of makeup character so that the learning process more effective.
2. For students, it is expected to utilize the use of video tutorial media as an independent learning media so that they can master the learning materials.
3. For the chairman of beauty program SMK n 6 Padang is expected to provide support facilities to use video tutorials such as speakers / headphones and in focus so that the use of video tutorials can be more optimal.
4. For other researchers are expected to be able to continue and further develop this study with better so that more development of learning media, especially on the development of video tutorial.

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PSYCHOLOGICAL FACTORS INFLUENCING THE DECISION MAKING OF PURCHASING PRODUCTS VIA ONLINE

Ulfa Annida Damanik[1] and Sri Wening[2]

Program Pascasarjana Universitas Negeri Yogyakarta

ABSTRACT: This research was aimed to determine: (1) the description of psychological factors in the decision making of purchasing products via online; (2) the psychological factors influencing the decision making of purchasing products via online. This kind of research was a quantitative research by using a correlation approach. The population of this research was all female students of S1 UNY year 2016. The sampling was using proportional random sampling technique. The collecting data was using questionnaires. The validity of this research instrument using content validity of research instruments conducted by judgment expert, and using construct validity conducted by Pearson Correlation analysis. The reliability testing was using the internal consistency reliability with formula Cronbach Alpha. The analysis of data was using descriptive analysis and regression analysis techniques. The results showed that, First, the psychological factors were included in the high category above the average of group 57.6%. Second, psychological factors influenced simultaneously the decision of purchasing products via online with t_{hit} value (7.216) > t_{tab} (2.241) and significance probability value 0.00 <0.05.

Keywords: Psychological factors, purchasing decisions via online

1. INTRODUCTION

The trends in fashion development in this era of globalization have developed rapidly and lead to be more various in fashion styles. Fashion becomes a lifestyle that highly attracts people's interest. The development of fashion world has become crucial in various groups of ages, both for the young or old people. Many people would like to perform attractively as well as to perform distinctively among others. Moreover, t is much more important to consider that performance is more crucial in the relationship. The more modern, the more hedonistic people in the way they would dress. Thus, the need for the fashion to perform much better has greatly become more important. This has caused a more appearance in various and selected styles of fashion.

The system of selling the fashion products is also in such different various ways. However, in general, it is done in two ways which are in the conventional way and modern way. In fashion field, conventional ways of selling are through faces to faces such as at boutiques or malls. By this way the goods needed by the customers can be taken home, communication between the shop assistants and customers as a social human being can be maintained. Meanwhile in a modern way which is a so-called online shop that uses internet media as the main facility, either website, blog or even social network account cannot be carried out through the conventional trading system. At this present time, it has been a common thing for a businessman in the fashion field to sell their products through internet media, online shop (Santana, 2015, p.137) stated that online is a general term for a media means of

communication-based on telecommunication and multimedia which contains updated, actual and worldwide network information. One line shop has become so popular that it enables people to get information both for selling and buying.

As one of the big cities in Indonesia, Yogyakarta has big potentials in buying through the online shop, especially for women customers. The increasing numbers of the internet users in buying through the online shop are caused by increasing interest for women and in turn, this increases the rate of shopping through online by women. This can be shown in figure 1 below:
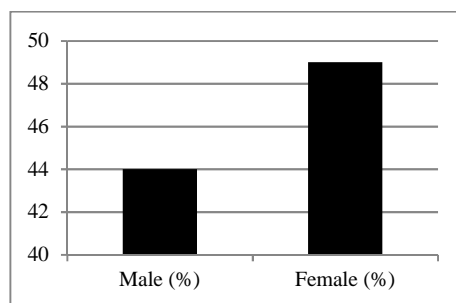
Figure 1. Data of Internet Users for Online Shopping Based on Gender

From the data above it can be concluded that the users of internet media for online shopping is dominated by women which are 49% higher comparing to men which are only 44%. This proves that women tend to like online shopping more than men. The increasing numbers of online shopping today may open trade opportunity, especially in fashion via the internet which aims at teenagers as

the more possible potential customers. And most of them are from educated people such as university students. This can be shown in figure 2 below:
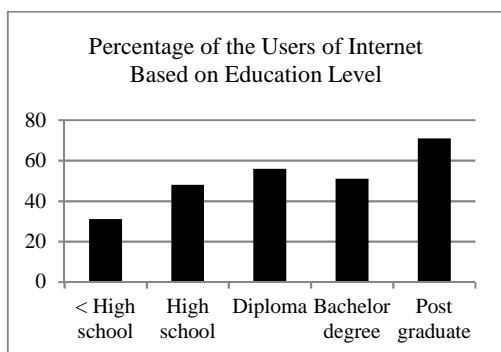

Figure 2. Data of the Internet Users for Online Shopping Based on Education Level

From the data above it can be concluded that students of university either it is S1 or S2 degree dominates comparing to a diploma or SMA degree. The customers' behaviors today tend to like something practical which can bee observed from the increasing numbers of people to change from conventional to online shopping.

The trend of in-line shopping is getting interesting for people because the decision of online shopping is not complicated. Online shopping is getting much easier and efficient in time, as well as efficient in cost comparing to conventional or offline shopping. Online shopping is a process of trading goods or services from the sellers through the internet, or trading via online without seeing each other between the sellers and the buyers directly (Sari, 2015, p 208).

Another advantage for the customers through online shopping is that it can give convenience to the customers. Customers will not be facing traffic jam, they do not have to walk from shop to shop, can compare the trademarks, check the price and even they can put an order at any time and at anywhere. Online shopping can even give the customer's information access to compare much more.

Some factors influence the customers in buying fashion products. One of the factors is a psychological factor. Basically, psychological factors are related to a condition in which people have interests that is from oneself appearing literately to find satisfaction from his or he ineterst. Psychology describes that the internal influences cover (motivation, personality, perception, learning, and attitude) that influence decision process to the customers (Schiffman & Kanuk, 2000, p. 444).

Viewing from a psychological point of view motivation in determining the need will lead someone to find satisfaction of the need. Motivation will also derive someone to find satisfaction of the need. Motivation will also derive someone's attitude in fulfilling the wish to consume the goods or service which are available at the market, especially in fashion. This is relevant to the opinion of Suryani

(2008, p.27) that stated that the process that appears for the customers to buy is called motivation.

Many factors that influence the interest for online shopping for fashion for the customers. Customers' attitude to be observed is caused by some factors that influence a customer before and finally take a decision to buy a service or goods being offered. According to Setiadi (2013, p. 12) stated that the process of taking the decision to buy viewing from a psychological point of view is that it is influenced by motivation, perception and the process of learning.

Although there are many advantages gained from the system of online shopping, there are some weaknesses found. Visa E-commerce Consumer a research Institute owned by Visa found four answers. Firstly, approximately 80 % respondents stated that time to buy is more efficient. Secondly, it is about 79% respondents stated that it enables them to compare the price and it can allow them to save their money. Thirdly, it is about 78% respondents stated that it helps them be able to compare product one to another. Last, it is about 75% respondents stated that it enables them to find cheap products.

Buying fashion products from the online shop's consumers are faced with some possible risks which may be found by the time or after buying the products at the online shops. Sonja and Ewald (2014, p. 784) stated that trading through the internet has a specific unique compared to traditional trading. These are such as uncertainty, anonym, lack of control, and the potential of taking the opportunity. Taking the opportunity meant here is that opportunity for taking privacy from the customers. The consumers who buy via the internet is faced with problems that the buyers themselves have to control to fulfill their hope when buying something via the internet since the consumers are not able to touch and rub directly the goods they are going to buy. And also they cannot meet or see the person who sells directly. However, ideally, when buying goods especially fashion products consumers must touch and see the form and texture of the products directly. And also in buying fashion consumers have to do the fitting. These basic things will not be found by the consumers who buy via online shops.

Online shopping is not only giving advantages to the consumers but also some disadvantages. In online shopping, there are many consumers that have been lied about the transaction since there is a lack of direct communication between the sellers and the buyers. The risk will probably increase as well. The data from direktorat reserse criminal Polda Metro Jaya in Kompas.com showed that in 2014 from 785 cases reported 404 cases or 51.4 % are online shop cases.

In online shopping business goods that are traded can be rubbed directly so that required more attention and service in order to cause consumer

confidence in purchasing the product. To display the goods to be sold, the producers have to do shooting using the camera with high resolution, so the results and product image quality is satisfactory. Buyers will be interested if detail and description of the goods clearly include the price, size, quantity and all information related to the product to be sold. But not infrequently from consumers who feel disappointed because of the lack of quality of service provided by the online store owners. Completeness of information about fashion products sold, seller unfavorable, delivery delay, and the way sellers respond to consumers who need other information desired by consumers sometimes not in accordance with consumer expectations. This ultimately makes consumers less interested in shopping at online stores.

Based on the various problems that occur in the purchase of online fashion products listed in the background, the researchers need to examine the more in-depth phenomenon of online shopping among consumers by setting the research title "Psychological Factors Influencing The Decision Making Of Purchasing Products Via Online ".

2. METHODS

2.1 Types of Research

The kind of this research is a quantitative research with corrasional approach. The data in this research is quantitatively explained. The purpose of this approach is to know the results of the analysis presented in the form of numbers which are then described in a description. This is in accordance with the opinion of Arikunto (2006, p.12) which suggests that quantitative research is a research approach that many are required menguakan numbers, ranging from data collection, interpretation of the data, and appearance of the results.

2.2 Time and Place

This research was conducted at Yogyakarta State University (UNY) having an address at Catur Tunggal Street, Depok District, Sleman Regency, Special Region of Yogyakarta. The study was conducted from May to June 2017.

2.3 Population and Sample Research

The population is basically a generalization region consisting of subjects that have certain qualities and characteristics that researchers set to be studied and ultimately drawn conclusions. This is in line with the opinion of Arikunto (2010, p.123) who says that the population is the whole subject of research. Population in this research is all student of the class of 2016 Yogyakarta State University as

many as 3506 people who are divided into seven faculties.

In determining the proportion of samples from the population in this study refers to the table determination of the number of samples developed by Issac Michael with a 5% error rate and using Cluster Proportional Random Sampling technique, this technique is used because the population has elements that are not homogeneously proportional in a particular area. This is in accordance with the opinion of Sugiyono (2017, p.83) who said that the techniques side of the area used to determine the sample when the object to be studied or data source is very broad. Based on the technique, the number of samples in this study is 318 people, with the sample of each faculty ie the faculty of engineering counted 60 respondents, faculty of sports science counted 14 respondents, the faculty of social sciences counted 38 respondents, the faculty of economics counted 51 respondents, faculty of education sciences counted 60 respondents, faculty of mathematics and natural sciences counted 53 respondents, and faculty of language and art counted 60 respondents.

2.4 Procedure

This research was conducted systematically by using quantitative research procedure. This research is basically a research approach which specifications are systematic, planned, and structured clearly from the beginning to the end of the research. The flow of these research procedures in this study can be observed in Figure 3 below.
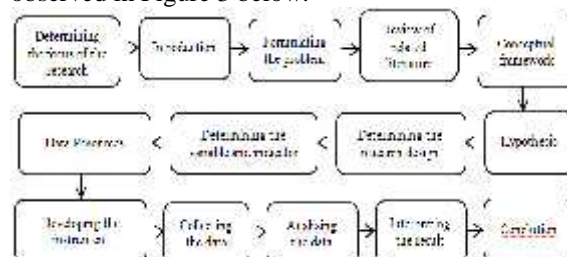
Figure 3. Research Procedure

2.5 Data, Instruments, and Data Collection Techniques

The type of the data used in this study is the interval data. The instrument employed in this research is a non-test instrument in the form of a questionnaire which is used to measure attitude. The type of questionnaire utilized in this study is only a closed-questionnaire type. In other words, the answer to the questionnaire in this study has been bound so that respondents are not capable of giving the answers beyond the choices provided by the researcher.

In this study, the scale of variables measurement used refers to Likert Scale) which each scale is set into 1-4 categories of answers. This Likert scale is applied to measure attitudes, opinions, and

perceptions of a person or group of people regarding the online purchasing decision. In this scale, there are two forms of statement, namely positive statements that serve to measure the positive attitude, and negative statements that serve to measure the negative attitude.

2.6 Data Analysis Technique

The calculation of data analysis in this research is conducted quantitatively by using descriptive statistical analysis and inferential analysis. Descriptive data analysis technique aims to obtain a general description of the independent variables to the dependent variable, namely the description of psychological factors in product purchasing decisions, as well as a picture of overall consumer behavior in deciding to purchase a product via online. Descriptive data analysis techniques in this study by using mean, standard deviation, and propensity test. The criteria for propensity test according to Mardapi (2008, p.123) are as follows:

Table 1. Criteria for Tendency Test

Formula	Category
$X \quad \overline{X} + 1. SBx$	very high
$\overline{X} + 1. SBx > X \quad \overline{X}$	high
$\overline{X} > X \quad \overline{X} - 1. SBx$	low
$X < \overline{X} - 1. SBx$	very low

The inferential analysis technique is employed to test the hypothesis. Inferential analysis techniques used are correlation analysis, and multiple linear regression analysis. Correlation analysis through Pearson Product Moment Correlation technique is utilized to discover the degree of relationship between research variables. The reason why the researchers chose this technique because the data gained in the form of interval data were obtained from the instrument by using a Likert scale. It is also supported by Kountur (2009: 210) clarifying that the data in interval scale or ratio can use Pearson Product Moment correlation.

Simple regression analysis is used to predict how the state (ups and downs) of the dependent variable as an indicator. In this study, regression analysis is deployed to determine the influence between independent variables (psychological) to the dependent variable (online purchasing decision). Regression analysis in this research is a partial test.

The partial test is conducted to test whether the independent variable has an effect or not on the dependent variable. The formula used in testing the hypothesis is partially by using t-test. T-test is used to know the effect of each independent variable partially to the dependent variable. The way to do t-test is by comparing the significance of tobserve with the provision If significance <0.05 then Ha is accepted and If significance> 0.05 then Ha is rejected and by comparing the statistical value tobserve with t table, if the statistical value t observe > t table then Ha is received while the statistical value t observe < t table then Ha is rejected (Siregar, 2015, p.441). The hypothetical statement partially in this research is divided into three namely, psychological factors (X) effect on purchasing decisions (Y) fashion products via online.

3. RESULTS AND DISCUSSION

3.1 Results

Based on the data analysis, the results are described in the form of descriptive analysis, correlation analysis, regression analysis, and discussion of research.

3.1.1 Descriptive Analysis

The Interpretation and the propensity of the data of each variable are classified into four categories namely very high, high, low, and very low. Following these the criteria, then, the interpretation of the data propensity of respondents' opinion on psychological factor variables can be illustrated in Table 2 below:

Table 2. Categorization of Propensity of Variable in Psychological Factors

Faktor_Psikologi

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sangat Tinggi	20	6.3	6.3	6.3
	Tinggi	216	67.9	67.9	74.2
	Rendah	79	24.8	24.8	99.1
	Sangat Rendah	3	.9	.9	100.0
	Total	318	100.0	100.0	

Table 2 above presents that in psychological factor variables there are 6.3% included in the very high category, 67.9% in the high category, 24.8% in low category, and only 0.9% in the very low category. Based on the data, it can be concluded that most (74.2%) respondents' answer tend to be into high category. Furthermore, following the criteria of propensity test, then the interpretation of the data propensity of respondents' opinion on the variable online purchasing decision can be gained and presented in table 3 below:

Table 3. Propensity Categorization

Keputusan_Pembelian

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sangat Tinggi	57	17.9	17.9	17.9
	Tinggi	212	66.7	66.7	84.6
	Rendah	49	15.4	15.4	100.0
	Total	318	100.0	100.0	

Table 3 above elucidates that in the online purchasing decision variables, there are 17.9% answers included in the very high category, 66.7% in the high category, 15.4% in low category, and 0% in the very low category. Then, it can be concluded that most respondents' answers (84.6%) tend to be in the high category.

Based on the results of descriptive analysis of each research variables, it can obtain the mean, median, mode, deviation standard, and the minimum and maximum score data scores which can be observed in table 4 as follows:

Table 4. Descriptive Test Results

		Faktor_ Psikologi	Keputusan_ Pembelian
N	Valid	516	516
	Missing	0	0
Mean		47.1184	52.9428
Median		47.0000	52.0000
Mode		50.00	51.00
Std. Deviation		5.03364	4.72475
Minimum		27.00	38.00
Maximum		60.00	68.00

Based on table 4 above, it can be seen that the categorization of the propensity score of the answers from a psychological factors variable. Then, the results show that most respondents (58%) mean is above the mean's group score and on the online purchasing decision variable, then the results show that most respondents' mean (56%) is also above the mean's group score.

Furthermore, to deepen the propensity score of each variable of psychological factor indicator in each faculty, then the data of propensity score can be gained which are able to illustrate the opinions of respondent on each indicator of the psychological factors variable. It can be seen in table 5 below:

Table 5. Distribution Score of Psychological Factor Indicators

Faculty Indicator	FT Scor	%	FPS Scor	%	FF Scor	%	FMIPA Scor	%	FIS Scor	%	FIK Scor	%
Motivation	951	49	1351	49	1189	48	1219	49	590	48	371	48	1189	49
Perception	571	29	479	22	558	31	551	23	134	23	16	23	479	22
Learning process	558	29	871	29	773	29	729	29	511	30	191	30	875	29
Total	1955	100	2787	100	2413	100	2560	100	1767	100	701	100	1835	100

Table 5 above presents that in the psychological factor variable, the indicator having the highest score and the biggest role in each faculty is the motivation indicator. On the other hand, the perception indicator is the smallest indicator based on its role in psychological factor variable. The things that can be interpreted from the table is that the most dominant element considered by respondents to buy products in psychological factors is influenced by motivation indicator followed by an indicator of the learning process, while perception indicator is less considered by respondents.

Moreover, to further explore how big the propensity score on each indicator of variables online purchasing decisions of each faculty, the data of propensity score can be obtained as a portrayal of respondents' opinion on each indicator on online purchasing decision variable which can seen in table 6 below:

Table 6. Distribution of Indicator Score of Online Purchasing Decision

Faculty Indicator	FT Scor	%	FBS Scor	%	FF Scor	%	FMIPA Scor	%	FIS Scor	%	FIK Scor	%	FIP Scor	%
Need Recognition	234	1	342	11	234	10	297	11	246	14	43	11	430	14
Information Search	685	32	949	32	475	30	897	32	545	32	249	32	1075	32
Evaluation of Alternatives	541	25	739	25	657	26	716	26	569	25	197	25	839	24
Purchase Decision	721	21	611	21	541	20	562	20	113	21	152	21	572	20
Post Purchase Behavior	243	1	356	11	320	1	313	11	234	12	51	12	368	12
Total	2132	100	2932	100	2658	100	2785	100	2133	100	757	100	3247	100

Table 6 above shows that in the online purchasing decision variable, the highest score and the largest role in each faculty is the information search indicator, followed by alternative evaluation indicator, then the purchasing decision indicator is in the third position of its role in the online purchasing decision variable. Meanwhile, indicators of realizing needs and post-purchase behavior have a relatively equal role, but if it is viewed through the results of the calculation of the score, the indicator of realizing the need gets the smallest score when compared with the scores of other indicators.

3.1.2 Correlation Analysis

Correlation analysis among variables is used to find the degree of relationship among variables which in this study by using Pearson Product Moment Correlation technique. The summary of the calculation of correlation analysis between variables can clearly be observed in table 7 below:

Table 7. The Summary of Correlation Results between Research Variables

Research Variable	r
X $\longrightarrow$ Y	0,490

Based on table 7 above, it is known that the correlation between the psychological factors variable (X) and the online purchasing decision (Y) obtaining the value of r = 0.490 with probability value 0.000. This value indicates that there is a relationship between variables, X and Y.

3.1.3 Simple Regression Analysis

A simple regression analysis was applied to determine the effect of psychological factors on the online purchasing decision. The effect test is conducted partially by using t-test. The results of the test can be seen in table 8 below:

Table 8. Partial Hypothesis Testing Results

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	7.343	3.450		3.476	.000
	faktor_Psikologi	.531	.050	.319	7.216	.000

a. Dependent Variable: Keputusan_Pembelian

Table 8 presents the value of t observe (7,216) and t table (2,241). It means that t observe > t table. Meanwhile, when viewed from the level of significance of 0.000 < 0.05. This means that Ha is accepted, so it can be asserted that the psychological

factors (X) effect on purchasing decisions (Y) fashion products online.

3.2 Discussion

The results showed that there are influences between psychological factors on the decision to buy fashion products via online. This is indicated by the value of t observe 7.216 greater than the value t table 2.241 and the significance level 0.00 <0.05, thus the psychological factor variables affect the decision of purchasing fashion products via online. The results of this study are similar to the findings of research conducted by Amperaningrum (2013: 292) which states that psychological factors consisting of motivation, perception, learning, beliefs, and attitudes simultaneously have a significant effect on purchasing decisions.

Hypothesis test results proved that in this study, there is the influence of psychological factors on the decision of purchasing online fashion products. Every indicator variable psychological factors (motivation, perception, and learning process) contribute to the decision of purchasing online fashion products.

Each successive percentage of the most answer scores affecting the purchasing decision is motivation indicator with percentage 49%, then followed by indicators of the learning process with the percentage of 29% and the last of the perception indicators with the percentage of 22%. The things that can be interpreted from the results of the percentage are in the variable psychological factors, motivation indicators provide the most contribution in making purchasing online decisions. And indicators in psychological factor variable that gives the smallest contribution in making online purchasing decisions is perception.

The indicator of psychological factor variable with the most contribution influencing purchasing decision is motivation. Motivation is divided into four sub-indicators namely physical needs, security needs, reward needs, and self-actualization needs. If it is seen from the percentage of a score of each sub-indicator of motivation, the most is the need for security. Things that can be interpreted from these results, security needs provide the greatest influence in making online fashion product purchasing decisions.

Buying a fashion product in an online store is certainly different from buying a product in a conventional store. For example, if you buy something through an online store, consumers can do transactions anywhere and anytime. It certainly will provide comfort for consumers. However, the constraints consumers themselves cannot see and hold directly how the condition of the fashion products that will be purchased. Starting from the shape, color, and size of the products, consumers can not check it directly. Instead, it makes the obstacle to

purchasing fashion products via online. It is in line with the opinion of Sonja and Ewald (2003: 784) said that shopping through the internet has its own uniqueness compared with traditional spending, in terms of uncertainty, anonymity, lack of control, and potential in taking opportunities. Opportunity, in this case, is an opportunity to misuse the privacy of the buyer.

The safety of personal information in online transactions is also a consideration of the consumer. This happens because there are still many consumers who doubt the ability of online stores to manage and maintain their personal data well. Indeed, it is only natural that most online stores are micro, small and medium entrepreneurs who generally do not have adequate safety systems to manage their customers' personal data. The opinion also supports the research conducted by Sukma (2012:7) who found that safety factors have an influence on consumer decisions in shopping online.

4. CONCLUSIONS AND SUGGESTIONS

The conclusions and suggestions of the results of this study are clearly described as follows:

4.1 Conclusions

Based on the results obtained through research, there are several conclusions:

a. In psychological factor variable, respondents' answer included in high category and above the mean of the group with the percentage of 74,2%. In the variables of online purchasing decisions, respondents' answers included in the high category and above the mean of the group with the percentage of 84.6%.

b. The result of partial hypothesis testing, psychological factors consisting of motivation (physical needs, safety needs, reward needs, self-actualization needs), perception, and learning process (knowledge and experience) influence the purchasing decision (Y) fashion products via online. This is indicated by the value of t observe 7.216> t table 2.241 and the significance level of 0.00 <0.05. So, this means that the better the psychological factors affect a person, the better the person makes purchasing decisions, especially the purchase of fashion products via online.

4.2 Suggestions

Based on the findings of the research, it is necessary to provide advice related to this research as follows:

4.2.1 Suggestions for online businesses

a. Online store sites should improve the safety of their customers so that customers are not afraid of any fraud cases that often happen everywhere. In addition, the online store must also improve the costumers' trust to re-buy or refer the online store site to others.

b. The online business users should be more sensitive to the expectations and willingness of consumers, for example by providing the opportunity for consumers to give criticism and suggestions for the product or service provided. So, it can be an improvement for the future and the online store will be better in understanding the willingness of consumers.

4.2.2 Suggestions for consumers

a. Before making a purchase especially purchase via online, consumers should be more careful in terms of product purchased, especially fashion product purchases e.g. in product details to minimize disappointment when receiving the product.

b. Consumers should be more careful in terms of providing personal data as well as in purchase transactions for the sake of consumers' safety in possible fraud are occurred.

4.2.3 Suggestions for further research

a. This research can be re-conducted by adding other variables such as social, personal, and cultural factors variables in order to explore the possibility of other variables that can influence the purchase decision of fashion products via online by consumers.

b. The writer expects for following research not only purchases of fashion products via online but can be developed to other products, such as electronic products, furniture, household necessities, food and other products.

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IMPROVING TEACHERS' PROFESSIONALISM APPROPRIATE TO NEW CURRICULUM 2017 FOR VOCATIONAL SCHOOLS BY CAPACITY BUILDING AND WORKSHOP ABOUT PREPARING LOCAL GOVERNMENT FINANCIAL STATEMENT;
AN EXPERIMENTAL STUDY ON ACCOUNTING TEACHERS' FROM VOCATIONAL SCHOOLS IN WEST SUMATERA PROVINCE

Vita Fitria Sari[1], Mayar Afriyenti[2] and Mia Angelina Setiawan[3]

[1]Faculty of Economics, Universitas Negeri Padang, Indonesia

ABSTRACT: At the beginning of 2017 has been published SK Dirjen Dikdasmen No.130/D/KEP/KR/2017 about the new curriculum structure for vocational schools. In accounting major, one of the changes is new subject "accounting practice of the institution and local government agencies", which have never taught before, so that accounting teachers' should prepare themselves for this. This study aimed to use capacity building and workshop to improve teachers' understanding in preparing local government financial statement. Research methods used is an experiment, which classified as pre-experimental (nondesign) by the method of the one group pretest-posttest design. The results indicated that there are differences in teachers' understanding in preparing local government financial statement before and after got capacity building and workshop. It can be concluded that this capacity building and workshop can improve the teachers' understanding in preparing local government financial statement so that the teachers' be ready to teach the new subject "accounting practice of the institution and local government agencies".

Keywords: accounting, capacity building, new curriculum, vocational teachers, workshop

1. INTRODUCTION

In Indonesia, there are several types of upper secondary education, i.e. senior high schools (SMA), vocational secondary school (SMK), Madrasah Aliyah (MA) and Madrasah Aliyah Kejuruan (MAK). Vocational secondary school (SMK) is a form of formal education unit organizes vocational or skills-based education. That is, students will occupy the one on the existing majors since entering at that school. Unlike the SMA/MA, vocational schools working world oriented, though not rare are choosing to continue in college.

Competitiveness of Indonesia in the face of competition between countries as well as free trade is largely determined by the outcomes of coaching human resources. One of the efforts of countries in the fulfillment of the mid-level quality human resources is the construction of vocational education. According to the explanation of the Law Number 20 years 2003 Article 15, vocational education is secondary education that prepares students especially for working in a particular field. Vocational education consists of vocational high schools and Madrasah Aliyah Kejuruan (MAK) [4].

Based on statistics, a vocational secondary school in 2015/2016 issued by Kemendikbud to see that, numbers of vocational schools are having a fairly rapid development in Indonesia [2]. Especially for West Sumatera alone, there are currently 105 public vocational schools with a total of 5,260

teachers and 94 private vocational schools with total 1,516 teachers.

In accordance with the general provisions of UU No.14 in 2005 about Teachers and Lecturers [5]. The teacher is a professional educator with the main task of educating, teaching, guiding, directing, train, assess and evaluate learners in early childhood education path of formal education, elementary education, and secondary education. Given the importance of the duties of teachers, then teachers are required to develop the science of knowledge.

The success of graduates/students largely determined by the teacher, so also in vocational schools whose primary purpose is preparing graduates who are ready to enter the field of work and developing a professional attitude in accordance with the field the expertise has been provided in all schools. However, lessons (provision of science) provided by the teacher in the school must comply with the set in the curriculum. And we know that there is always also, curriculum changes and adjustments, it is caused due to the development of education and the development needs of its stakeholders. With the curriculum changes then consequently teachers have to prepare themselves for the changes, both in terms of learning methods, material or changes of subjects taught.

At the beginning of the year 2017 has been published SK Director General Dikdasmen No. 130/D/KEP/KR/2017 of the latest Vocational Schools Curriculum Structure since 10 February

2017 [3]. The structure of the curriculum is the arrangement/building various subjects required to form one competence that is arranged according to the grouping, sequence, and certain intensity. Curriculum structure of SMK 2017 is divided into 3 loads i.e. muatan nasional, muatan kewilayahan, dan muatan peminatan kejuruan. To the charge of muatan peminatan kejuruan the field of business and management, in particular, majoring in accounting and financial institutions experienced a change in part of the competency expertise. A change is the emergence of the subject "accounting practice of the institution and local government agencies" which will be taught in classes XI and XII.

Changes in the structure of the new curriculum expected to expand world work for graduates of the vocational schools. The emergence of the subject "accounting practice of the institution and local government agencies" are expected to prepare graduates from vocational schools can work in the institutions and agencies of government. So graduates students from vocational schools with accounting areas of expertise no longer can only work in a business sector that is the field of trade and services, but also the public sector particularly acceptable in government.

This is in line with the results of a survey conducted in April 2017 in MGMP Accounting SMK West Sumatra. Vocational schools with an accounting major, MGMP team West Sumatra admitted that one of the problems facing teachers MGMP accounting now is any change of the curriculum/spectrum of accounting-related subjects are taught. That is, the appearance of government accounting subjects, but curriculum changes in the structure of the curriculum are now 2017 was made a compulsory subject. The existence of this change then the teachers should prepare themselves to teach government accounting, especially for schools that were previously never taught governmental accounting subjects. This is certainly a problem/concern for vocational teachers, especially at schools like never before.

On the other hand, the development of governmental accounting runs very rapidly. One of them is the publication of the Government Regulation Number 71 in 2010 with accrual-based accounting standards. With the development of related regulations of government accounting, then vocational teachers especially majoring in accounting should update the accounting knowledge of governance and development because for these vocational accounting teachers has not been too focused on it caused these subjects do not yet exist in the curriculum. However, now the subjects already entered in the curriculum structure of 2017, then it means that the teacher "had to" should update/learn about government accounting.

Related to the goals of vocational schools graduates are preparing students to directly enter the field professionally work in accordance with their expertise, and we know also that the student/graduate of vocational schools has been considered most important part of the professional accounting tested through a test of competence. Technically, although it would not be burdened with the responsibility of superstar who set higher education accounting, they need to understand about the preparation of the financial statements, cost accounting, tax accounting, coupled with the presence of new curriculum so graduates/students of SMK expected they also gained control of government accounting. So, to equip students/graduates in order to master it, then teachers should update the knowledge related to accounting as a whole and in particular accounting, rule is the new subjects in the curriculum.

Based on the description of the problem above, it can be concluded that the updating of knowledge teachers against regulations and the latest developments of the science of government accounting becomes very important. To reduce the problem as mentioned above, capacity building and workshop on the regulation and development of the latest government accounting for science teachers is still badly needed.

2. LITERATURE REVIEW
2.1 Improving Teachers' Professionalism

In Indonesian context, teacher professionalism based on the national policy related to the ability of teachers in conducting their role and function and how they behave at school and in society context.

UU No. 14 the Year 2005 about the teachers and lecturers [5] mandates teachers as professional educators with the primary task of educating, teaching, guiding, directing, training, assessing, and evaluating students on early childhood education, formal education, primary education, and secondary education. The law required people who have talents, interests, vocation, and idealism; committed to improving the quality of education, faith, piety, and noble character; academic qualifications and educational background in accordance with its assignment; necessary competence in accordance with its duties; responsibility for the professionalism of the performance of duties; income determined in accordance with job performance; opportunity to develop in a sustainable manner with the professionalism of lifelong learning; guarantee of legal protection in carrying out the duties professionalism; and professional organization that authorize to regulate matters relating to the task of teacher professionalism.

In carrying out professionalism duties, teacher obliges to meet certain quality standards or norms and require professional education. Teachers must be own live, and control knowledge, skills, and behaviors as a set of competence. They require having the academic qualification of a bachelor or

four-years-diploma level of academic education to be possessed by the teachers in accordance with the type, level, and formal education units in where the assignment. Certification is also obligated as the process of granting certificates to teachers and teacher educators according to the Teachers Law. Educator certificate is evidence of formal recognition given to teachers and teachers as professionals by the state.

2.2 Government Accounting

In 2010, the Government published the Government Regulation Number 71-year 2010 [9] on Government accounting standards (SAP) to improve the quality of accountability for the performance of the Government. The very real changes from SAP previously controlled by government regulation Number 24 year 2005 [7] is anyone the use of accrual-based accounting (accrual) by Governments, including local governments, from previously using cash-based accounting toward accrual (cash toward accrual). Change the base accounting does not immediately show up because in fact already required by previous regulations i.e. on article 1 of the Act No. 17 of the year 2003 explained that [6]:

1. The revenue of the country or regions is the Central Government rights/areas that are recognized as net worth value enhancer.
2. Shopping country/region is the obligation of the Central Government/region which is recognized as a deduction on the value of net worth.

From the description above that income and expenditure is in fact already based accrual that would affect the net worth on the balance sheet. So it's actually from the year 2003, the recording and presentation of financial statements already directed to accrual-based.

However there is a transition to full accrual described in article 36 paragraph (1) of the same Act that, provisions on recognition and measurement of income and accruals based expenditure implemented no later than within 5 (five) of the year.

On article 70 paragraph (2) of law number 1 Year 2004 [8] confirmed began when implementing accrual begins, namely, provisions on recognition and measurement of income and accruals based expenditure implemented no later than fiscal year 2008.

2.3 Accrual-Based SAP Structure

A complete explanation of the accrual-based SAP is described in Appendix I of the Government Regulation Number 71 Year 2010 [9] writing based on the structure are arranged as follows:

a. Conceptual Framework of Government Accounting
b. Governmental accounting standards Statement (PSAP):

1) PSAP number 01 about the presentation of the financial statements;
2) PSAP number 02 on the budget realization report;
3) PSAP number 03 about the cash flow statement;
4) PSAP number 04 of notes to financial statements;
5) PSAP number 05 about accounting of inventories;
6) PSAP number 06 on Accounting of investment;
7) PSAP number 07 about accounting of fixed assets;
8) PSAP number 08 about accounting in the Construction Workmanship;
9) PSAP number 09 about accounting of obligations;
10) PSAP number 10 about error correction, the accounting policy change, and the change in accounting estimate, and Discontinued Operations;
11) PSAP number 11 of the consolidated financial statements;
12) PSAP number 12 on the operational Reports.

2.4 Benefits of the Application Of Accrual-Based Accounting

In Study No. 14 which was published by the International Public Sector Accounting Standards Board (2011), said that the information presented on the accrual-based accounting in financial reporting enables stakeholders (stakeholders) in order:

a. Assess the accountability of the management of all resources of entities as well as the dissemination of these resources.
b. Assess the performance, financial position and cash flows of an entity.
c. Decision making about provision of resources, or do business with an entity.

Furthermore, a more detailed level in the Study number 14 stated that the reporting on the basis of the accrual will be able to:

a. demonstrate how government-funded activities and meet the needs of the Fund;
b. to allow users of the report to evaluate the ability of the current government to finance his activities and to meet the obligations and their commitment;
c. indicate the government's financial position and changes in financial position;
d. give the opportunity to the government to demonstrate the success of the arranged of resource management;
e. Useful to evaluate the Government's performance in terms of efficiency and effectiveness use of resources.

2.5 Points of SAP With Accrual-Based

Good financial report was compiled based on SAP. Points accrual-based SAP is covered within the framework of conceptual and presentation of financial statements (PSAP number 01). Some of the staples of the SAP are to know to compile financial statements based accounting:

2.5.1 Accounting and reporting Entity

In paragraph 21 the conceptual framework of government regulation Number 71 Year 2010 there is an explanation of the Accounting Entity in addition to the reporting Entity [9]. On the paragraph explained that the accounting entity is a government unit at module 1 – concept and the accounting Cycle in local government manage budgets, wealth, and the obligation of conducting accounting and presents financial reports on the basis of accounting which asked suit SOTK local governments respectively, among others:

a. Regional Secretariat;
b. Secretariat of the Board;
c. Service;
d. Agency;
e. the Office;
f. Subdistrict; and
g. Village

Then the reporting entity is the government unit that consists of one or more accounting entities according to the provisions of the legislation of compulsory liability report, presenting the financial statements aimed at the public in the context of the reporting entities, local government consists of:

a. the Government of the region; and
b. Organizational Unit in an environment of local government or other organizations, if according to the laws and regulations of the organization unit the meant mandatory presents financial reports for example BLUD.

2.5.2 The role of the financial statements

In paragraph 25 the conceptual framework of government regulation Number 71 Year 2010 [6], explained that the reporting is necessary for the purposes of:

a. Accountability;
b. Management;
c. Transparency;
d. the balance between generations; and
e. performance evaluation

Reporting for the benefit of performance evaluation is not previously described in the Government Regulation Number 24 of the year 2005. Basically, all government accounting standards statement is a standard to develop the components of the financial statements of the Government, where these components are described in paragraph 28 of the conceptual framework of government regulation Number 71 The year 2010 as follows [6]:

a. report on the realization of the budget;
b. budgetary balance changes report (SAL);
c. balance sheet;
d. cash flow statement;
e. operational Reports;
f. report of the equity change; and
g. Notes to financial statements.

According to the PP 71-year 2010 [6] financial reporting Government should present information that is helpful for the users in assessing accountability and make economic decisions, social, or political with:

a) Provides information about the source, allocation and use of financial resources.
b) provides information on the adequacy of the acceptance period runs to finance the entire global
c) provides information on the number of economic resources used in the activities of the reporting entity and the results that have been achieved
d) provides information on how the reporting entity funded throughout its activities and adequate cash needs
e) provides information on the financial position of the reporting entities and the conditions relating to acceptance of the sources, both short term and long term, including those derived from the levy of taxes and loans
f) provides information about changes to reporting entity's financial position, does increase or decrease, as a result of activities undertaken during the reporting period

3. RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

Research methods used in this research is a method of experimentation. The experimental method is a method of research that is used to search for a particular treatment influence against the other in conditions completely (Sugiyono 2011:72) [10]. Experimental research is also more suitable done in the field of education. This is due to two reasons as follows: (1) teaching method which gives a more precise will be compared naturally and in a State that is not biased; (2) basic research with the aim of lowering the General theoretical principles into applied science which corresponds to the problems faced by schools.

According to Sugiyono (2011:73), there are some forms of experimental design [10]. Experimental design to be used in this research is a type of pre-experimental (nondesign) by the method of the one group pretest-posttest design. On the one group pretest-posttest design there is a pre-test prior to treatment (the treatment), the results of treatment can be assessed more accurately because it can be compared with prior treatment. Variable treatment in this study was the use of capacity building and

workshop about preparing local government financial statement. The design of chart form is as follows:

01	X	02
Pretest	Treatment	Posttest
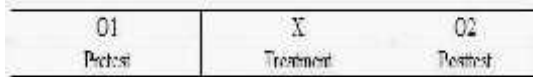
The steps in this experiment research referring to Gay (in Hidayat, 2001) [1] as follows:

1. The existence of a significant problem for the researcher.

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2. The selection of the subject enough to be divided into groups of experiments.

The subject in this study is accounting teachers from vocational schools in West Sumatera Province.

3. The making or development instruments.

The instruments used in this research was capacity building and workshop about preparing local government financial statement.

4. The selection of design research.

Design research is the one group pretest-posttest design.

5. Execution of the procedure.

The initial procedure in this study is to use capacity building and workshop about preparing local government financial statement. This procedure will last for 2 days. In the beginning, researchers will conduct a pre-test to find out accounting teachers' understanding about preparing local government financial statement. Then, accounting teachers' will get capacity building and workshop about preparing local government financial statement. At the end of the meetings will be conducted post-test to see the influence of using capacity building and workshop about preparing a local government financial statement to improve teachers understanding in preparing local government financial statement.

6. Doing data analysis.

To see the effects of capacity building and workshop about preparing local government financial statement, then data analysis will be performed with a different test, that is, to see if there is a difference on understanding about preparing a local government financial statement before and after got capacity building and workshop about preparing local government financial statement. Then the hypothesis presented in this study are:

HO: there is a difference in accounting teachers' understanding about preparing local government financial statement before and after got capacity building and workshop about preparing local government financial statement courses.

3.2 RESEARCH SUBJECT

The subject of this research is the accounting teachers' from vocational schools in West Sumatera province.

3.3 RESEARCH PLACE

Research was done at Siti Nurbaya Room at SMKN 2 Padang.

4. RESULT AND DISCUSSION

The following is a description of participants in this study:

a. Gender

Table 2. Gender Participants

Gender	Numbers	%
Men	4	8,70
Women	42	9,30
Total	46	100,00%

Based on the data, show that the majority of participants were women, as many as 42 people or 91.30% of all participants while the number of male participants only 4 people or 8.70% of total participants. So it can be inferred that the majority of the accounting teacher who became participants on this studied were female.

b. Teaching experience

Table 3. Participant's Teaching Experience

Respondents' Experience	Numbers	%
0 5	6	13.04%
5 – 10	13	28.26%
10 – 15	14	30.43%
16	13	28.26%
Total	46	100.00%

Based on table 3, it can be seen that only 6 people or 13.04% who has teaching experience in less than five years. While a number of the other 13 people or 28.26% has been teaching accounting during the period between 5 to 10 years, 14 people or 30.43% has taught accounting for 10 to 15 years even the rest as many as 13 people or 28.26% have had teaching experience of more than 15 years. So it can be concluded that participants in this study isn't a junior accounting teacher but mostly it is the teachers who had experienced teaching accounting for more than 5 years.

We also asked questions related to the knowledge of the participants to the materials of government accounting especially about the preparation of local government financial statements:

Table 4. Knowledge of Government Accounting

Question	Ever		Never	
	amount	%	amount	%
Have you ever taught government accounting courses?	1	2.17%	45	97.83%
Does Mr / Mrs attended training about the preparation of local government financial statements	0	0%	46	100%
	Knowing		Do not know	
	amount	%	amount	%
Do you know about accrual-based accounting in government accounting?	4	8.96%	42	91.31%

Based on the chart above to see that subjects government accounting is a new thing for accounting teachers from vocational schools at West Sumatra Province, it's shown from the answer to the first question where only 1 participants who ever taught lessons relating to the topic of government accounting, while others never taught government accounting before. Overall participants also have never followed the training theme of government accounting especially about the preparation of the financial statements of local government. The third question asks whether participants had known about the implementation of accrual-based accounting in government accounting, most participants do not know about this. Overall participants answer the question shown the importance of capacity building and workshop about the preparation of the local government financial statements since most of the participants have never received training related to this topic and the majority of participants also have yet to find out the latest updates from government accounting. Whereas the new curriculum 2017 demanding participant to the new subject "accounting practice of the institution and local government agencies".

Following are the results of the comparison of pretest and posttest to find out the extent of the understanding of participants related to government accounting especially in preparing the local government financial statements:

Table 5. Comparison of pretest and post-test

	Mean	N	Std. Dev
Pre Test	11,48	46	2,739
Post Test	21,04	46	3,651

Based on the chart above show that average score of pre-test is only 11.48 for 30 questions or just around 38.26% whereas after getting capacity building and workshop about the preparation of local government financial statements there are increases in score which became 21,04 or 71,03%.

This indicated that capacity building and workshop about preparation of local government financial statement can improve participants understanding' about government accounting especially about preparation of local government financial statement.

Before performing a difference test it should check for data homogeneity and normality. Here are the results of the test of normality and its homogeneity:

a. Test of normality

Table 6. One-Sample Kolmogorov-Smirnov Test

		skor_pre_test	skor_post_test
N		46	46
Normal Parameters [a,b]	Mean	11.48	21.04
	Std. Deviation	2,739	3,651
Most Extreme Differences	Absolute	, 156	, 170
	Positive	, 156	, 118
	Negative	-, 105	-, 170
Test Statistic		, 156	, 170
Asymp. Sig. (2-tailed)		, 007 [c]	, 002 [c]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

Based on table look that normality test results show that the value of asymp. sig (2-tailed) data from pre-test is 0.007 to post data in a test of 0.002 where value of asymp. sig (2-tailed) smaller than 0.05 so that it can be concluded that the data pretest and post-test is not distributed normally. So, in this study will use nonparametric analysis.

b. Test of homogeneity

Based on the chart (in Appendix 1) shown that the value of sig of this is 0.982 where the value of the sig > 0.05 it means that value of sig is bigger than 0,05, then it can be said that the data homogeneous.

c. Test of difference

Based on table 7, it shown that 44 of participants get post-test score is higher than pre-test score, while 2 of participants got the same score for their pre-test and post-test. But no one gets lowest score after getting capacity building and workshop about preparation of local government financial statement. It proves that capacity building and workshop can improve participants understanding' about government accounting especially about the preparation of the local government financial statement.

Subsequent hypothesis testing is done by using Wilcoxon ranks test indicated that significant value 0000, meaning significant value smaller than 0.05 so that the hypothesis in this study is acceptable. This indicates that there is a difference in understanding of the participants before and after getting the capacity building and workshops on the preparation of the financial report of the government of the region.

Table 7. Wilcoxon Ranks

Ranks

		N	Mean Rank	Sum of Ranks
skor_post_test skor_pre_test	Negative Ranks	0ᵃ	,00	,00
	Positive Ranks	44ᵇ	22,50	990,00
	Ties	2ᶜ		
	Total	46		

a. skor_post_test < skor_pre_test

b. skor_post_test > skor_pre_test

c. skor_post_test = skor_pre_test

Test Statisticsᵃ

	skor_post_test - skor_pre_test
Z	-5,780ᵇ
Asymp. Sig. (2-tailed)	,000

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

The teacher is a professional educator with the main task of educating, teaching, guiding, directing, train, assess and evaluate learners in early childhood education path of formal education, elementary education, and secondary education. Given the importance of the duties of teachers, then teachers are required to develop the science of knowledge. As an educator, teacher should update their competence and capability to improve their professionalism.

In addition to the improving teachers' qualification and obligating certification, teachers need opportunity to involve in the professional development in order to maintain and grow up their knowledge, skills, and practice. The kinds of professional development have been made in Indonesia to improve teacher professionalism such as, PKG (Pusat Kegiatan Guru or Centre for Teacher Activity), KKG (Kelompok Kerja Guru or Teachers Working Group), and MGMP (Musyawarah Guru Mata Pelajaran or Forum of Teacher-subject) that allow teachers to share their experiences in solving the problem they face in teaching activities. The other forms of professional development held for teachers are training and workshop with generally or specifically purposes. The programs proposed in it will be melting the daily-faced problem in learning and teaching and improve teachers' innovation and creativity for the success of the students. [11]

5. CONCLUSION

Government accounting is new things for accounting teachers from vocational schools in West Sumatera province. Most of the teachers never taught government accounting and never joined any training or workshop that related to this topic. Capacity building and workshop is use to improve their understanding in government accounting especially preparing local government financial statement. The results indicated that:

a. There is a difference in teachers' understanding in preparing local government financial statement before and after got capacity building and workshop.

b. Capacity building and workshop can improve the teachers' understanding in preparing local government financial statement, so that the teachers' be ready to teach the new subject "accounting practice of the institution and local government agencies".

Some limitations in this research are:

a. research is only using multiple choice question for pretest and post-test.

b. the time limitations in capacity building and workshop, so that has not shown maximum results.

c. types of experiment that was done in this study a new type of pre-experimental (nondesign) by the method of the one group pretest-posttest design.

Hence the advice to next researchers are:

a. the next research can design more complex cases related to government accounting to checked participants understandings in preparation of local government financial statement.

b. subsequent research can develop another type of research experiments such as true-posttest only control include experimental design, pretest-control group design or other types of research experiments.

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THE DEVELOPMENT OF VIT (VOCATIONAL INTEREST TEST) MODEL USING DECISION SUPPORT SYSTEM(DSS) TECHNIQUE

Vitriani

Faculty of Vocational Technology Education, Padang State University, Padang, Indonesia

Abstract: The accuracy in choosing interest of vocational major can determine the learning success of a student, wile lose a good opportunity if they are mistaken in deciding their vocational interest.The most important thing of vocational education is the recruitment of the student. If the application of the recruitment tool is eminent, it will create a good graduate. The solution offered to overcome this problem is by calibrating vocational interest instruments developed from Holland theory with informational technology and systems with knowledge-based to create a model of vocational interest test and innovative vocational interest software supported by decision support system in taking the decision. The objective of the research is to provide an innovative model and software of interset tes with knowledge and information technology based. The method of the research is RD method four D. The conclusion is Holland personal theory can help the student in deciding their vocational interest.

Keywords: Vocational Interest Test (VIT), Decision Support System (DSS), Holland, Vocational High School, Selection System

1. INTRODUCTION

Vocational education according to SISDIKNAS regulation no 20, 2003 about national education system verse 18 explains: Vocational education is the secondary education which prepares the students to work in the certain field" As a further action of the implementation from the regulation above, a vocational education needs to be developed.

Many unproductive students graduated from vocational high school. Badan Pusat Statistik (BPS) of West Sumatera record that an opened unemployment rate in this region in August 2015 is dominated by Vocational School (SMK) graduate which is 13.32 % from 161.560 of open unemployment. Based on BPS catalog no 57 February 2015, The Data of Open unemployment rate (TPT) in August 2014, Vocational high school placed the highest position, 11.24%, followed by general high school 9.55% and the lowest in elementary school 3.04%.

This data show inequality between government expectation and the reality that SMK which should prepare the students to join a working place ironically gives the highest contribution of the unemployment rate in Indonesia. One of a significant factor which creates this problem is the choice of interest of the students to the skill field chosen. Theoretically, a student who has a high interest will create a good learning motivation. The accuracy in choosing the vocational interest determines the success of a student, while the good opportunity for the student will be missed because of the inaccuracy in choosing their vocational interest. A successful vocational education firstly determined by the recruitment of the students. Good recruitment will create a good student if using a good recruiting tools thus create a good graduate The result of a good recruitment and qualified students can be seen in the process of recruiting using proper tools and method.

Based on above explanation, it is important to develop a model of software test of vocational interest which is innovative by using Decision Support Technique which is able to smartly help the students in deciding their vocational interest.

2. THE MATERIAL AND METHOD

2.1 Data

The object of this study is the students of SMP in class VIII, the sample used is 120 samples, the data analysis using confirmatory factor analysis (CFA) with SEM model (Structural Equation Modeling), based on data analysis conducted and application of vocational interest test with Decision Support System can be determined student personality types are Realistic, Investigative, Artistic, Social, Enterprising and Conventional. From the personality type, we can recommend the student's vocational interest according to his personality type

2.2 Method

The method used is a method of research and development (R & D) by using a model of Four D which consists of the following steps: Define, Design, Develop and Disseminate. In outline the steps being taken in this study:

2.2.1 Define

Stages define:
A. Determine the potential and problems
   1. The measuring instrument used in the selection of interest is still not right.
   2. Students do not understand their own potential and interest held in particular vocational interest so do not have a picture and a future career direction
   3. Model the concept of vocational interest test that is not valid, practical and effective
B. Gather information and literature
   1. The initial survey, February 18, 2015, to gather information about the learning outcomes, how the process of determining and interests.
   2. Collect literature on Vocational Interest Test to establish a construct, dimensions and test items.
C. Analysis of needs
   1. The preliminary analysis
   2. Analysis of the object
   3. Analysis of the concept
   4. Analysis of indicators
   5. Scale, formulating objectives

2.2.2 Design

A. Stages of the design are the design stage a product consisting of:
   1. Establishment of a construct based on the theory used, a construct of this study is the vocational interests. Establish the dimensions of a construct that has been determined, the dimensions of vocational interests, namely 1) Realistic, 2) Investigative, 3) Artistic, 4) Social, 5) Enterprising, 6) conventional
   2. Design Blue-print scale vocational interests. 3. Writing items and item review by experts psychometric (FGD 1) The resulting product phase I SkalaVocational Interest (Validation Phase I).

2.2.3 Develop

Stages of the design are the design stage a product consisting of:
A. Establishment of a construct based on the theory used, a construct of this study is the vocational interests. Establish the dimensions of a construct that has been determined, the dimensions of vocational interests, namely 1) Realistic, 2) Investigative, 3) Artistic, 4) Social, 5) Enterprising, 6) conventional

Design Blue-print scale vocational interests. 3. Writing items and item review by experts psychometric (FGD 1) The resulting product phase I SkalaVocational Interest (Validation Phase I).

2.2.4 Disseminate

At this stage the new concept of Vocational Interest Test which is divided into:
A. Book a concept model of the development of Vocational Interest Test (VIT)
B. The guidebook use of Vocational Interest Test (VIT) to the instructor.
C. The guidebook use of Vocational Interest Test (VIT) to the test taker.

2.2.5 Construct Validity

Construct Validation is the validity that challenges the extent to which test items are able to measure what is really being measured in accordance with a specific concept or defined conceptual definition. In the assessment of personality of entrepreneurship, the measured constants are Realistic, Investigative, Artistic, Social, Enterprising, Conventional from the result of validity test by using CFA analysis (Confirmatory Factor Analysis) found the close relation of each collective with vocational interest.
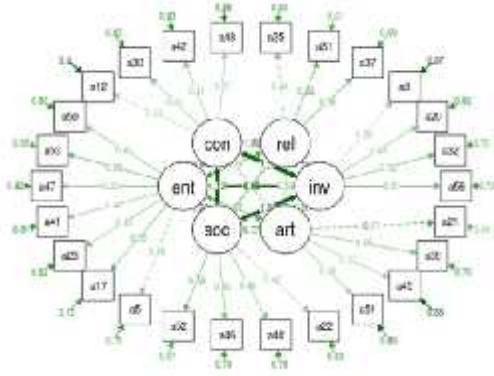
Figure 1. CFA VIT construct of SEM Model

Confirmatory Factor Analysis (CFA) is a model to see if data from the field is entered with the structure can be fit or not. To fit the model with the data obtained there are several sizes, Tukey-Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Residual (SRMR). The fit values 窶銀 鞠 or each size are TLI> 0.90; CFI> 0.95; and SRMR <0.08 (Miller, Smart, Rechner, 2015). From the analysis results by entering all items into the personality aspect in the results can be like in table 2.12

Table 1.Goodness Of Fit Index Statistic SEM (VIT)

No	Criteria	Cut Of Value (Nilai Batas)	Conclusion	Results
1	X^2 (Chi Square)	≤ 207.53	620.76	Marginal Fit
2	TLI	0,09	0.71	MarginalFit
3	GFI	0,09	0.85	Fit
3	CFI	0,09	0.74	Marginal Fit
4	NFI	0,09	0.61	Marginal Fit
5	RMSEA	0,08	0.06	Fit
6	SRMR	0,05	0.06	Marginal Fit

3. RESULTANT DISCUSSION

A. The user register page contains the display, where a user who has not become a member please fill out his personal data to have his own account, in order to conduct a direct consultation so as to know the results of the consultation

Figur 2. Registration User

B. In this consultation menu, the user will be confronted with some questions related to personality, so that the user can know clearly about the personality of the user, and after answering the question then the system will issue results in the form of the end result of all these questions.

Figur 3. Question Page View

C. This page is a continuation of the question area page. On this page will be delivered the results of questions that have been answered by the previous user. On this page will be the result of determining the personality type and the department that is suitable for the user. For more details can be seen picture 5.5 below:

Figure 4. Display Results Consultation

4. CONCLUSION

The research and development of Vocational Interest Test model in determining vocational interest of students based on expert guidance theory based on John L Holland-based expert system has succeeded in determining the most influential indicator in determining VIT (Vocational Interest Test) model that is Realistic, Investigative, Artistic, Social, Enterprising , and Conventional based on John L Holland's career guidance theory using in determining vocational interest, besides that researchers have also successfully designed online vocational interest test applications.

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ANALYSING INFORMATION SYSTEM OF ACADEMIC SERVICES IN THE UNIVERSITY

Wahyu Prima[1], Ganefri[2] and Krismadinata[3]

[1]Fakultas IlmuKomputer, UniversitasDharmas Indonesia, Indonesia; [2,3]Universitas Negeri Padang, Indonesia

ABSTRACT: The purpose of this study was to analyze the information system of academic services at the university. This type of research is the study of literature whose results serve as starting points for developing the information system of academic services at the university. Based on a review of literature, the data indicate that the lack of access to information, waste of time, huge cost, storage, management, decision-making, and tracking still share manually, the lack of information for stakeholders to make decisions, and the lack of information about the University for prospective students, as well as working with the mismatch of competency. Based on these results, the need to develop information systems academic service quality through customer satisfaction, which university students are the main customers. Thus, further research will be developed for academic-based service information systems Customer Relationship Management (CRM).

Keywords: Information System of Academic

1. INTRODUCTION

The information system of academic quality of service is determined by the quality of service. Quality services could be identified through customer satisfaction [1]. In college students are the main customers [2]. Higher Education academic success of the future depends on the ability of institutions to communicate with students in meeting their needs [3]. Thus universities must apply the concept of the student as customer satisfaction by providing services.

Customer Relationship Management (CRM) is a combination of people, processes, and technology that seeks to understand customer[4]. Some research says that the implementation of CRM can improve customer loyalty[5]–[10], simplify the data collection process customers [4] as well as to maintain the benefit of the organization [11]. From these results, it appears that the application of CRM trying to optimize profit company or organization in a way to establish a closer relationship with customers.

The aim of the study aims to look at the extent of the use of information systems CRM-based academic services at the University.

2. METHODS

Application of the method in the research literature review aimed identifies gaps in academic services at the university. Therefore, the focus of this literature review is specialized in the information system of academic services at the University.
The design of the present scoping review was guided by the York method developed by Arksey and O'Malley[12]. The design consists of five steps:

Identification of sources of literature review, the source selection literature review, noting the key from the desk reviews, conclusions, and reporting.

3. RESULT

The results of the literature review are done, there are two broad themes identified from the literature were selected: the obstacles that occur in academic services at the university and look at methods that are suitable for academic services at the University.

3.1 Academic service problems

Some of the results obtained by some problems in academic services such as: lack of access to academic information, causing the students lazy asking [13], frequent occurrence of fatal errors, waste of time, and requires a lot of costs due to: the use of paper, the collection of information by means of face-to-face, storage, processing, retrieval, transmission, tracking, sharing manually [14], the lack of information for *stakeholders* in the decision-making marketing and promotion [15], the lack of information about higher education for college student [16], and many college graduates who could not find a job according to their competence [17]. From some of the above results, it can be concluded that the information system needs of academic services at the university that is able to meet the needs of a college student and prospective college student.

3.2 Types of Academic Service Methods

3.2.1 Total Quality Management

Total Quality Management (TQM) appeared in 1980 when it was suggested to replace the word "Control" to "Management" it is believed that the quality was not something that should be controlled but to is managed [18]. TQM was developed by W. Edward Deming to the processing industry and the educational process with the proviso conceived specifically for education. Deming developed the theory of TQM approach humanist philosophical that of the belief that all people are educated and they want to do something good and deserve to be respected [19]. TQM has three main elements, namely: customers, processes, and people. The basic elements of TQM are to focus on customers, a basic understanding of human, full participation, continuous improvement, teamwork, and leadership of top management [20]. It can be concluded that TQM is a quality management system that focuses on the customer by involving all elements organized.

The quality of higher education is a task that heavy Sagat this is caused by a couple of things: first education, the lack of standardization in the definition and measurement of service quality; two considered as a function of customer satisfaction and quality perspective or the perceived quality is a function of customer satisfaction [21], [22]. TQM in higher education has some perspective and orientation that can be connected with the conceptual, measurement, and control. Quality management in higher education can be oriented customer quality. Good quality higher education can be assessed using a systems approach. Assessment is done at this stage of input, process, and output. It can be seen a few things, namely: objectives, inputs, outputs to be achieved, feedback from the environment [23].

Characteristics of higher education using the principles of TQM [19], namely: a) Optimization of the Faculty, each faculty should work in accordance with the quality standards well. It starts with the dean, vice-dean, department head, and the all faculty in the environment; b) Keselaratan Vertical, Everyone who is in the university environment must understand the policies that have been made in the domain of quality university college; c) Horizontal Alignment; Not allowed any competition between faculty at the same university, and there must be a mechanism or certain functional procedures to solve the problem efficiently, especially if quality management is applied.

3.2.2 *Customer Relationship Management*

Customer Relationship Management (CRM) is a service that is well organized in order to build relationships with customers in order to obtain,

persevering, and increase customer benefit the organization organisasi[24]–[30]

Generally CRM has three stages in its cycle and every stage intertwined with each other [29], including a) Acquire, By promoting the benefits of the product or service in terms of innovation and ease because the value of a service for the customer is the product better and supported by satisfactory service; b) Enhance, By encouraging the creation of competent services and sales of services better than services that are owned by customers .; c) Retain, offers what is required by a specific customer is not required by the customer market, as the value of services for the customer is the most proactive value according to his needs. The company's focus now is how to maintain existing customers, would benefit from the company on how to get new customers who are not necessarily profitable. The third stage can be seen in Figure 1.
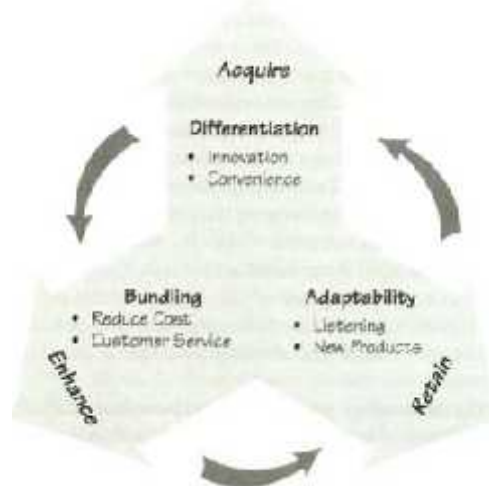
Figure 1. CRM Stage

The purpose companies implementing CRM is to establish a balance between customer by customer business advantage. It is the same as well as providers of education (University), through the ministry of education products according to the needs of learners (college student) as students can access the knowledge and capacity and better quality of service [31]. Therefore, the college also needs to consider the interests of the organizers and the interests of students, and identify factors that affect each individual college student to make each student creates more satisfaction, as well as universities to maximize their profits.

Some concepts of CRM experts say can be seen in Table 1

Table 1. The concept of Customer Relationship Management

Expert	Concept
Stanley. A. Brown	A process of obtaining, maintaining and increasing profitable customers.Requiring a clear attribute in the service attribute that will generate value to the customer will create loyalty[32]
Paul Temporal dan Martin Trott	The collaboration of every consumer who is able to create a situation that does not harm either party [33]
ArmitTiwana	Combination of business processes and technology by trying to understand the company's customers from different perspectives in order to produce products and services different from competitors[34]
Paul Greenberg	A system that can serve as an intermediary in maintaining individual loyalty [35]
Bryan Bergeron	Dynamic processes in managing customer and company relationships where customers choose to continue to make profitable and avoidable exchanges from the adverse exchange for the enterprise [36].
Bern H Schmitt	Customer relationship in which one customer with another subscribes is treated differently according to their needs [37].
William G. Zikmund dkk	The process of gathering information that will improve understanding of how to manage a company's relationships and its customers[27].

4. DISCUSSION

Quality college education system by the public is influenced by several factors [3], namely: a) Universities should have a function to create a sustainable future by integrating the activities of the college; c) Universities have an education system which produces harmonious action between the scientific community, faculty, students, and employees are creating a logical and systematic transformation way in developing new innovations. Based on these two types of academic service that

has been described is seen that CRM is considered more effective methods to improve the quality of academic services, because CRM is a service concept that seeks to understand the students as customers, thus increasing the confidence of college student to college. This is also reinforced by several studies that say that: Method CRM is a combination of people, processes, and technology that seeks to understand the customer [4], CRM can increase customer loyalty [5]–[7], simplify the data collection process customers [4] and can maintain profit organization [11]. From these results, it appears that the application of CRM trying to optimize profit company or organization in a way to establish a closer relationship with customers.

5. CONCLUSION

Based on the concept of CRM from some experts that shown in Table 1, it can be concluded that this concept is closely related to human relationships. In this case, how to treat people well, building a relationship between ourselves and help each other, so as to create a satisfaction that can increase loyalty. This concept is very suitable to be applied in the system of academic services at universities, so Dapa improve the quality of academic services. With this concept, it will develop academic information system services in accordance with customer needs as a student at the College

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RESOURCE SHARING–BLENDED PROJECT BASED LEARNING (RS-BPBL©) MODEL DEVELOPMENT IN VOCATIONAL HIGH SCHOOL

Wahyudi

Information System, STMIK Indonesia Padang, Indonesia

ABSTRACT: Resource Sharing-Blended Project Based Learning (RS-BPBL©) Model is a learning model from a dissertation research, passed a pilot project in STMIK Indonesia Padang. This model has IPR, Copyright Number: P/IDEC00201600776/00374. This research aims to develop the RS-BPBL© model as a comprehensive problem solving of problem limited availability e-learning facilities at Vocational High School Dharma Bakti (SMK DB) LubukAlung. The specific target development computer network hardware technology, and computer technology e-learning software on SMK DB. This is to improve understanding and skills teachers and students about resource sharing technology in project-based learning in blended learning based on RS-BPBL© bring to the world education without limit. This research was conducted with quantitative research design, Research, and Development using the ADDIE model. Methods and implementation of research: 1) Analysis of needs teachers and learners; 2) Design and development computer hardware technology based on e-learning network in Resource Sharing (RS); 3) Design and development computer software technology development in website and e-learning based on RS-BPBL©; 4) Development and implementation Blended Learning (BL) with Personal Learning Network (PLN) system; 5) Project Based Learning (PBL) operational / training assistance; 6) Dissemination of RS-BPBL©; 7) Testing model RS-BPBL©. The research output: 1) The new innovation RS-BPBL©Model form computer network hardware technology, and computer technology e-learning software; 2) Increasing application science and technology to teachers and students; 3) Increasing competitiveness graduates by providing added value to improving quality teachers, and improving comprehensive, meaningful and sustainable community values with RS-BPBL©; 4) Improvement social values teachers and students.

Keywords: Resource Sharing–Blended Project Based Learning, RS-BPBL©

1. INTRODUCTION

Model RS-BPBL© (Resource Sharing - Blended Project Based Learning), is a learning model for dissertation research, has been conducted pilot project in Higher Education STMIK Indonesia Padang. Possessing IPR Right Number P / ID EC00201600776 / 00374. The model has a paperless concept, the shared use of resources in the group (Resource Sharing). Groups can consist of educators with educators, educators with learners, or learners with learners in project-based learning conducted in Blended Learning. Model RS-BPBL© has learning resources. These can be shared, consisting of learning hardware, e-learning websites, and e-book teaching materials. This resource is implemented in the Personal Learning Network (PLN) series. This model has products such as e-learning website, e-book teaching materials, Manual E-Book, Student E-Book, and Instructor's E-Book.

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This program aims to achieve the utilization of technology R & D results and improving people's welfare.

Resource sharing is a concept of shared use of resources aimed at obtaining higher cost reductions and flexibility [1]. E-learning is a comprehensive education system [2], across space, time, and socioeconomic [3], opening access to education for anyone, anywhere, and anytime [4]. E-learning as a solution to various educational issues, especially with regard to equity and democratization of education [5], as well as the expansion of access to quality education to all levels of society [6]. E-learning becomes an option for people to gain access to education[7].

Blended Learning (BL) is the next development in education, combining face-to-face classes with e-learning [8], which allows for the benefit of both teaching methods [9]. Other advantages include greater flexibility[10]and reduced costs[9]compared to traditional class[11], especially when it should teach large numbers of students.BL equips traditional classes with online materials: a) has a positive effect on student performance[12][13], b) allows the promotion of a flexible learning environment and strengthens student autonomy, reflection, and motivation[14], c) facilitates review and control learning[15].

There are several ways to implement active learning, among them there is the Project-Based Learning (PBL), which has been gaining ground and is successfully applied in several fields [16][17]. It consists of a project based methodology where students must independently solve technical problems similar to those faced in their professional life. However, one of the difficulties found in PBL is the measurement of how knowledge is generated and disseminated.

2. METHOD

Quantitative research design, with Research and Development, use models ADDIE in Dharma Bakti Vocational High School. The research has a population of 215 (two hundred and fifteen students) and 30 (thirty) teachers. Data collection techniques such as questionnaires, interviews, observations, and tests. Descriptive data analysis techniques, processed with SPSS [18].

This research uses the following methods: 1) Analysis of the needs of teachers and learners; 2) Design and development of computer hardware technology based on e-learning network by Resource Sharing (RS); 3) Design and development of computer software technology development in the form of website and e-learning based on RS-BPBL©; 4) Development and implementation of Blended Learning (BL) with Personal Learning Network (PLN) system; 5) Project Based Learning (PBL) operational / training assistance; 6) Dissemination of RS-BPBL©; 7) Testing model RS-BPBL©.

2.1 Analysis

Research object is Vocational High School Dharma Bakti (SMK DB), LubukAlung, Padang Pariaman. SMK DB was established on 22 April 1999 with NSDS: 4208080002 and NSS. 34308502001. School status is recognized. The school is located on Jl. PulauJantung Indah, LubukAlung, Padang Pariaman District, West Sumatera Province with a land area of 9.660 M2. Telephone (0751) 96079 Fax. (0751) 698416. E-mail: smkdharmabakti@yahoo.com.

SMK DB has a Vision: To produce graduates who are cautious, intelligent, competent, disciplined, ready to work, ready to compete in their field of expertise.It has a teacher with 30 people, men 07 people, and 23 women. All teachers have bachelor's degree.Twenty-seven teachers have ages between 35-51 years and 3 people over 51 years old.The school has 5 study groups with 42 Electrical Engineering students, 44 Machinery Engineering, 58 Light Vehicle Engineering, 42 Computer and Network Engineering, 29 Motorcycle Engineering. The total number of students is 215 people.Students who came from parents with economics pre-prosperous class as many as 179 people and middle-class economy 36 people. SMKDB personnel numbering 11 people, consisting of 5 men and 6 women.

SMK DB has several technological issues, namely: 1) Computer laboratories are available for learning, inadequate. 2) Inadequate and often damaged computer equipment. 3) School Information only through Social Media. 4) School profiles are informed on social media, which seem to reduce the credibility and quality of schools.

Researchers conducted interviews with Principal SMK DB. It knows several other problems: 1) The learning process has not been based on e-learning. The Internet in learning is used only for sending tasks via e-mail, and searching data, and downloading. 2) Seventy percent (70%) of teachers do not have a structured learning material, 85% of teachers have instructional materials in hard copy, so students have to pay for photocopying learning materials.One hundred percent (100%) teachers have not been able, and do not have e-book teaching materials. 3) One hundred percent (100%) of the learning process in the form of midterms and final examination of the semester, done manually and not using computer technology. In this case, the correction of learning outcomes takes considerable time, as this is done manually. 4) The learning model used by teachers in the learning process has not varied and has not maximized the utilization of computer technology. Learning cannot be maximized more focused. 5) Students total 215 persons; forty-five percent (45%) own smartphone devices, and 12% have laptops. This device has not been used for e-learning based learning. Students who own a smartphone, 69% are still used for social media purposes like Facebook, WhatsApp, BMM, chat, Instagram. It is only about 10% used to find tasks, and send e-mails for learning. 6) Student motivation is still less in taking advantage of computer technology in learning. Meanwhile, the demands of the working world for graduates are expected to have the ability in using computer technology. Especially as a candidate for vocational school graduates should have the ability in mastering e-learning based learning. This illustrates the low competitiveness of graduates in e-learning capabilities.

2.2 Design

The design of school competitiveness can be optimized for 89% of teachers who have internet access. Then, optimization of 69% of students who own smartphone devices, and 10% have laptops. These learning tools can be used together, using the Resource Sharing (RS) method. This is to improve the quality of e-learning based learning hardware development. This design is to overcome one of the problems, namely the inadequacy of instructional hardware provided by school managers.

School competitiveness can be improved by improving the quality of development of RS-BPBL©-based learning software, in the form of e-books, and websites. This is expected to address the existing SMK DB websites and the use of social media as information.

Blended Learning (BL) that is implemented gradually can increase pedagogy, and create a fundamental paradigm shift. The success rate of online learning depends on the level of active interaction in a particular context. BL gives different effects to different learning methods that encourage educators to make learning with various methods. BL has major benefits for improving learners 'learning experiences in order to improve graduates' competitiveness. The integration of learning in the classroom with online learning can reduce the cost of education and meet the flexibility and convenience of learners. Furthermore, to improve the implementation of science and technology, done by Blended Learning (BL) design using Personal Learning Network (PLN) system. All of this is expected to overcome the learning process that has not varied and not the maximum utilization of computer technology. Thus, learning can be maximized with more focused and focused and provides a variety of learning models. These are all enriched with the wealth of teachers and students.

Design for added value enhancement and graduate's competitiveness is done by increasing the applied science and technology, and improving teacher and student values. It is comprehensive, meaningful and sustainable by training using RS-BPBL©based learning methods.

Design for Project Based Learning (PBL) for students is done collaboratively to solve challenges. This approach allows teachers to devote more time involved with students, and become a personalized learning experience for each of their individuals.

2.3 Development

Development is done to improve the competitiveness schools is through the improved design quality e-learning based network hardware technology in Resource Sharing (RS). Increasing the competitiveness of schools is also done by improving the quality through the design development software technology in the form of websites and e-books based RS-BPBL©. Improved implementation of science and technology by making and testing Blended Learning (BL) with RS-BPBL© Personal Learning Network (PLN) system.

Development of Technology Based Hardware Based Technology RS-BPBL Technology ©: Installation of PC Computer Hardware Components and: 1) Opening the Casing; 2) Processor to Motherboard; 3) RAM zoom; 4) Power Save; 5) Checking the motherboard to casing; 6) DVD RW; 7) disk disks; 8) VGA and Sound Card; 9) processor cable; 10) DVD RW and Hard disk cable cables; 11) USB and Audio connectors; 12) power / power LED / HDD LED / restart cable; 13) power supply cable to the motherboard; 14) Connecting the Power Flow Cable; 15) Connecting the Monitor; 16) Connecting Keyboard and Mouse; 17) Connecting Active Speakers; 18) Closing the casing.

Installation of Computer Network Components (Computer Network): 1) Install USB WiFi to PC Computers; 2) Installing the Processor to the Motherboard; 3) Installing WiFi USB Driver; 4) Install Wireless Configuration; 5) Select the folder where setup will install files; 6) Ready to Install the Program; 7) Setup Status; 8) Install Shield Wizard Complete; 9) PC Computer Connection - USB WiFi with USB modem; 10) Type the network security; 11) Connected.

Development of software technology in the form of website and e-learning based on RS-BPBL ©: Development Model RS-BPBL© on SMK DB: 1) Development Support System; 2) Development of Social Instructional Instructions and Companions; 3) Development of Syntax; 4) Development of Social System; 5) Development of Reaction Principles; 6) Development & Improvement of Learning Quality; 7) Development & Improvement of Student Learning Outcomes; 8) Development & Improving Graduates' Competitiveness.

Development Architecture e-learning RS-BPBL©: 1) Database; 2) Database Library; 3) Libraries; 4) User Interface; 5) User Using a web browser.

Designing e-learning Platform RS-BPBL©: 1) Plagiarism detection plugins; 2) Question import / export formats; 3) Resource types; 4) User profile fields; 5) Workshop forms; 6) Admin reports; 7) Blocks; 8) Course reports; 9) Database presents; 10) Gradebook report; 11) Message senders; 12) Portfolio plugins; 13) Quiz reports; 14) Search engine adapters; 15) Web services; 16) Workshop evaluators; 17) Assignment types; 18) Content editors; 19) Course importers; 20) Enrolment plugins; 21) Gradebook export; 22) Mnet services; 23) Question types; 24) Repository plugins; 25) Themes; 26) Workshop allocators.

2.4 Implementation

Implementation of Blended Learning (BL) is done by using RS-BPBL© Personal Learning Network (PLN) system. Implementation of Personal Learning Network (PLN): 1) Blended Learning System Menu; 2) Start Menu; 3) Introduction Menu; 4) Description Menu; 5) Learning Objectives Menu; 6) Learning Materials Description Menu; 7) Summary Learning Materials Menu; 8) Assignment Menu; 9) Quiz Menu; 10) Bibliography Menu.

Implementation of Project Based Learning (PBL) with operational / training assistance: 1) Group Project Menu; 2) Group Project Menu: Learning

Objectives; 3) Group Project Menu: Submission Proposals; 4) Group Project Menu: SAP Making Work Plan; 5) Group Project Menu: Making Work Plan; 6) Group Project Menu: SAP Progress Reports 70%; 7) Group Project Menu: Progress Reports 70%; 8) Group Project Menu: SAP Progress Reports 100%; 9) Group Project Menu: Progress Reports 100%; 10) Group Project Menu: SAP Group Presentations (You Tube); 11) Group Project Menu: Group Presentations (You Tube); 12) Group Project Menu: SAP Other Group Presentation Resume; 13) Group Project Menu: Other Group Presentation Resume; 14) Group Project Menu: Closing.

Implementation of using Resource Sharing-Based Learning Methods (RS-BPBL©): 1) Introduction (RS-BPBL© and Learning Management System (LMS); 2) Create New Account and Account Settings; 3) Create E-Learning; 4) Quiz and Assignment; 5) Small Group Discussion; 6) Students e-Attendance; 7) Resource Sharing (RS) using Edmodo Spotlight; 8) Resource Sharing (RS) using Enyflip; 9) Edmodo Progress Indicators; 10) Create E-Book; 11) Create Project I; 12) Create Project II.

Figure 1: https://smkdb.edmodo.com/

Figure 2: Edmodo account all teachers SMK DB

2.5 Evaluation

Evaluation has been performed on the RS-BPBL© Model as a comprehensive problem solving limited availability e-learning facilities.Evaluation will be continued on level understanding and skills teachers and students SMK DB about resource sharing technology in project-based learning in blended learning based on RS-BPBL©.

3. CITATION AND REFERENCE LIST

BL implemented gradually to improve pedagogically and create a fundamental shift of paradigm [19]. The success of online learning depends on the level of active interaction in a particular context [20]. BL gives different effects to different learning methods that encourage educators to make learning with a variety of methods [21][22]. The main benefit of BL is the enhancement of learners' learning experiences [23]. The integration of learning in the classroom with online learning can reduce the cost of education and meet the flexibility and convenience of learners [24]. The interaction in the BL should act as an active process that requires learners to do, rather than just passively absorb the information given [25].

The leadership role of electronic educators connects between social and cognitive presence in the learning approach and contributes to a meaningful educational experience in online, face-to-face and BL contexts[26]. Better access to technology and improved pedagogy is needed to prepare learners to meet the learning challenges provided by increasing access to information online[27]. Students in the BL environment have the greatest weight in the Course Designer and Organizer (CDO) dimension, followed by the Technology Facilitator (TF) and the Discussion Facilitator (DF) dimension[28]. The principle of benefit is the most important contributing factor power educators and the actual use of BL[29].

Some variables are of greater concern in evaluating the learning quality of learners in the BL environment. Evaluate the material aspect of the learners' experience, online learning technology. This is not just a matter of whether technology is good or not, but how learners understand their goals for learning, how they approach their use and how they perceive their role in the learning environment in which learning experiences are provided. This is the difference in the quality of the approach applied and the perceptions that the learners have for their aspects of the experience. This is what helps explain why some learners are more successful than others [30].

The relationship between online and face-to-face learning. If educators are favored by learners, and

educators do their best in online and face-to-face learning paths, then teach possible strategies to improve learners' perceptions and their values [31]. BL is implemented successfully requires the support of faculty, and related parties within the institution [32]. Administrative support personnel contributes to developing a common vision for the implementation of the BL, broadening communications, and finding funding, as well as other necessary resources [33]. Faculty, support staff, and even student involvement provide cooperation and enthusiasm that can facilitate implementation [34][35].

4. RESULTS

1) SMK DB already has two sets of e-learning hardware devices in Resource Sharing (RS), and ten teachers can operate it. 2) Eight people SMK DB teachers already have e-learning software RS-BPBL©. Each with five sets of RS-BPBL© Products Digital Versatile Disc in E-Book consisting five RS-BPBL© E-Handbook, five Instructor's E-Handbook, five Student's E-Books, five Create E-Books, and five Learning Management System Introduction E-Book. 3) SMK DB has twenty books Resource Sharing Blended Project Based Learning (RS-BPBL©) Windows Operating System, with ISBN: 978-602-371-347-9. 4) Three teachers SMK DB has been able to create an e-book and website-based learning RS-BPBL©. 5) All teachers from SMK DB understand BL, and eight teachers have implemented using Personal Learning Network (PLN) system, and have e-learning website using Learning Management System based on RS-BPBL©. 6) Eight classes have applied RS-BPBL© based learning methods with five face to face, and one online. 7) All teachers from SMK DB understand PBL, and eight teachers with eight learning classes can be accompanied by continuous project-based learning (PBL) education with BL system during one meeting. 8) Treatment, evaluation of RS-BPBL© technology done in continuous blended learning conducted during two meetings.

5. CONCLUSION

Resource Sharing model - Blended Project Based Learning (RS-BPBL©) Model Development in Vocational High School Dharma Bhakti (SMK DB) Lubuk Alung using ADDIE method has been done up to the Implementation stage. Up to this point, Evaluation has been performed on the RS-BPBL© Model as a comprehensive problem solving limited availability e-learning facilities. Stage Implementation has developed a network of computer hardware and computer software e-learning on SMK DB. Evaluation will be continued on level understanding and skills teachers and students SMK DB about resource sharing technology in project-based learning in blended learning based on RS-BPBL©.

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USE OF GEARBOX VIAR ON FISHING SHIPS

Wakhinuddin S, Donny Fernandez, Andrizal, M Nasir, Rifdarmon

Fakultas Teknik Universitas Negeri Padang

ABSTRACT: Natural potency, especially fish is one of life source of fisherman community in Kenagarian Siliki Nyalo Subdistrict Koto XI Tarusan. This is included in the area of Mandeh, which is the topography of the bay and headland. Potential untapped optimum, not yet using technology as a boat driving motor. The development goal of producing fishing boats that can move forward and backward. The method applied is the research and development of ship engines and ship propellers, a combination of automotive engineering work, production, and fabrication. Machines used powered 5.5 HP brand Tesla and Viar gearbox. The specialty of this development lies in the integration of Small Engine use with Viar motorcycle gearbox on fishing boats. Test data obtained that comparison ratio of reverse gearbox at 1: 0.75. The development results can be said, each round 1000 rpm on the reverse gearbox input, will produce 750 rpm rotation, a decrease in rotation. The implication is that for the fishing boats in the Nyalo River, the use of these machines and gearboxes is appropriate according to topography, fishermen do not need high speed, the ship can move forward and backward in a narrow area without using a rower.

Keywords: Small engine, gearbox, ship, movement forward and backward.

1. INTRODUCTION

Fishery Potential is one of life source of fisherman community in Kenagarian Siliki Nyalo Subdistrict Koto XI Tarusan. These potentials have not been utilized optimally to meet the daily needs of life. Especially on the fisherman around Kenagarian Siliki Nyalo Subdistrict Koto XI Tarusan not use motor fuel as a motor of the boat, for technical and economic reasons. The need for energy to be able to sail along the beach along Kenagarian Siliki Nyalo Subdistrict Koto XI Tarusan require great power, it can be fulfilled by using motor fuel as a driving force.

In Kenagarian Siliki Nyalo Subdistrict Koto XI Tarusan many river estuaries found that have great fish potential, and is one of the nagari in subdistrict Koto XI Tarusan from 20 Nagari. With an area of Koto XI Tarusan district 425.63 km ^{2}, and the population of 50.115 people. One of the nags that has beaches, swamps, river estuaries and geographical kenagarian is a bay that has a promontory. Topographical conditions such that make the sea waves are not too large.

The population of Kenagarian Siliki Nyalo is largely dependent on the fishing sector. The location of a fishing village with other fishing villages far enough, and where the fishermen caught quite far away. To go using the boat manually (traditional) requires power and a long time, so the mobility of fishermen is not fast.

Now the use of outboard engines as a prime mover, has been known by the community of nyalo river fishermen. But still rarely fishermen use motor burner stationer as prime mover. Almost all fleets of fishing vessels and existing tourist boats are boats using outboard engines. Whereas by using a stationary motor fuel that is given propeller (propeller) ships much cheaper price.

A ship engine ideally requires maintenance by using appropriate technology to keep the ship's engine and automotive working optimally. Limitations of the capability of fishermen in the repair and maintenance of machinery and automotive ship itself through appropriate technology must be addressed and improved. Information obtained from fishermen, obtained when the team conducted a survey said that, there is a limitation of the ability of fishermen in developing the ship by using appropriate technology.

The first problem, the expensive modern ship; outboard engine vessels have a very expensive price that is not affordable by fishermen Nyalo Pesisir Selatan River. To that end, fishermen use traditional ships that are manually driven (paddle). As an alternative to troubleshooting, the use of stationary engines given propellers, the price is cheaper than the outboard engine ship. Purpose, to create and develop the usefulness of the use of ship engines (small engine) and propeller (propeller) ship, so that fishermen can reach the price.

2. METHOD

The achievement of the planned results has been accomplished in accordance with the initial expectation of providing a ship engine for fishermen which can work the same as the engine ship's output, but at a much cheaper price. The concept of technology development used is industrial enggineering, which is a combination of technology products on the market. Then designed, calculated and assembled to produce a new product.

Once designed and calculated, the engine used a small brand Teslah engine with 5.5 HP power and

power train using Viar gearbox. Technical drawings of 'installed products' can be shown as follows:
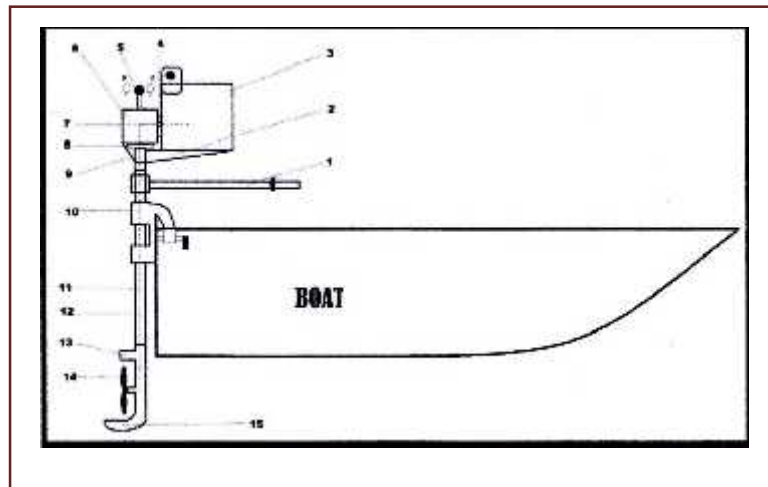

Figure 1: Image of product development techniques

Work undertaken includes calculation of power requirements in accordance with automotive technology. Flange and crank component construction on boat body with fabrication and production technology. This development was carried out in FT UNP's machinery and automotive workshop. Product trials were conducted at Kanagarian Sungai Nyalo, Mandeh area, Tarusan - Pesisir Selatan District.

3. RESULT AND DISCUSSION

Once created and developed, then tested the product, found little problem that the speed of the boat (boat) is slower when compared to the outboard ship engines used by the previous community. The cause of ship speed is not in accordance with the expected due to errors when designing power transfer system. Where the output ouput after going through the reverse gearbox decreased which causes the propeller spin down so that the boat speed is low. Here are the calculations to solve the problem:

From the test data can be obtained that the ratio of reverse gear ratio on the direct sight is about 1: 0.75, with each description occurs 1 round in the input then the new ouput occurs 0.75 rounds (not complete one full rotation). In other words, every 1000 rpm rotation on the reverse gearbox input, then the ouput will produce 750 rpm rotation, in other words a decrease of rotation after going through reverse gearbox.

$$
\begin{array}{rcl}
1 & : & 0.75 \\
1 \times 1000\ rpm & : & 0.75 \times 1000\ rpm \\
1000\ rpm & : & 750\ rpm
\end{array}
$$

If the reverse gearbox position is reversed it will get the ratio of input with ouput of 1: 1.33 with annotation every one rotation at input feed ouputnya will happen 1.33 rounds (more than one round).

Ratio in the original position	1 : 0.75
Ratio if reversed	1 : (1/0,75)
	1 : 1.33

From the above data then obtained the result that each round 1000 rpm at the input, then at the output will produce 1330 rpm, in other words the increment of rotation after the reverse gearbox position is reversed

$$
\begin{array}{rcl}
1 & : & 1.33 \\
1 \times 1000\ rpm & : & 1.33 \times 1000\ rpm \\
1000\ rpm & : & 1330\ rpm
\end{array}
$$

From the above description based on the problems that occur in power transfer system on the boat modification engine, it can be concluded to solve the problem can be done by reversing the reverse gearbox position.

4. CONCLUSION

After the experiments can be concluded: 1. Design and calculation generate opinion can use machine with power 5,5 HP; 2. Transfer of power to the propeller shaft can use Viar gearbox; 3. Baling boats (boat) at least use the size of five inches; 4. The product may be mounted on the ship's body with slight modification of the holder on the rear of the vessel; 6. The ship can move forward and backward, in accordance with the

natural topography conditions of the River Nyalo, Tarusan, Pesisir Selatan.

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DEVELOPMENT ASSESSMENT MODEL TO HIGH ORDER THINKING SKILL ORIENTATE FOR EVALUATION STUDENT COMPETENCY

Wakhinuddin S., Bahrul Amin., Waskito

FT UNP, West Sumatra, Indonesia

ABSTRACT: High order thinking skill (HOTS) is a skill that should be present in every teaching. Teaching automotive particularly require teacher to be skillful in planning activities that thinking skill among student. Automotive techology to develop, teacher of automotive technology should be to make and to develop test base on HOTS, to anticipate its. This research examines what practitioners in automotive education judge to be the key issues in the current and future use HOTS assessment. This research using of R and D with Four D Models. The result show that HOTS can be make teaching effectiveness and achievement student increase 12%.

Keywords — Teaching, Evaluation, Teacher automotive, Thinking high level, Thinking skill.

1. INTRODUCTION

Implementation of Curriculum 2013 lead to changes in the learning process. In the Curriculum 2013 the learning curriculum oriented toward active learning. Active learning can be High Order Thingking Skill (HOTS). HOTS wants student to assess in high order thinking, so that the test plan of student should be designed in C4 until C6 on cognitive taxonomy Bloom.

Increased diversity of expertise in vocational followed by increasing public participation can learn at vocational school. This makes some competence skills increase the number of students. Expertise competence of Teknik Kendaraan Ringan – TKR (Small Vehicle Engineering - SVE), as part of the automotive engineering disciplines, in 2013 was named skills competency of curriculum called packets. This package became the idol of junior high school to graduates, and the number of students has increased dramatically in taking the package. In order to anticipate the decline in the quality of education and changes in the vocational learning process, Development Technology, especially vehicle, could be expected to overcome this problem. It demands that we continue to make innovations to evaluate student.

The demands of these advances have logical consequences on attempts at improvement in continuously learning and evaluation. One consequence is the change and increase in volume and complexity of the assessment. The needs of assessment accurately at different levels and classroom management, and in order to improve the quality of care and improving the quality of the material assessment is a vital necessity, and determine the success of the assessment process.

In order to participate the improvement of the quality service balance and quantity of student learning both technical and strategic as a result of the implementation of the curriculum 2013. These development include in the facilities and Resources development for teacher, the results of which are expected to contribute for improving the reliable learning quality, especially for vocational which have practical activities learning at SMK 1 of West Sumatra, include Training and Technical Education Centre (Balai Latihan dan Pendidikan Teknik - BLPT), Padang. Various innovations of teaching are continued by teacher, so that in order the learning process is going well.

HOTS is an attempt to innovate development for learning strategies. Learning assessment activities are associated with the environmental context of daily students' life, so that students are active and more easily understand the content of the lesson, linking the lesson content with the their surrounding automotive technology environment will make learning more meaningful, because students know the lesson obtained in the class would be useful in their daily life.

The problem that develops in schools today is that most TKR teachers have difficulty in designing and implementing assessment in accordance with the Curriculum 2013, on the other hand a new paradigm of education (reflected in the curriculum 2013), students' assessment is not only done in the cognitive domain , but also in the psychomotor realm and affective sphere. Lack of teacher knowledge about various assessment techniques (other than "paper and pencil test"), how to design, and how to implement it makes the assessment tool invalid and unreliable. On the other hand, school demands (especially for reporting) require the teacher to conduct a comprehensive assessment. The results of the research interview (as a team of RSBI facilitators) with some TKR teachers in West Sumatra indicate that in general they do not yet understand how to assess students' ability. As a result, in filling out report cards teachers tend to

assign numbers to these domains on a very subjective "estimate" basis, without making specific instruments to measure those aspects. In addition, there was also an assessment of teachers who did not assess these aspects correctly. The learning assessment activities have been mostly only on cognitive aspects, measured and assessed through "paper and pencil test".

This research will be developed an assessment based on HOTS for Dasar Teknologi Otomotif (DTO) and Dasar Perbaikan Otomotif subjects in TKR class XI package. The results of this study are expected to help teachers TKR, especially class XI SMK, overcome their difficulties in implementing assessment. Problems to solve through this research are: how to develop implement HOTS validation, practical, and effective for learning competency package of TKR in class XI SMK can overcome the problem of implementation of curriculum 2013. This research is driven by the desire to contribute in solving assessment problems faced by TKR Smaall Vehicle Engineer in SMK in implementing the 2013 curriculum. This desire will be realized in the form of making assessment based on HOTS for two subjects. More specifically, this study aims to develop and implement valid, practical and effective e-assessment tools.

Schlecty and Vance (1981) concluded that the teaching experience was positively related to the competency test score (one of the indicators was the ability to make tests). However, in Person research, the opposite is true that the teaching experience is negatively related. Thus, teaching experience is a factor that needs to be investigated, so it is clear that its role in determining the quality of teacher-made tests. The reason for the importance of developing test skills: 1. Develop a test helps clarify the behavior that is important to learn. 2. The skills learned in developing the test can be applied in the aspects of curriculum planning and development and lessons learned. 3. The skills and knowledge gained in test assignments help evaluate the quality of tests made by others or other agencies. 4. Well-crafted tests can serve as guidelines for objective and fair procedures in judging. 5. knowledge of the latest development of the test will lead to the understanding of the limitations and understanding of how the misuse occurred. To be able to develop (create) qualified tests teachers need some special skills (Mehrens and Lehmann, 1973: 119 - 200): a. Mastery of the subjects to be tested b. Awareness of the underlying values of education c. Understanding the characteristics of the individual being tested d. The ability to conjure ideas e. Mastery of type and technique of writing questions f. Awareness of the strengths and weaknesses of writing questions To make the test, first plan the steps that begin the preparation of the test. Here all aspects of test preparation are considered. This is the hallmark of

developing a good test specification. The test specification is a description that shows the overall characteristics that the test should have developed. The test specifications include:

a. Determine general objectives as well as test requirements
b. Arranging the test grille as a reference, contains scope, pressure and parts of tests that are subject matter and cognitive level measured.
c. Choosing the type of questions that match the purpose of the test, scoring, administration and printing tests.
d. Determine the degree of difficulty of the problem and its distribution.
e. Determining the number of grains for all and part of the test, weight, reliability, time and test.
f. Determine how the problem is compiled in the final form.
g. Prepare writing questions and study questions.

Mehrens and Lehman (1973: 197-198) add that the question formulation is clear, the test items written on different papers, made more than necessary, are written after the material is taught, make corrections before it is tested and prepare the key and assessment rules. In the 2013 curriculum, teacher assessments are assessed through authentic assessment techniques, including: objective tests (PG), essay tests, portfolio assessments, assignment assessments, affective assessments, and performance for practical assessment (Cangelosi, 1990). The assessment model that will be developed and implemented in this study is oriented of HOTS.

2. RESEARCH METHODS

This research was conducted by using of research and development (R&D) method. The research development approach is used to design and develop learning tools and valid and practical assessment for the subjects DTO and DPO in class XI SMK. Research and development is the research used to produce a particular product and test the effectiveness of the product. In the development will be analyzed the current system, how the procedure of processing information by teachers and students in getting the final result of learning results. The development model used in prototyping development research.

Research and development is the effort to develop and produce a product in the form of assessment. Research development has three main goals: Produce product design that will be developed and used to improve the quality of assessment. 2. Testing the effectiveness of the product that has been created as a primary validation function through trials; 3. Testing the

effectiveness, efficiency, and attractiveness of the product. In this study developed assessment tools and validation and practical for learning and HOTS test material productive, its effectiveness. Research activities are conducted two stages, namely: needs analysis and designing prototype and implementation.

Research in the first year is focused on designing software prototype, which consists of

learning tools and assessment tools based on PBL and Web that are valid and practical for the class XI Electrical subjects. The research activity begins with a needs analysis that includes: analyzing the TKR Curriculum, conducting interviews with teachers and students, as well as reviewing the litertur about the assessment and design.

Table 1: Prototype Validity of Class-Based Assessment Tool

Objek yang divalidasi	Metode pengumpulan data	Instrumen
Validitas perangkat asesmen	Discussion with expert.	Validation Sheet

Discussions with some education experts and evaluation experts and automotive experts.

Tabel : 2 : Validator

No	Nama	Keahlian
1.	Dr. Dedy Irfan, MT	Teknologi Informasi
2	Drs. Rahmad Hadi, M.Kom	Teknolgi Informasi
3.	Drs. Andrizal MPd	Otomotif
4.	Drs. Prawoto, MPd	Guru Otomotif

3.   RESEARCH RESULTS

Table 3. Category Validity Value of each Expert

No.	Nama	Total Skor	Presentase (%)	Kategori
1	Validator I	46	92	Very Valid
2	Validator II	45	90	Very Valid
3	Validator III	47	94	Very Valid
4	Validator IV	43	86	Very Valid

From Table 3 above can be known, the maximum score of all aspects of the expert side is 50 (maximum score x the number of questions = 5 x 10 = 50). Based on the data in the table above, it concluded 4 experts stated the value information system is very valid.

4.   Conclusion And Implications

4.1   Conclusion

Based on research result of development of HOTS Assessment can be drawn conclusion as follows: The eligibility of HOTS is assessed by experts from various aspects that obtain an average percentage of 98%.

4.2   Implications

The process of easy use, both for teachers and students is likely to increase the effectiveness and efficiency of time in the process penginputan teaching materials and student assessment so that student learning outcomes can increase.

The implication of this research is HOTS can be used for the process of inputting teaching materials and assessments by teachers and see the final results of students quickly and easily and can

improve the implementation of science and technology in schools.

In addition, the school needs to complete and renew school facilities and infrastructure such as the need for internet, modem, speedy, and provide training on the use of Assessment to teachers and students. The school committee should also provide financial assistance so that the implementation of HOTS can run better.

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THE APPLICATION OF SIMPLE STRAIN GAUGE DYNAMOMETER IN LEARNING STYLE ON CUTTING LATHE

Wenny Marthiana [1, *)], Suryadimal [2] Edi Septe [3] Duskiardi [4,] and [5] Andika

[1,2,3, 4,5] *Mechanical Engineering, Faculty of Industrial Technology University of Bung Hatta* , Indonesia

* Universitas Negeri Padang Graduate Student, * E-mail: Wenny_ma @ yahoo.com

ABSTRACT: One of the characteristics of the production process using a lathe machine is to know the magnitude of the cutting force and cutting Power Cut of any kind of cutting materials. the magnitude of the actual cutting forces can be determined by measuring it using Dynamometer. Unfortunately, nowadays the Dynamometer price is still quite expensive.That is for, through this research aims to design a simple dynamometer that can be used as a means of supporting the learning process on analysis turning cutting forces at Lathe machine.

Dynamometer designed consists of four octogonal rings which made by alumina material. The top surface of the ring is made flat to put a *strain gauge* measuring instrument with 350 Ohm resistance value. When the cutting tool cut the cutting material will cause deformation on the octagonal rings then the material will produce a change of resistance whose value is proportional to the deformation of the ring shape. The change in resistance of four *strain gauge* connected to form a *Wheatstone* bridge will cause imbalance resulting in differing voltages at both inputs.

The result of the result is the Dynamometer wit The specification Overall dimension is 150 mm x 100 mm x 100 mm; Number of strain gauge being used is four. The strain gauge was positioned on alumina octagonal ring surface; S*train gauge* resistance value is 350 Ohm; Wheatstone bridge type is a full bride; Strain Amplifier of 1.000 gain; Data acquisition type is Jmida MF 126.

Keywords: Cutting Force, Cutting power, *Dynamometer*, Strain gauge

1. INTRODUCTION

One of the important process parameters of the production process, especially in the lathe process, is the Cutting Force. The cutting force becomes quite important because since it is very influential on the lathe process, such as if the cutting force increases, it is influence to the increasing of the friction that occurs between the workpiece and cutting and the increasing in vibrations that occur in the process as well. The increasing of the friction and vibration value may result in non-achievement of appearance (the surface roughness for example) on the cutting field.

The Cutting force values could be obtained in two ways, first it could be obtained through analytically mathematically, its a Pitti in this way the cutting force value which obtained is not accurate, it is because the factors that influence the cutting process are not taken into account entirely, such as process temperature, value the frictional force, the vibrations that occur during the process does not quite match as actually happens. The second way to get the cutting force value is by direct measurement. The mean used to measure the Cutting force known as the Dynamometer.By Dynamometer the cutting force could measure of 3 different styles of direction: tangential, axial, and radial.

On the use of the Dynamometer, the Dynamometer is attached to the cutting chisel, so that when the cutting process takes place, the chisel that cuts the workpiece will cause a strain on the dynamometer sensor. The strain received by this sensor is usually very small and cannot be read by the computer. In purpose of that signal on the sensor can be read by, so Strain Amplifiers is adapted to strong the signal then forwarded to the data acquisition .

The Data acquisition generally involves the process of taking signals and then processing them for information. A Sensor, one of the data acquisition component system then convert a measurement parameter into an electrical signal. The data obtained is usually displayed, analyzed and stored in a Personal Computer base.

2. RESEARCH METHODS

Use at most three levels of headings that correspond to chapters, sections, and subsections. The first level headings for chapter titles should be in 10pt, bold, justified, and uppercase font. Leave one blank line before and after the first level headings, respectively.

2.1 STRAIN GAUGE DYNAMOMETER

2.1.1 The Description

The main component of the Dynamometer with strain gauge sensor consists of a cutting toots holder that serves as the cutter holder as well as placing the strain gauge sensor. Strain gauges Sensors are attached to its tool holder ring (in the form of a ring is a big ring). The Strain Gauge, as a signal reader, read the strain value of cutting tool when it cutting materials. The Data Acquisition serves to store and process the cutting measurements data that have been strengthened by the strain amplifier before.

2.1.2 The Components Preparation

The first thing to be prepared is the tool holder which consists of a base strain gauge, strain gauge rings and cutting knife holder. Next, preparation of strain amplifier system before all of the Dynamometer components being assembled. It needs to thoroughly check the function of the system before it is assembled on a lathe machine.

3. STRAIN GAUGE DYNAMOMETER

The Geometry and dimension of dynamometer components as described below
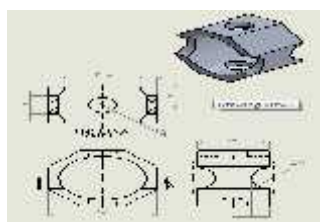

Fig 1. The cutting holder assembly
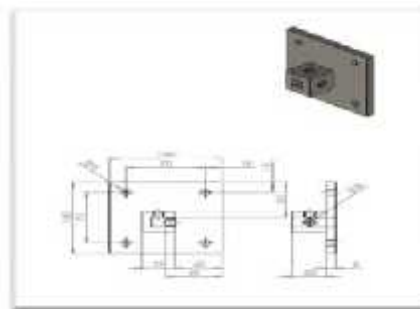

Fig 2. The Strain Gauge Ring
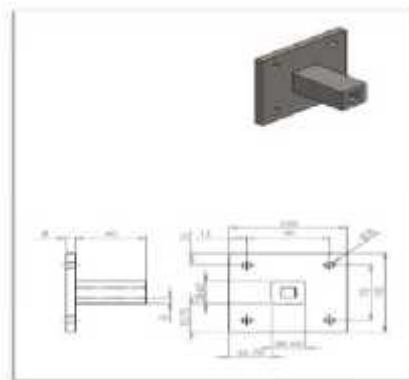

Fig 3. Cutting Tool holder
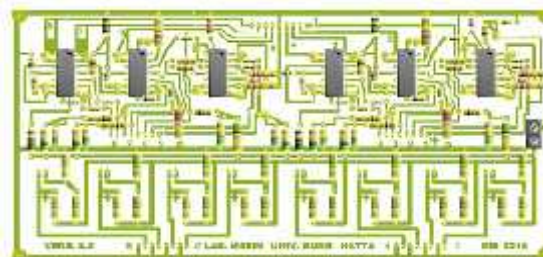

Fig 4. Strain Gauge base

Fig 5. Strain Amplifier

3.1 Working Principle

Fig 6. strain Gauge circuit

As seen in Fig 6, strain gauge circuit, When the cutting tool cuts the workpiece material, the cutting tool will receive strain in the axial, tangential, and radial directions. The Yield value/strain value that happened will be read by the strain gauge sensor since the strain value is too low to be read than the strain signal will be amplified first by a strain amplifier so that it can be read and displayed on the monitor. Acquisition data is used to enable measurement results data gathering and storing.

The unit measurement that appears on the monitor is the value of electrical voltage and current. Then that value must convert to cutting force value using formula

$$F = \frac{Vakt * 2 * y * A}{E} \quad (1)$$

F   : Cutting Force
V_{act} : Actual Measurement voltage
E   : Input Voltage

Y : Young Modulus

A : Area of the *strain gauge*

4. TEST RESULT

The result of the cutting process will be displayed on the monitor screen as shown below

Fig 7. Display data on the monitor

The graph on the monitor as clearly seen shown below,
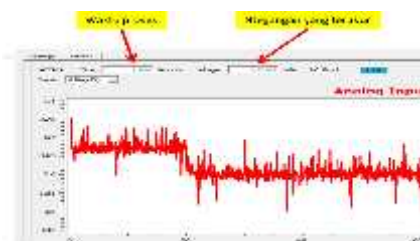
Fig 8. Test Result graph

From the graph in Fig 8, On the horizontal axis shows the time of the cutting process, The value on the Vertical axis shows a measured Voltage value with magnification value 1.000 (thousand) times.

For the evaluation of the tool, the process of lathing is done by adjusting the parameters of certain test lathe process, one example of the process parameters of the lathe process that is carried out is with a value of Round (n) of 275 rpm, Feeding (F) of 1.5 mm.

The Voltage Value generated for the Axial Style measurement as shown in Figure 4 and Figure 9 views of Grafik .
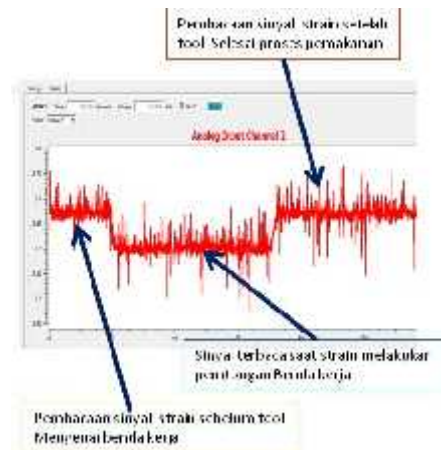
Fig 9. Data of channel 2
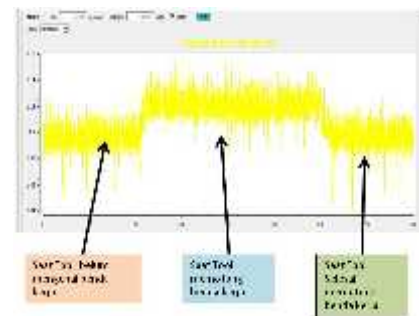
Fig 10. Data of Chanel 5

4.1 Discussion

At the time of Tool or eye, chisel cuts workpiece, as in Fig 9, the value of stress decrease compared to before and after cutting tool cut the material. While in Fi 10 it shows the different values from Fig 9.

Based on the principle of the strain Gauge resistance, If a wire is drawn, the wire will lengthen and the cross section becomes narrows so that the electrical resistance will increases. The addition of electrical resistance will cause the voltage value to increase as they are directly proportional, and vice versa

Based on that principle above, the value shown in Fig 9 The data was gained from input channel 2 indicates that the strain gauge wire experience compressed force, so the electrical resistance will decrease and causing its voltage to decrease as well

While in Figure 10, the data obtained from channel no 5, strain gauge wire has experience extension force (indicating the lathe part of the lathe that has withdrawal during cutting), so that the electrical resistance increases as well as the voltage increases.

From the data above, it can be seen that when cutting process happens there is the side of chisel eyes experience an extension and at the back side is shortened.

Based on the data of the lathe result shown on channel 2, the voltage value is 0.014348 Volt after enlarged 1,000 times on the strain amplifier. It is mean that the actual voltage value that occurs is the value of the displayed resistance divided by 1,000.

To obtain the value of the Cutting force, then the value of the voltage is converted into a force value using Eq 1.

By using the conversion factor as in Eq 1 above, for the measurement voltage in channel 2 of 0.014348 volts, obtained a cutting force as 12,052 N

5. CONCLUSION

The Strain Gauge Dynamometer has been produced with Technical specifications as follows:
• Strain Amplifier with 1000 gain
• Acquisition Data Jmida MF 126
• Material Base strain gauge aluminum, with overall dimension diameter 32 mm and length 20 mm
• Material Base holder ST-37, with dimensions 100 mm long and 100 mm wide
• Material Case chisels ST-37, with dimension length 30 mm, thickness 8 mm and height 28 mm.
• Strain gauge used with the type of a resistance of 350 ohms.

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DESIGN OF ANDROID BASED INTERACTIVE BOOK IN INTEGRATED ISLAMIC ELEMENTATY SCHOOL OF LAN TABUR PAGARALAM CITY

Yadi[1], Efan[2], Sigit Candra Setya[3]

[1,2,3]College Student of Doctoral Program, Universitas Negeri Padang, Indonesia;

ABSTRACT: The increasing of technology involvement on daily life becomes a solution of information exchange, use of technology has been used by education world. The learning process is a related components between teacher and student. For achieving of learning process, interaction between teacher and parent of student is extremely required to help student achieving purpose of desired learning. The success of learnig process can be seen from level of understanding and mastery of matter, and outcome that obtained by student while studied in classroom. This Research is intended for : 1) increasing interaction of parent of student towards learning process in the classroom; 2) knowing learning outcomes of student by using of information technology; 3) knowing respons of parent of student towards learning process. The researchers on designing process, use prototype model and quantitative data. The technique of data gathering by observation. The purpose of this research is producing design of android based interactive book that can be used by teacher and parents of student in communicating each other for increasing achievement of learning process of student in the classroom.

Keywors : Interactive Book, Prototype, Desingning, Android

1. INTRODUCTION

The increasing of expansion of information technology effects in human life system both big scale and small scale. As an example is use of smartphone technology. Most of the people do daily activity using smartphone to simplify their job. Improvement of technology is used on business, government, and education scope. An example of application of technology on education world is distance learning using E-learning. The learning process is related components between teacher and student. Education is a form of responsibility that must be taken by society. Everyone have to read, write and count. Elementary school is a formal education in Indonesia that must be taken for 6 years. The Integrated Islamic Elementary School of Lan Tabur (SDIT Lan Tabur) is a Islamic based education institute in Pagaralam City. Most of parents of student give their child an education by register to elementary school, they hope their child's education progress become to be better so that effects towards child's mindset and character. However, most of parent that do not know education activity of their child in the school, this caused while the student enter to school environment. It is means that the responsibility of student activity fully moves to teacher and school. The success of learning process can be seen from level of understanding and mastery of matter, and outcome that obtained by student while studied in classroom.

Basically, process of child development is not fully become to be school responsibility. Every student actually has two educators that extremely effect to development of student, that is parents and teacher. For achieving of learning process, interaction between teacher and parents is extremely required to help student achieving purpose of desired learning. Involvement of parents extremely effects to help process of student development. However, the problem that happen in SDIT Lan Tabur is, the teacher finds much difficulties to communicate with parents of student. It is happened because parents of student often did not red information that is written in communication book. The parent of student prefers communicate by communication media like smartphone.

Based on the problem above, so the researchers want to create a design of interactive book using android based information technology as a communication media between teacher and parents of student. By using the interactive book, the researchers hope the parents of student can increase their interaction to the teacher. So the parent of student can know activities that are done by their child. By designing this application, is expected the parent of student and teacher can well communicate each other about the development and activities of student. So with this application the parent of student can increase their interaction, monitor their child development by using information technology.

The purpose of design of android based interactive book is: 1) increasing interaction of parent of student towards learning process in the classroom; 2) knowing learning outcomes of student by using of information technology; 3) knowing respons of parent of student towards learning process

2. METHODOLOGY

2.1 Research Approach

According Sugiyono, there are two types of research approaches: quantitative research and qualitative research. Quantitative research is a research approach with research data in the form of numbers, and analysis using statistics. Qualitative research is a research approach with research data relating to the interpretation of data found in the field. Population is a generalization region consisting of objects/subjects that have certain qualities and characteristics set by the researchers to be studied and then taken conclusions. [7]

The population in this research is SDIT Lan Tabur consisting of parents of first grade student and 5 teachers, where the respondents are used as a sample is the parents of the guardian students where they can provide information related to the purpose of research.

2.2 Data Collecting Method

Interview method collects data by way of question and answer with teacher and student to get problem which is being faced by respondent so that research purpose can solve the problem. Researchers also use literature studies to find reference to theories relevant to the case or problems found. References can be searched from books, journals, research report articles, and websites on the internet. The goal is to reinforce the issues as the basis for making interactive teacher-and-parent-teacher book designing.

2.3 Time and Place of Research

The location of this research was conducted at SD IT Lan Tabur Kota Pagaralam, with implementation time for 1 (one) month which started from August to September 2017

2.4 System Development Method

In conducting the design of the liaison book, Researchers use Prototype model with several stages as follows :
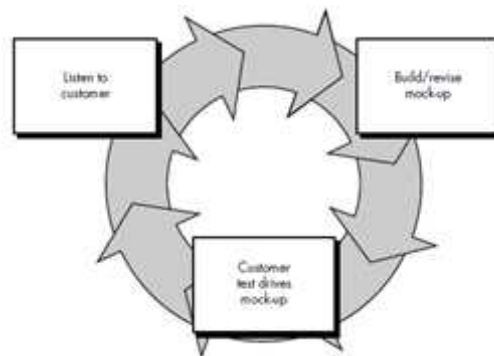
Fig 1 . Prototype Model

The stages in Prototyping are as follows:

2.4.1 Gathering needs: developers and clients meet and define common goals, known needs and descriptions of parts that will be needed next;

2.4.2 Design: the design is done quickly and the design represents all aspects of the software is known, and this design is the basis for making prototype;

2.4.3 Evaluation Prototype: client evaluates prototype made and used to clarify software requirement. [6]

3. RESULT

The result of this research is an interactive contact book design of teachers and parents based on android using information technology that developed is expected to increase the interaction of parents and teachers to the development and activities of children in achieving the goals in the learning process. This research is a research with quantitative approach with descriptive method, which is the design of interactive book of parents and teacher based on android with data result done by researcher in describing the use of student contact book as communication media by parents and teacher at SD IT Lan Tabur Kota Pagaralam . The variables studied in this study is the use of the student's own diary and Sub-Variables of this study so that communication made by parents and teachers can be evaluated on the activities of student development.

3.1 System Design

In the design stage of interactive android-based liaison between teachers and guardians in SD IT Lan Tabur Pagaralam city researchers use a design stage that consists of Use case diagrams, activity diagrams, and descriptions of the display of the liaison book.

3.1.1 Use case diagram

In the design stage of interactive android-based liaison between teachers and guardians in SD IT Lan

Tabur Pagaralam city researchers use a design stage that consists of Use case diagrams, activity diagrams, and descriptions of the display of the liaison book.
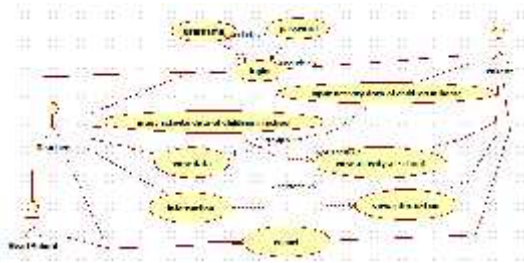
Fig 2 . Use Case Diagram

3.1.2 Activity Diagram of Teacher

In the Activity Diagram of the teacher here the researcher explains how the procedure of teacher in doing the data processing of student which seen in picture 4.2 teacher must have right of access to interorif base book android by doing validation of username and password so that teacher can login into next page for data processing
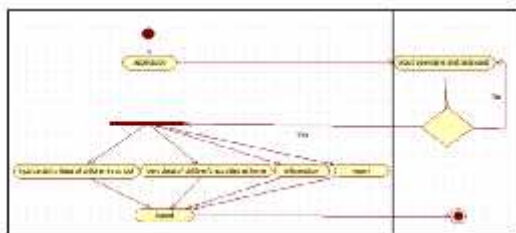
Fig 3 . Activity Diagram of Teacher

3.1.3 Activity Diagram of Parent

In the parent activity diagram here the researcher explains how the parent procedure in doing data processing at home students seen in the figure 4 parents must have access rights into the book interorif android based interfaces by doing the validation of username and password so that parents can login into the next page for student data processing for home activities.
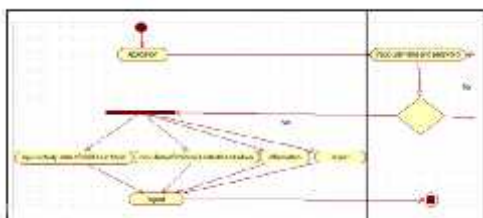
Fig 4 . Activity Diagram of Teacher

3.2 User Interface Design

3.2.1 Login menu design

Here is the design of the login view. This login menu works so that users (teachers and parents) can access the liaison book and manage the data that exist according to their respective access rights. This view is the first step to enter the main menu of an interactive liaison between teachers and parents. To enter the main menu, the user must enter the correct username and password provided by the administrator. Figure 4.1 is a login view The design of an interactive teacher-and-parent-based teacher book on SD IT Lan Tabur.
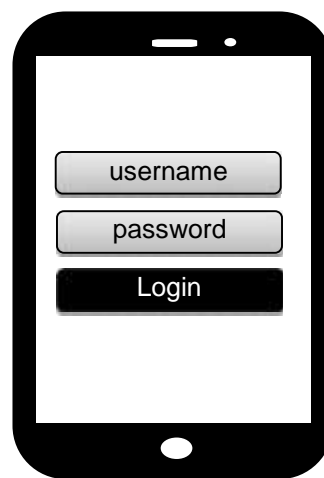
Fig 5 . Login Menu Design

3.2.2 Main menu design

The main menu is a sign that the user has logged in using the username and password correctly. Once entered into the main view the user can access the liaison book to perform data processing in accordance with the permissions they have. Figure 4.2 shows the main menu display to enter into the next menu the parent simply pressing the submit menu Parents can view the student data and perform data processing with, some options for viewing data such as student data, school activity data, data information, and report learning outcomes.
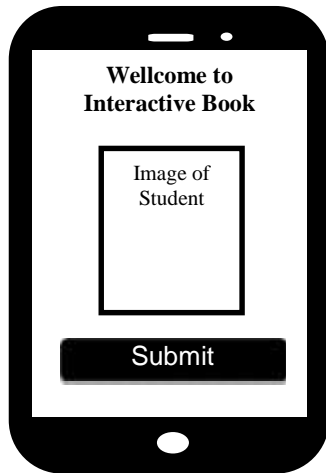
Fig 6 . Main Menu Design

3.2.3   Profil menu design

In the Profile menu of student data, parents can view student data such as student identity in the form of Nis, Name, Class, Date of birth Place gender with identity of parent of student beside that parent can do data processing, some menu edit option

3.2.4   Student Activity at School Menu Design

On the menu of student data activity in school, parents can only see student data such as the development of student learning process in the form of completion of tasks assigned by teachers in the school while the note column can contain messages from teachers to parents of students.
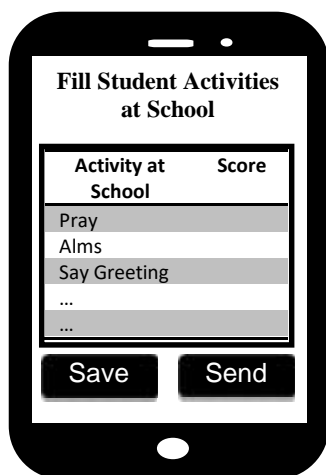
Fig 7 . Student Activity at School Menu Design

3.2.5   Student Activity at Home Menu Design

On the menu of student data activities at home, parents are responsible for reporting activities of students at home such as the tasks assigned by teachers in school so that the achievement of learning materials in schools can be developed outside the school.
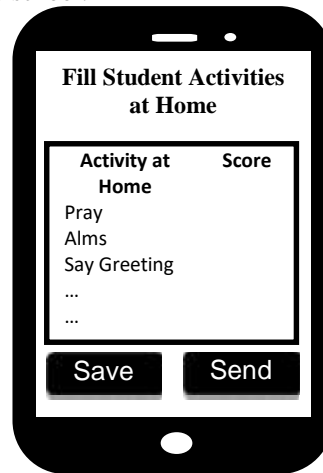
Fig 8 . Student Activity at Home Menu Design

4.   CONCLUSION

Based on the results of research and discussion about the design of interactive book students in SD IT Lan Tabur, it can be concluded as follows:

4.1   Interactive link book design can be run by using mobile-based information technology, so as to improve the communication interaction of parents and teachers more effectively.

4.2   Designing an interactive liaison book parents can improve supervision to determine student learning outcomes by using information technology on the development of learning process of children in school.

4.3   The design of liaison books can help teachers or the school in the process of recording the development of student learning in school along with know the response of parents to the learning process.

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SMART CLASSROM DESIGNS IN THE SMART EDUCATIONAL ENVIRONMENT

Yasdinul Huda[1]dan B Herawan Hayadi[2]

[1]Department of ElectronicEngineering, Fakulty of Engineering, Universitas Negeri Padang
[2]Department of Computer, Faculty of Computer, UniversitasPasir Pengaraian Riau

ABSTRACT: The Smart classroom is a typical environment for Smart Education, and this is a high end class of the digital class. This paper addresses the key characteristics of smart learning and the key challenges that must be addressed when designing a smart educational environment to support personalization. Aiming to integrate the smart learning environment into the learning ecosystem and educational context of the smart classroom, Innovative use and new pedagogical approaches need to be implemented to manage formal and informal learning. This contribution illustrates the key characteristics of smart learning and an smart learning environment and supports the relevance of future user engagement taking during the design process, to improve knowledge about the design and application of new pedagogical approaches in the smart learning environment at the UNP Faculty of Engineering.

Keywords: Smart Classroom, Smart education, Seamless learning, Smart learning environments, Participatory design

1. INTRODUCTION

The advantage of using information and communication technology (ICT) in learning in the literature of the 1990s is expressed as an opportunity to learn anywhere, anytime and anywhere [1]. Thus, this statement reveals that ICT has modified the concepts of space and time, providing new opportunities for accessing information and modifying knowledge outcomes. The use of mobile devices in learning alters the conception that the place and context in which learning takes place is of little importance. However, location (physical and virtual) becomes irrelevant; On the contrary, all this is becoming increasingly important, where the design of smart learning environment needs to set up different locations where one can learn, incorporating both formal and informal situations.

The use of mobile devices that will integrate location as an important aspect of adaptation and personalization is also relevant. The use of mobile devices gives users the opportunity to generate and control more aspects of the environment or real location-based contexts [2].

The use of mobile devices not only support learning is everywhere, yet can be applied in real locations or classrooms by integrating smart learning environment into an ecosystem context of learning and education in the smart class. The concept of smart classes associated with the optimization of teaching in backing right presentation of content, easy access to learning resources, teaching and learning interactivity deep, contextual awareness and detection, spatial and management classes, etc. "Pishva and nishantha in [3] defines the class as smart as smart classrooms for educators who are involved in education everywhere that allow teachers to use real approach classroom teaching or learning everywhere or remote classroom.

In traditional classrooms, teachers are the main source of information and students are asked to be in the same place, space and simultaneously participate in the same activities, while in situations of learning activities everywhere can be done in different spaces and times for each student. In addition, teaching materials are available at any time and accessible from any device. The use of the concept of unlimited learning to describe when a person experiences continuity of learning through a combination of location, time, technology, and social arrangements. "Smooth learning can be a collective or individual process It can continue over time and location, offering access to existing learning resources, covering the physical and digital world, involving multiple types of technological devices, and integrating different approaches to learning and teaching [4] Learning to be effective everywhere requires more distributed experience in space and time [5] It is well understood that the learning environment is everywhere an environment where students can learn without being fully aware of the situation. , the boundary between "work/play, learning/entertainment, accessing/creating

information, public/private, formal/informal is a conceptually clear distinction but now becoming obscure" [5].

Digital technology has promoted a new vision for learning. Summarize the challenges of the future in education well when they say that learning is essentially personal, social, distributed, wherever, flexible, dynamic and complex. "Fundamental shifts are required for predictive, social, open, dynamic, flexible, and more personalized models, as opposed to a one-size-fits-all, centralized, static, top-down and knowledgeable model of traditional learning solutions [6]. the desired outcomes of education, their realization requires new learning designs based on new pedagogical approaches and the use of more effective technologies that can support and guide individual learners.The concept of smart learning emphasizes the importance of technology design to make learning better. concept related to the term 'Technology-Enhanced Learning' (TEL), which has been used primarily in Europe.

Unlike other terms, TEL implies an assessment: 'enhanced' suggests that something is enhanced or superior in some ways, but what exactly will be improved when technology is used for teaching and learning, how can improvement be achieved, and how is improvement determined? What are the enhancements related to the increased use of technology or the improvement of the environment in which educational activities are conducted? Similar questions arise when talking about learning smart. However, the term 'Smart Learning' refers not only to the idea of improving learning, but also emphasizes the need for adaptation and personalization, taking into account the places where learning takes place. In smart learning, real-time location is the critical data needed by the system to tailor the content and situation to the learner.

The purpose of this contribution is to analyze the key challenges that must be addressed when designing a smart educational learning environment. The author argues that one of the most important features of smart learning is that the data used serves as feedback for learners to support personalized learning. Based on personal experience, current authors believe that applying participatory formulation methodologies helps develop an smart learning environment tailored to the needs and socio-cultural context of learners.

The following sections address the key characteristics of smart smart classrooms, smart learning environments and smart education, and analyze key challenges faced in designing smart learning environments.

2. CHARACTERISTICS SMART EDUCATIONAL ENVIRONMENT

The following sections review the main characteristics of the smart classrooms (smart classroom) learning smart (smart learning), smart learning environments (smart learning environments) and education smart (smart education), and analyze the main challenges faced in designing smart learning environment.

2.1. Smart Classroom
Detailed description of first-generation smart classrooms and second-generation smart class requirements is available at [7]. For example, Huang et al. in [8] proposed "... a smart classroom SMART model characterized by showing, easily managed, accessible, interactive and testing. ... The smart classroom deals with the optimization of content presentation teaching, easy access to learning resources, deep teaching interactivity and in-depth learning, contextual awareness and detection, classroom layout and management, etc. "Pishva and nishantha in [3] defines the class as smart as smart classrooms for teachers involved in distance education which allows teachers to an apparent engguna p p endekatan classroom teaching to learning everywhere. "The classrooms are smartly integrate voice recognition, computer vision, and other technologies, which are collectively called smart agents, to provide tele-education experience that is similar to the traditional classroom experience" [3]. Glogoric et al. in [9] discussed the potential use of technology Internet-of-Things (IOT) to build a smart classroom. "Combining IoT technology with social and behavioral analysis, ordinary classes can be transformed into smart classes that actively listen and analyze sounds, conversation, movement, behavior, and so on, to reach conclusions about the presentation of educators and audience satisfaction "[9].

2.2. *Smart Learning*
According to Zhu et al in [10], "there is no clear definition of smart learning and integrated so far. Multidisciplinary researchers and education professionals continue to discuss the concept ". In fact, many different definitions can be found in almost all articles that emphasize the various aspects and characteristics of smart learning published since 2014 in the journal Smart Learning Environments. However, there are some common and important element identified by most researchers d i this field. y ang first highlight that smart learning based on two different types of technology: smart devices and smart technology.

Smart devices refer to artifacts that show some of the ubiquitous computational properties,

including (though not necessarily) artificial intelligence; For example, internet, technology can be used in the form of accessories such as glasses, backpacks, or even clothing. The use of smart technologies, such as cloud computing, learning analysis or large data, focuses on how learning data can be captured, analyzed and directed to improve learning and teaching, and support the development of personalized and adaptive learning [11], [12].

Regardless of the difference between smart devices and this smart technology, both are actually related, because there is no independent type of technology. For example, the Internet and the most usable technologies require large data to generate personal information and provide feedback to users.

In addition to technical characteristics, it is useful to analyze the characteristics that describe smart learning. Related to this, Zhu, et al. In [10] describes ten key features that define smart learning:

a. *Location-aware*: in real time smart location learning is the critical data the system needs to tailor the content and situation to the learner;

b. *Context-aware*: explores various scenarios and activity information;

c. *Socially-Aware*: feel social relationships;

d. *Interoperable*: sets standards for different resources, services and platforms;

e. *Seamless connection*: provides continuous service when there is a connected device;

f. *Adapting*: encouraging learning resources according to access, preferences and demand;

g. *Ubiquitous*: predict the demands of learners until expressed clearly, provide visual and transparent access to learning resources and services;

h. *Whole record*: recording the learning path data to the data mine and analyzing in depth, then provides a reasonable assessment, suggestion and boost of on-demand services;

i. *Natural interaction*: transfers the senses of multimodal interactions, including the recognition of facial and facial expressions;

j. *High engagement*: immersion in a multidirectional interactive learning experience in tech enriched environments.

In short, in smart learning, real-time location is important to tailor the content and situation to the learner. However, location is not always an important requirement in smart learning. The most important characteristic is the system will be able to advise and predict the needs of learners. Smart learning is a learning system that advises learners to learn in the real world.

2.3. Characteristics of Smart Learning Environments

Implementation of smart learning environment beyond the application of smart technology. A smart learning environment not only allows learners to access digital resources and interact with learning systems in any place and at all times, it also actively provides the necessary instructional guidance, instruction, support or learning advice in the right place, at times right. and in the correct form.

Spector in [13] considers that a smart learning environment is an "effective, efficient and attractive" environment. Furthermore, today's authors find it imperative to support the integration of technology and pedagogy to create a coherent ecosystem that provides "an ongoing evidence of ongoing knowledge and knowledge change, instilling skills that are seamlessly transferred to learners as they move from one context learn the other "[14].

According to Hwang in [15] the three main features define an smart learning environment:

a. *Context-aware*: the system should be able to provide learning support based on the online and real-world status of learners;

b. *Adaptive Support* : The system should offer instant and adaptive support to learners based on individual needs from different perspectives (learning performance, learning behavior, profile, personal factors, etc.), as well as the online and real-world context in which they are ;

c. *Adaptive Interface*: the system must be able to customize the interface with the user (how to present information, learning preferences, learning performance etc.) The user interface can be a mobile device (smartphone, tablet computer, etc.), wearable device (digital watch) or even the ubiquitous computing systems embedded in everyday objects.

Hwang at [16] establishes potential criteria for a smart learning environment as context-conscious, able to offer learners instant and adaptive support and customize the learner's interface and subject content. A smart learning environment aims to support learners to gain new knowledge, even as they engage in leisure activities. It plays the role of a coach, or guide, who seeks opportunities to advise learners in their daily lives by considering their needs and preferences. In short, the purpose of a smart learning environment is to provide self-service learning, personal and personal motivation.

According to Spector in [13], it is also highly desirable to design an smart learning environment to provide motivation for diverse learners,

recognize the competence of learners, learning styles and interests. In addition, the learning environment should provide personalized tasks and / or formative feedback, and should include a supportive pedagogical strategy:

a. *Conversation:* learning environment can engage students in dialogue or facilitating a dialogue group on the relevant topic or issue;

b. *Reflection:* the learning environment can produce an independent assessment based on the progress and performance of students, should suggest activities and attributes in a learning environment that can be adjusted to improve the overall effectiveness;

c. *Innovation:* the learning environment using new technologies and emerging and utilize innovative technology with creative ways to support learning and teaching ;.

d. *Self-organization:* the learning environment can rearrange the resources and control mechanisms to improve its performance over time based on the data that is collected automatically and used to improve how the environment interacts with students in a variety of situations

2.4. Smart Learning Environments And Learning Ecology

The author argues that an smart learning environment is an important component in the ecology of learning. The concept of learning ecology provides a systemic picture that goes beyond a simple techno-centric standpoint. It is important to understand that technology is embedded in the life experiences of learners. John Seeley Brown introduced the idea in an influential article from 2000 entitled *"Growing Up Digital:* How to Change Web Works, Education, and How People Learn". Seeley uses it to show how new technology is driving new niches and habitats, which require new collective and individual behaviors.

Related to study the ecological framework Barron in [17] explains how learning takes place in various settings and identify possible synergies and barriers between them, including the role of technology in making the boundary more permeable and allows the new agents in the learning levels. Barron develop learning ecology framework based on three assumptions [17] various ideational resources can trigger and sustain interest in learning; 2) people not only choose, but also develop and create learning opportunities for themselves once they are interested, assuming they have the time, freedom and resources to learn; and 3) interest-based learning activities are limits and self-defense. Individual views about the ecological study looked at students as major

actors in the network, is responsible for maintaining social relationships and create meaning in the whole context of the physical and virtual [18].

Smart Learning Environment. Hwang [16] presented the concept of an smart learning environment "... which can be regarded as a technology-powered learning environment which makes adaptation and provide appropriate support (eg, guidance, feedback, guidance or tools) in the right place and at the door the right time based on the needs of individual learners, which may be determined by analyzing the behavior of learning, performance and real-world and online context they're in. in short, according to Hwang [15], an smart learning environment should:

a. Place the learner in a real-world scenario.

b. Adaptation of learning interfaces for individual learners.

c. Customize learning tasks for individual learners.

d. Provide personalized feedback or guides.

e. Provide interdisciplinary learning or support.

f. Provide learning or support guidance throughout the context.

g. Recommend a learning tool or strategy.

h. Consider the online learning status of learners.

i. Consider the real-world learning status of learners.

j. Facilitate formal and informal learning.

k. Consider some personal and environmental factors.

l. Interact with users through multiple channels.

m. Provide learners with support first, across real and virtual contexts.

The use of technology embedded in the life experiences of learners has important consequences for pedagogical formal education methods. The inclusion of a smart learning environment within the educational context of increasing complexity and educational professionals needs to introduce innovative uses and new pedagogical approaches. The next section discusses major pedagogical challenges when designing ecosystem learning that integrates smart learning.

2.5. Smart Learning and Smart Pedagogies

In the early 1990s, the use of technology to support classroom teaching is very rare because of the lack of knowledge of educators. For this reason, the earliest professional development program focused on the use of hardware and software. However, it soon became clear that this was not a good strategy, as the use of ICT should be embedded in educational methodologies. Many attempts have been made to effectively integrate technology as an

educational tool as a means to promote student-centered learning, in line with Government Regulation No. 32 of 2013 concerning the use of ICT in learning. Currently, the next challenge is to design an ecosystem learning that integrates smart learning for personalization and self-organizing learning. According to Zhu, et al. in [11], "Objective smart education is to improve the quality of learning lifelong learners. It focuses on contextual learning, personal and indefinitely to promote intelligence of learners and facilitate troubleshooting capabilities m hey in an smart environment ". Similarly, Kim et al. in [19] assumes that smart education is centered educational paradigm and service-oriented employees. Middleton in [20] also believe that smart education should be developed based on a learner-centric aspect. MEST in [21] serves as an smart learning is defined as a *self-directed,* motivated, adaptive, enriched resources and the technology embedded, while Lee [22] proposed that features smart learning includes formal and informal learning, social learning and collaborative. , personalized learning and learning, and the focus of apps and content.

What is clear is that this type of education will address new pedagogical issues. Researchers and educators need to develop new thinking about pedagogy based on the existing theories, such as constructivism, cognitive load theory and the theory of the new relationship as connectivism and network learning [23]. The new learning concept can provide an excellent opportunity for researchers to develop new strategies to help learners more effectively and efficiently gain knowledge and solve real-world problems.

Smart pedagogy must take into account the metaphorical learning of knowledge creation that highlights competence in generating knowledge. "Knowledge-pull approach to learning is based on providing students with access to seju mlah node tacit knowledge / explicit and handing over control to them to choose and combine the knot in accordance with their wishes, to enrich their personal knowledge networks" [24]. These skills are increasingly related to the use of digital technology that provides a flexible way to support modeling, sketching, testing and social interaction.

The presence of technology requires a shift from the use of low-level technologies, such as drilling, drilling and searching for information. Instead, smart education encourages the use of 'high-level' technology, using it as a 'thought tool' or 'intellectual partner' for creativity, collaboration and multimedia productivity. Technology must enable and accelerate the learning relationship between teachers and students and between students and other learning partners, such as coworkers, mentors and others who have a similar interest in learning. Deep learning tasks reconstruct learning activities from focusing on mastery of content to explicit student capacity building for learning, creating and proactively implementing their learning. In the most effective example, in-depth learning tasks are guided by clear and precise learning objectives, ideally combining curricular content and student interests or aspirations; involves specific and appropriate success criteria that help both teachers and students know how well objectives are achieved; and, incorporating feedback and formative evaluation cycles into learning and work, building student self-confidence and proactive disposition.

Despite advances in psychological research and vocational technology education, assessment practices in educational institutions has not changed for decades. There is a need to move beyond the traditional form of assessment, using new methods to combine different levels. The development of smart learning technology provides great potential for automated assessment enhancement. According to Kopainsky et al. in [25] learning analysis system can be used to balance real-time assessment of evidence-based (especially self assessment) with smart digital system designed to encourage critical thinking and problem solving. Data from tracking and management of learning activities can inform instructional design by providing evidence to support media choice and sequence of activities. Such analytical feedback to students can continue during the course and allow students to focus on areas of material poorly understood.

In addition to the use of technology, new pedagogies emphasize the active involvement of students in their own learning, student responsibility, metacognitive skills and a dialogical and collaborative learning and learning model. For this reason, self-assessment and peer assessment are also very important. Andrade and Du in [27] gives the definition of the principle of assessment is very helpful that focuses on learning formative be promoted: "Self-assessment is the process of formative assessment where students can reflect on and evaluate the quality of work and their learning, assess the extent to which they reflect the objectives or explicitly stated criteria, identify strengths and weaknesses in their work, and revise them accordingly ".

Peer appraisals involve students who take responsibility for assessing the work of their peers. Therefore they can be involved in providing feedback to their peers. This is a powerful way for students to gain a better understanding of the assessment criteria and also be able to transfer

some ownership of the assessment process to them, potentially increasing their motivation and engagement.

3. THE DESIGN OF SMART LEARNING ENVIRONMENTS: PARTICIPATION AND FEEDBACK

In the author's view, the learning environment involves pertimbang an smart context, a source of cultural and socio-cultural features of formal and informal learning environments. The smart learning environment is not only related to ideas for improving learning, but also emphasizes the need for adaptation and personalization depending on where the learning takes place. Thus, the smart learning poses an important challenge for the evaluation because the content may not be repaired and activity may extend across both formal and informal settings. The author now considers that there are two main issues to consider when designing an smart learning environment: 1) user participation in the design, and, 2) providing useful support to offer appropriate feedback to the user.

a. Participatory design

Traditional design methodologies limit the participation of students in a consultative role, in which the de sain decision taken by the designer and / or developer. Traditional development adopts a systematic approach to analysis, design and testing, without having to use a specific user model. However, users are an important source and can be partners in the design process to ensure that the technology is useful and useful. The authors assume that the potential of smart learning depends on the design of the learning environment and it is important to design the learning ecosystem using a participatory process. In contrast to the image of students measured as actionable data objects with algorithmic techniques, smart learning should emphasize the idea of 'smart learners'.

The field of instructional design has evolved in recent years and now offers a set of methods, tools, systems and models in [27], [28] which can empower educators in designing scenarios that provide a richer learning experience. The design must articulate and organize the content disciplines, pedagogical theories, based on practical experience and the use of technological resources are increasingly diverse and sophisticated [27]. The design is, naturally, iterative and collaborative. This requires discussion, reflection, criticism and implementation. Designing a collection of complex human and objects require fluency epistemic rare, sometimes it is not preferred in the practice of education [29].

In designing an smart learning environment, it is necessary to take into account that users will interact with heterogeneous devices that must be successfully integrated and interconnected. According to Pons et al. in [30] , "it is impossible developer can produce a system that is able to find preference contextual users with a high degree of accuracy in all cases without any input from the user. Therefore, user preferences should form a key knowledge to be identified during the initial stage configuration. " .

Participatory design is used to increase knowledge about the design of smart devices. For example, Pons et al. in [30] applying participatory methodologies to design and visual language tools that will be used when creating table-based real tangible editor to personalize smart environments. The design serves to identify the characteristics of visualization, taking into account different learners' knowledge.

Durall and Leinonen in [31] apply participatory design to develop Feeler, a prototype designed to help people develop an awareness of how differences in habits and mental state of an impact on their learning. Thus, Feeler aims to raise awareness and reflection on learning activities. Feeler design is based on the assumption that learning technologies are built on the monitoring of physiological data should aim to empower students by helping them understand the various aspects that affect their learning performance. Therefore, Feeler explore some strategies to support reflection in the design of the prototype e such as the creation of time, ask reflective questions and letting some aspects incomplete to encourage users to ask the meaning. Although these cases there was a prototype, some authors [30] , [31] to consider the draft is adopted that is very relevant to open a discussion about the role of data to support the meaningful and personal information.

b. Data visualization

Feedback has been regarded as a key tool to help students improve performance. Feedback is usually associated with traditional communication mechanisms learners with educators and their colleagues. As mentioned in the previous section, the use of technology to add new possibilities to track the activities of the students and give them feedback sooner about their learning performance. However, most efforts to use learning analysis focuses on providing information for instructors to improve their pedagogical strategy [32] . Very rarely students is considered as a major recipient of learning analytics data or given the opportunity to use the information in reflecting their learning activities and learning to manage them more efficiently.

Some authors cautioned that actual learning analysis can paralyze learners by making them dependent on institutional feedback [33] . Se part of the research anali tik have examined historical data to identify patterns in the learning behavior of the students then associated with academic performance and / or retention. However, most of the studies did not have an understanding of the pedagogical context that affects the activity of students, and how to identify patterns in the behavior of student learning that can be used to influence and contribute to the teaching and learning experience more positive.

Essentially there are gaps in knowledge for teachers who are trying to bridge the gap between the information provided by the analysis of instructional and pedagogical action types are designed by teachers to support learning. The field of instructional design offers a way to address this gap by helping teachers to articulate the design and purpose of learning activities that can be used as a guide for interpreting the data analysis of learning. T presumption against the use of learning analytics as a tool to serve the institution, the more scientists began to promote student-centered analysis [34] . In line with the statement , we assume that learning analysis can and should be used as a tool for reflection and metacognition to support independent learning [35] .

It is important to identify the main challenges in the design of learning environments that utilize learning analysis to encourage reflection. The most urgent challenges to be faced are divided into two categories: data and visualization. What kind of data that is most meaningful to students? What visualization types that can encourage reflection of the most successful?

Converting data into knowledge is a cognitive process that can be supported by the availability of data. Visualization of information has been recognized as a tool for the creation of a sense, because it helps synthesize complex information and facilitates comparisons and conclusions [32]. Therefore, in order to actually use the analytics that help students become independent learners, need to adopt a student-centered approach.

There is a need to rethink how learning indicators chosen and the extent to which they contribute to the understanding of learning as a process, not in terms of results. In this case, allows the students to decide what aspects will they monitor and analysis can help make learning analysis as a tool for reflection in an smart learning environment.

4. CONCLUSION

Learning anytime, anywhere is not a new concept. However, where the process considered a general activity during life, it is important to be explicitly designed and deliberately supporting them. As stated above, the smart learning environment should integrate formal and informal learning to create an adaptive autonomous learning environment to support individual learners. This environment requires using smart data analysis and learning techniques to integrate real-time information about student locations and historical data to identify meaningful learning patterns. It is very important to take into account the smart learning environment Context of consciousness that can combine physical classes with many virtual learning environments.

A new concept of 'Education as a Service' According to Boulanger et al. in [36], is emerging as an approach to addressing global and open market challenges. Educational resources in this approach are easily accessible to global learners by providing them as a service. From this perspective, one can expect traditional organizational education structures and teaching processes to undergo major changes. For example, lectures can be separated from the course itself. Some lectures may be given by a teacher other than the teacher who is responsible for the course. Assessment can also be separated, where a third party can test, not a subject matter.

This service should take into consideration the student's point of view and learning experience. In an smart learning environment, learners have different service options at different stages of learning, where these services are provided by various educational facilities, both online and physically. Due to the rather vague line between formal and informal learning, and increased focus on informal learning, it may not be necessary to distinguish these two different learning formats in the future.

Knowing more about student performance and perceptions is essential for researchers to develop more smart learning environments more effectively and deployment in smart classes with the advantages of appropriate technology tools. Evaluation can be done using various aspects, such as learning achievement, problem-solving skills, self-efficacy and self-regulation. In the meantime, it is necessary to investigate the impact of smart learning environments on learning performance and students' perceptions with learning styles, cognitive styles, or other personal characteristics.

Having an in-depth understanding of learners' behavior and learning patterns will be essential for researchers and educators in developing more effective learning tools and strategies especially in

smart classroom environments.

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BUILD AND DESIGN OF BUSINESS INTELLIGENCE UNIVERSITY SYSTEM AS DECISION SUPPORT ACADEMIC

Yaslinda Lizar[1] dan Asriwan Guci[2]

[1]Faculty of engineering and vocational, Universitas Negeri Padang
[2]Institute of Health Science, MERCUBAKTIJAYA Padang

ABSTRACT: The system of business intelligence university begins with the stage of data integration, data analysis, create reports and create web portal and then integratethe reportwith the webportal Analysis of the data processed with OLAP, KPI and data mining to extract information from data stored in a data warehouse. The results of the data analysis process in representation in the form of statistical reports and dashboards are then used as decision support academic. This research aims to design structure of business intelligence university system as a decision support academic at University web based with OLAP. This research resulted in the system framework and web portal business intelligence university systems that can be accessed through a browser online. Business Intelligence can be used as a solution to consider the process of decision making in the management of the university and solutions to improve the academic performance of management in achieving academic excellence.

Keywords: Business Intelligence, Data Warehouse, OLAP, KPI, Data Mining

1. INTRODUCTION

Business Intelligence is a process of extracting operational data organization, and then collecting it into a data warehouse, then the data in the data warehouse is processed using various processes of statistical analysis and data mining process, in order to get the various tendencies pattern or a pattern of such data [1].
In business intelligence known method of data analysis approach in the form of On-Line Analytical Processing or abbreviated OLAP which is an approach method to present the answer of demand process of analysis that is dimensional quickly, in the form of design, application and technology that can collect, store, manipulate data into multidimensional data for analysis purposes. OLAP is the key of business intelligence and is used to analyze data and information that will then be used as a basis for decision making or decision support system in an organization or company.
Academic and student information system into one measure of the level of success in providing education and competitiveness of faculty and students at a college or higher education organization universitas.Kualitas assessed from the use of information technology and the use of information technology systems may affect competitiveness in many aspects assessment of the college, both nationally and internationally.
Gains or excess application of business intelligence solutions with the OLAP approach on academic and student information system in the form of data collection, storing the data, analyze the data and provide access to the data so that it can assist the user in making decisions accurately and quickly to perform a variety of activities

including OLAP; roll up, drill down, fi ltering, aggregation, pivoting, slicing and dicing. So the application of business intelligence solutions with OLAP in the information system of academic and student can be used as a solution in considering the decision making process in the management of the university and also as a solution to increase their academic performance to achieve academic excellence or academic excellent and can assist in making strategic planning university forward.

Utilization of business intelligence solutions at universities has provided many benefits and advantages to developing a decision support system in academic, personnel management and financial management and the development of university strategic plans. Because the solutions business intelligencedapat use in considering the decision-making process at universitas as an important part of business management major in the world of education in Indonesia, this is due to factors that affect the performance and optimization of the management of the university as well as such whichengages in business processes in the company profit in general .
This research aims to make the design of Business Inteigene university system to support academic decision making at State Islamic University Imam Bonjol Padang based web using OLAP with the help of SQL Server Business Software Inteligence Development Studio and Microsoft Visual Studio. The stages in this research begins with database and data design warehouse, and then the design stage of the web portal system interface Business Intelligence university and OLAP query process on the university's Business Intelligence system.**.**

2. THEORY

2.1 Business Intelligence

Business Intelligence (BI) is a collection and set of activities or stages to collect data and analyze data so that it can be used for better decision-making process so that it can be used in the process of making vital decisions in the company's business or the decision to obtain goals from the company's business. Business Intelligence is a conceptual framework to support business decisions, business intelligence incorporates architecture, databases or data warehouses, analytical tools and applications [2]. Business Intelligence is used for applications and technologies in collecting, storing, analyzing, and providing access to data so as to help enterprise or organizational users make better and more informed decisions [3]

Business Intelligence in relation to management support for structured data and unstructured data, is a process of integrating and integrating components to handle data on the business intelligence framework. The approach will be carried out with three types of approaches: integrating structured and unstructured data, analyzing the data collection and distributing the results of the analysis into the form that suits the needs. The above approach can utilize three layers of business intelligence framework in the form of data layer, logic layer and access layer as shown in Figure 1 business intelligence architecture with multiple layers [4].
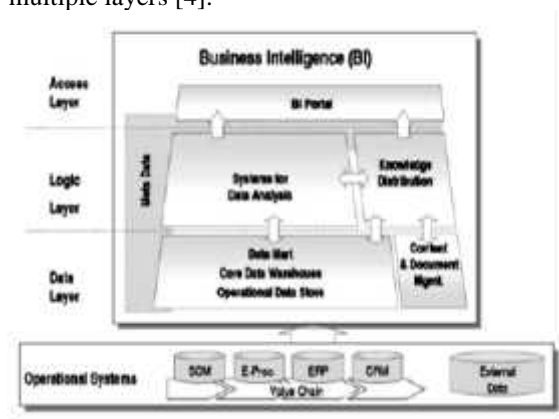
Figure 1 Business Intelligence Architecture
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2.2. Data Warehouse

Data Warehouse atau disingkat DW merupakan basisdata relasional yang didesain lebih kepada *query* dan analisa dari pada proses transaksi, dan biasanya mengandung history data dari proses transaksi dan bisa juga data dari sumber lainnya. *Data Warehouse* dapat juga dikatakan sebagai tempat penyimpanan ringkasan dari data historis

yang seringkali diambil dari basisdata terpisah departemen, organisasi atau perusahaan [1]). *Data warehouse* merupakan koleksi data yang mempunyai sifat berorientasi subyek, terintegrasi, *time-variant*, dan bersifat tetap dari koleksi data dalam mendukung proses pengambilan keputusan management, proses ini *subject-oriented*, terintegrasi, waktu yang bervariasi dan permanen [5].

Table 1 Comparison of Operational Data Functions and Data Warehouse

Operational Data	Data Warehouse
Designed oriented only on specific applications and functions	Designed based on certain subjects (main)
The focus is on database design and process	The focus is on data modeling and data design
Contains details or details of the data	Contains historical data to be used in the analysis process
Relation between tables based on current rules (always follow the latest rules)	Many business rules can be presented between the tables

2.3 On-Line Analytical Processing

On-Line Analytical Processing or abbreviated OLAP is basically a special method to perform analysis of data contained in data storage media in the form of database and then proceed with making analysis report in accordance with the request of the user or user. For that purpose the data in the form of information is made into a special format by giving groups or groups to the data, this is called the cube models.

OLAP is a technology that allows analysts, managers and executives to simultaneously access data quickly, consistently and interactively with a variety of visualization and visualization of information where each row of data can be transformed to reflect the company or organizational dimension so that it is easily understood by the user or user [6].

Here are the main characteristics found on On-Line Analytical Processing that includes:
1. Support the utilization and use of data warehouses that have multidimensional data.
2. Provide interactive query facility and complex analysis.
3. Provide drill-down facility to obtain detailed information, and roll-up to obtain aggregate in multidimensional.
4. Able to produce calculations and comparisons.
Able to present results in the form of numbers that are easy to understand and presentation in

graphical form.

2.4 Key Performance Indicators

Key Performance Indicators or abbreviated KPIs are financial or non-financial metrics used to assist an organization or company to determine and measure progress toward the goals of the organization or company.KPI is used in business intelligence to assess the current state of a business and can determine an action against such circumstances [7].

KPIs are often used to assess activities that are difficult to measure such as the benefits of leadership development, agreements, services, and satisfaction and are generally associated with organizational or corporate strategies that are applied with techniques or methods such as balanced scorecards.

KPI as a measure or indicator that will provide information on the extent to which the organization or company has succeeded in realizing the strategic goals that have been set. In preparing the KPI an organization or company should set clear performance indicators, specific and measurable (measurable).

2.5 Data Mining

Data Mining or abbreviated as DM is a method of data mining or the discovery of new data and information by searching for certain patterns or rules of a very large number of data (Davies, 2004). Data Mining is also known as knowledge discovery in database or abbreviated as KDD in the form of activities that include collection, data usage, historical data to search and find regularity, patterns or relationships in a large data set [8].

Data Mining can also be referred to as a series of processes or stages to explore and seek the added value of knowledge that has not been known manually from a data set. Data Mining is related to other scientific fields such as database systems, data warehouse, statistics, machine learning, information retrieval, and high-level computing. In addition, data mining is also supported by other scholarship such as neural network, pattern recognition, spatial data analysis, image database, and signal processing.

Data mining is an activity or process of finding patterns in the data and in finding interesting patterns are sourced from large amounts of data, the data is stored in database, data warehouse, or other information storage technology.

3. RESULTS AND DISCUSSION

This research produces; 1) Business Intelligence University System Framework, 2) Academic KPI, 3) Web Portal Business Intelligence University.

3.1 The University Business Intelligence System Framework

The framework of the university's Business Intelligence system is a detailed description of the underlying components as well as the layout of those components against other components in building the university's Business Intelligence system. Figure 1 is the basic framework of the university's Business Intelligence system generated.
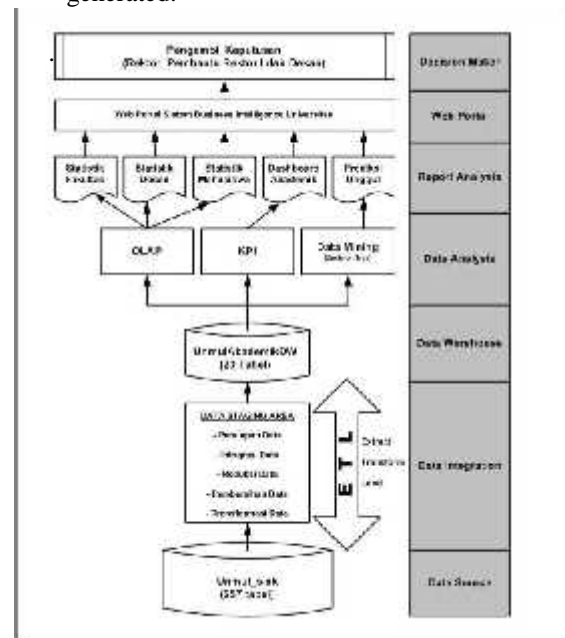
Figure 1. Basic Framework of University Business Intelligence System

The following describes the components in the University Business Intelligence system Figure 1.

1. Data Source

Source data or source data comes from academic and student database UIN Imam Bonjol Padang namely Uinib_Siakad. In the database there are as many as 257 tables. Furthermore, tables that will be used as source data are selected in accordance with the needs related to lecturer data, research data, publication media data, student data entry and graduate students, accreditation data of study program, data status of study program implementation, and cooperation data of faculty and program study from 2010 to 2015.

2. Data Integration

Is a process of integrating data from the Uinib_Siakad (data source) database and then stream the selected data into the UinibAkademikDW (data warehouse) databases by DbUinibSiakad (data staging) database database using Microsoft SQL Server Integration Service software. The following ETL process that pass in the establishment of data warehouse are:

a.   Data preparation that is on the database Uinib_Siakad examined lecturer data, research data, publication media data, student data entry and graduate students, accreditation data study program, data status of study program implementation, and data cooperation faculty or study program before imported to database DbUinibSiakad (data staging), where only the relevant data attributes are selected;

b.   Integrasi data is a process of combining the interesting attributes of the table analyzed in Uinib_Siakad database, then the attributes are selected to determine the attributes used in fact tables and attributes used in the dimension table. This is done on the DbUinibSiakad database (data staging);

c.   Reduction of data that is the process is done in conjunction with the process of data integration, ie by removing the attributes that are less interesting than the table analyzed. This is done on the DbUinibSiakad database (data staging);

d.   Data cleaning, process is done on attributes that are not consistent writing. This is done by discarding or uniforming its value by using a minimum value, average, maximum or classification. This is done on the DbUinibSiakad database (data staging);

e.   Data transformation is a process done by taking data from DbUinibSiakad database (data staging) which is then entered into the database UinibAkademikDW (data warehouse). In other words the transformation process, done to move data and loading data from data staging to data warehouse run execute package.

3. Data Warehouse

The data warehouse used is a relational database created with Microsoft SQL Server 2008R2 software and the database is named UnmulAkademikDW consisting of 8 fact tables and 15 dimension tables, so the total of all tables is 23 tables.

4. Data Analysis

The data analysis process uses Microsoft SQL Server Analysis Services software which is a technology component for OLAP and data mining. The OLAP process is performed in SQL Server Management Studio in the form of viewing data, creating multidimensional expression, data mining extensions, XML for Analysis and also defines roles for OLAP security access. The following components used are:

a. OLAP in this study uses cube to generate statistical analysis report by using some tool function on cube ie cube structures to determine measure group and dimension, calculation to write arithmetic expression, and browser to see the final result of query process from cube in the form of roll-up report, drill-down, slice and dice, then the result of the cube is deployed to the analysis server;

b. KPI is used to generate dashboard reports. In this research KPI is built after the cube process is formed then on the cube component of the KPIs where the expression status is created script to compare expression statement in accordance with the value or weight of KPI designed, then the results of the KPIs are deployed to the analysis server;

c. Data Mining in this research uses decision tree algorithm and tool used are mining structures to see tables and attributes used as input and prediction and mining model viewer to see decision tree of decision tree and mining model prediction to produce prediction report based on data in trainning. The results of the process are able to provide predictions academic excellence, and the results of data mining trainning are deployed to the analysis server.

5. Report Analysis

Report Analysis is a report created as a support in decision-making, because the report format in the form of statistical analysis and dashboard. In this study the report was created using Microsoft SQL Server Reporting Services software, because reports can be created in tabular, graphical and indicator form from OLAP data sources residing in the analysis server. Reports made in the form of faculty statistics, lecturer statistics, student statistics and academic dashboards as well as superior predictions. The result of making the report in publish or deploy to report server.

6. Web Portal

Web Portal is a web-based program to link (link) between users (users) with statistical analysis reports, dashboard reports and prediction reports.

Web Portal created using Microsoft Visual Studio 2008 with VB.NET programming language. The Web Portal is used to secure reports from unauthorized parties and may also make it easier for legitimate users to access the reports.

7. Decision Maker

Decision Maker or decision maker is the person or user of the Business Intelligence university portal system that will take or determine the decision for a strategic policy.
The person has a vital and important role in the university in decision making and related to academic and student activities namely Rector, Vice Rector I and Dean of the Faculty

4.2. Academic KPI

The predicate of key performance indicator or academic KPI is based on the category of accreditation status, lecturer category with doctorate degree, lecturer category with professorship and graduate student category with cum laude.

Table 2. Category of Accreditation Status

Predicate KPI	Weight Value Requirement KPI	Indicator Color
Excellent	Average Accreditation Value Overall Study Program ranging from 3.50 to with 4.00	Green
Good	Average Accreditation Value Overall Study Program ranging from 3.00 to with 3.49	Yellow
Growing	Average Accreditation Value Overall Study Program ranging from 2.50 to with 2.99	Blue
Grow	Average Accreditation Value Overall Study Program ranging from 2.00 to with 2.49	Red

Table 3. Lecturer Category Holds Doctorate

Predicate KPI	Weight Value Requirement KPI	Indicator Color
Excellent	Lecturer Ratio with Doctorate and all Lecturers in the Faculty or Study Program that is less than 1: 3	Green
Good	Lecturer Ratio with Doctorate and all Lecturers in the Faculty or Study Program that is 1:3 s/d 1:4	Yellow
Growing	Lecturer Ratio with Doctorate and all Lecturers in the Faculty or Study Program that is 1:5 s/d 1:6	Blue
Grow	Lecturer Ratio with Doctorate and all Lecturers in the Faculty or Study Program that is over than 1: 6	Red

Table 4. Category Lecturer Professorship

Predicate KPI	Weight Value Requirement KPI	Indicator Color
Excellent	Proficiency Ratio from Prof all Lecturers in the Faculty or Study Program is less than 1: 4	Green
Good	Proficiency Ratio from Prof all Lecturers in the Faculty or Study Program is 1: 4 to with 1: 6	Yellow
Growing	Proficiency Ratio from Prof all Lecturers in the Faculty or Study Program is 1: 7 to with 1: 9	Blue
Grow	Proficiency Ratio from Prof all Lecturers in the Faculty or Study Program is over 1: 9	Red

Table 5. Category Status Graduates With Cum Laude

Predicate KPI	Weight Value Requirement KPI	Indicator Color
Excellent	Faculty or Study Program graduates students with Cum Laude Predicate more than 15% per year	Green
Good	Faculty or Study Program graduates students with Cum Laude Predicate between 10% - 15% per year	Yellow
Growing	Faculty or Study Program graduates students with Cum Laude Predicate between 5% - 9% per year	Blue
Grow	Faculty or Study Program graduates students with Cum Laude Predicate less than 5% per year	Red

4.3. Web Portal Business Intelligence University This research produced a web prototype

The university's Business Intelligence portal system used to support academic decision-making for university leaders. Figure 2 is the main page view or page menu for users or users on the university's Business Intelligence web portal system.

Figure 4. Main User Menu page

Figure 5 is the interface of the statistical reports of lecturers by faculty and gender based on the functional position of lecturers in the format of graph reports and tables, where this report has a function to inform the number, sub total and total number of lecturers who have functional lecturer

positions according to gender type in each faculty .

Figure 5. Functional Position Statistics Report Lecturer

Figure 6 is the interface of the statistical report of the number of lecturers according to the faculty and gender based on the rank and class of lecturers in graphical and table report format, where this report has a function to inform the number, sub total and total number of lecturers who have rank and class of space according to gender type in each faculty.
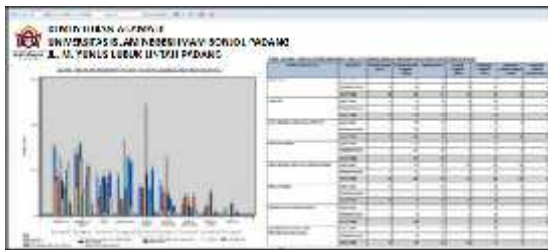
Figure 6. Classification Statistics Report Lecturer

Figure 7 is the interface of the academic dashboard report of study program performance based on the ratio or ratio of the number of lecturers with doctoral degrees with all lecturers in the study program or all faculty members at faculty according to the faculty. This dashboard report has the function to inform the number of lecturers with doctoral degree, the total number of lecturers in the faculty, the ratio of lecturers with doctorate lecturers with unpublished doctorate, performance indicators, performance predicate and decision recommendation on each faculty.

Figure 7. Dashboard Lecturer Status Doctorate

Figure 8 is the interface of the academic dashboard report of study program performance by comparison or ratio of the number of lecturers with

functional positions of professors with all lecturers in the study program or all faculty on faculty according to the faculty. This dashboard report has a function to inform the number of professors of professorship, the total number of lecturers in the faculty, the ratio of professorship professorship to lecturers who have not professorship, performance indicators, performance predicates and decision recommendations on each faculty.

Figure 8. Dashboard of Professor Functional Lecturer

Figure 9 is the interface of the academic dashboard report of study program performance by comparison or ratio of the number of students graduating cum laude with all graduates on the study program according to the graduation year according to the faculty. This dashboard report has a function to inform the number of students graduating cum laude, the total number of graduates on the faculty, the ratio of graduating cum laude to the total number of graduates, performance indicators, performance predicates and decision recommendations on each faculty based on the graduation year.

Figure 9. Student Dashboard Graduated Cum Laude

4.4. Building Analysis Service Project

To build OLAP, KPI and data mining first start by creating a new analysis services project by selecting Microsoft SQL Server 2008, then running Business Intelligent Development Studio program, then select file then new. Next will be seen dialog box new project, then give name UnmulAkademikAS, then click ok button. In the analysis service project there are several components that are data sources, data source view, cubes, dimension, mining structure, role, assemblies and miscellaneous. To build OLAP and

KPI in this study used component of data sources, data source view and cubes, while data mining in the form of data sources, data source view and mining structures.

4.5. Build Data Source

Data Sources becomes the database reference which data will be accessed by OLAP, KPI and data mining. To create data sources, in the solution explorer, right-click the data sources folder in UnmulAkademikAS and then select new data source in the pop-up menu. Then it will show the data sources wizard, and then click next button to pass the next process, then choose the name of the provider that will be used to access to this database is OLE DB SQL server native client 10.0, then enter the server name database that is localhost, and then use use windows authentication to log on to the database server or by using SQL server authentication. Then select the database name that will be used ie UnmulAkademikDW, seteleh configuration connection manager finished click ok button to return to data sources wizard, then click next button, then select use the services account and after that, click next button, then click finish button. The result of configuration data sources can be seen in Figure 10.

Figure10. *Data Sources* UinibAkademikDW

4.6. Build the Source View Data

Data Source View or abbreviated DSV is a metadata that combines the tables and views used in the analysis services project. To create a DSV right-click on the data source view folder in the solution explorer and then select new data source view forwarded to the data source view wizard. Next click the next button to go through the next process. In this study data sources used ie UnmulAkademikDW, then click next button to select the table and view needed. Once the table is selected to display on the DSV, then click the next button, then click the finish button. Figure 11 shows the configuration of the source data view that will be used in making the cube.

4.7. Building Data Analysis With OLAP The following steps create a cubes with tables

facts FactDosen and some dimension tables that are DimFakultas, DimProgramStudi, DimGender, Dim Fung-sional, DimPangkatGolongan, and Pendj-Pendkan.
a. Defining Cube is making cube with right click on cube folder inside solution explorer, then select new cube on pop - up menu. Next select existing table, then click the next button to select the measure group, then kemudain process then select the field that will be made in the cube measure on FactDosen table. Then uncheck the other column, then click the next button to continue the next process where the dimension table is used ie table DimFakultas, DimProgramStudi, DimGender, Dimungsional,
DimPangkatGolongan, dan DikJenjangEducation. To complete the following cube wizard click on the next button and then name it CubeDosenAll then click the finish button. The next process formed the measure groups and dimensions of the CubeDosenAll process and can be seen in Figure 12.

Figure 12. *Cube* CubeDosenAll

b.Process and Browsing Cube is where to be able to see the data already integrated in a cube, then the cube must be processed by selecting the process, or by another way that right click on UnmulAkademikAS in solution solution explorer and then select process in pop-up menu . Figure 13 is a progress process from CubeDosenAll created earlier.
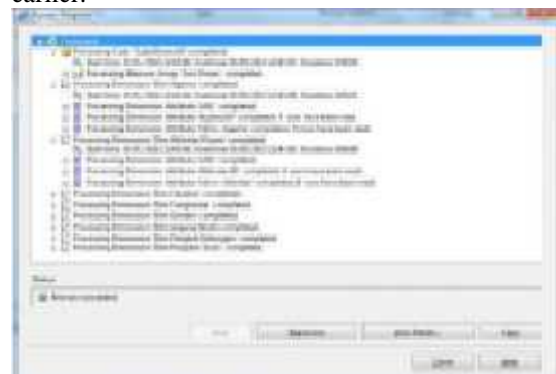

Figure 13. *Process Progress* CubeDosenAll

c.Displaying Cube Data is a process to test the results of CubeDosenAll from the process. Next use the browser tab to display data on a cube, then expand dimension DimFakultas, DimProgramStudi, DimGen-der, DimFunctional, DimPangkatGolongan dan DikJenjang Pendidikan, then drag the field from the dimension table as needed from the navigation pane on the left and place the dimension field into the drop row fields here area on the browser tab. Then drag the field from the FactDosenCount measures in the total drop area or detail field here. As shown in Figure 14 the browser tab designer for CubeDosenAll.

Figure 4. Tab Bowser Designer CubeDosenAll

Figure 15 shows the results of the drag field dimension and drag field measure used in the statsytic report generation process and the dashboard report. Then the next process is to build and deploy the project to the analysis server.

Figure 15. Roll-Up and Drill-Down Lecturer Data

From the picture 15 roll-up and drill-down lecturer data can be done lecturer data roll-up process by clicking the icon on the column or row of the icon, and to perform the drill-down process of lecturer data by doing or clicking the icon on the column or line that contains the icon. As for the process of slicing and dicing can be done by clicking on the icon on the column or line contained the icon, then check to make the desired data cut. The information obtained from the OLAP process is based on Fig. 15 that the report is made in the form of matrix statistics in which the number of lecturers who have functional grouped by gender and can be seen from the point of faculty and study program respectively. Where each study program can see the total number of lecturers based on functional and gender, and can also see the total grand total based on functional and gender either

from the sum of the line or the sum of perkolom.

4.8. Building Data Analysis With KPI The process of making KPI must be through

Making cube first, then can use the function of KPI by selecting cube designer, then select tab KPIs. Creating a new KPI by clicking on the new KPI icon in the KPI toolbar window, then the next KPI designer makes MDX expression where the value of the expression is a physical measure, while the goal of the expression is the objective. Here is a picture of 16 MDX statements for the ratio of professorship professorship with all lecturers in each faculty.
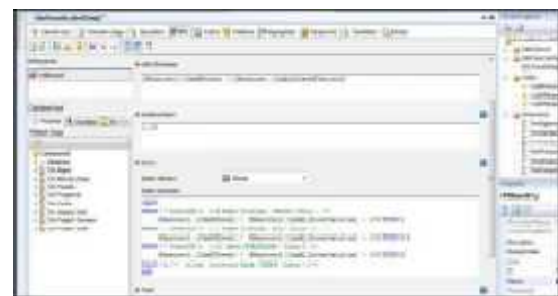
Figure 16. MDX Statement For Teacher Ratio Big

The next process builds and deploys the project to the analysis server to continue the stages of the dashboard reporting process. From the picture 16 MDX statement for teacher ratio explain that value expression is an arithmetic process to do the distribution between measure JumGBDosen is the number of professorship professorship in each faculty with measure JumAllDosenFacultas that is the total of all lecturers in each faculty. Goal expression is the number that becomes the ultimate goal or the highest score to achieve excellence in this case the highest number is 1.Status indicator is a representation of image or symbol form to show an indication of superior in this case green color. Status expression is a logic or conditioning process of value expression if the measure of JumAllDosenFacultas is greater than 1/4 then the goal expression is 1, if the measure of JumAllDosenFa-kultas is greater than 1/7 then the goal expression is 0.5, if the measure of JumAllDosenFacultas is greater than 1/10 then the goal expression is 0, if outside of these three conditions then the goal expression is -1.

4.9. Building Data Analysis With Data Mining

To make data mining do right click on UinibAkademikAS which is in the mining structures folder inside solution explorer and then select new mining structures that forwarded to data mining structures wizard. Next click the next

button to go through the next process. In this study data mining used Microsoft Decision Tree which provides predictions in the form of tree structure. The next process select from existing relational database or data warehouse on define method, then select microsoft decision trees as data mining structure. Then select DSV to be used, then select FactDosen table to be processed in data mining training. Figure 17 shows the configuration of the data source view data mining that will be used in data mining.
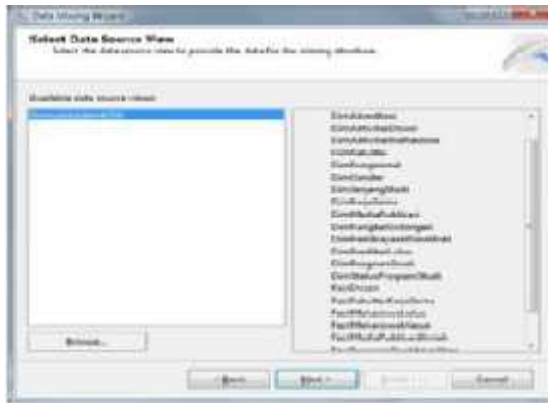
Figure 17. *Data Source View Data Mining*

Next select the field from the FactDosen table that becomes the key, input and predictable, in this case the key field ie NIP, input field ie FungsiinolID, ProgramStudiID and PangkatID, while the predictable field ie FacultyID. Next select the next button, then select the percentage of test data is 30%, then the next process save the name of the structure data mining with the name DMFactDosenPredikFakultas, then performed the process of training data mining by selecting the process menu on the pop-up menu that is by right click on DMFactDosenPredikFakultas. Figure 18 shows the process of data mining training using microsoft decision tree algorithm.
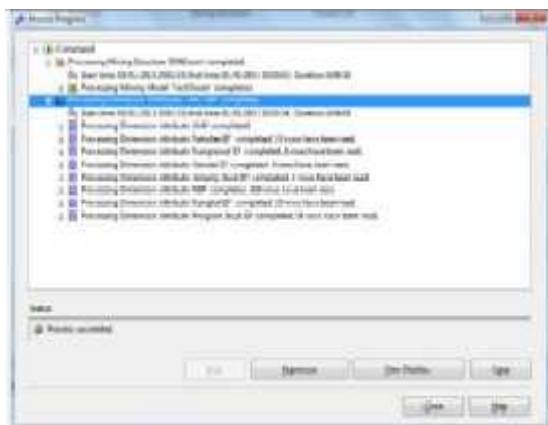
Figure 18. Data Mining Training Process

After completing the process of data mining

training, then the results of the process can be seen in the form of a model tree model in the tab mining model viewer. Figure 19 shows a graph of the data mining decision tree model and also displays the mining legend in terms of the percentage probability to excel from each faculty marked by the value representing the faculty code.
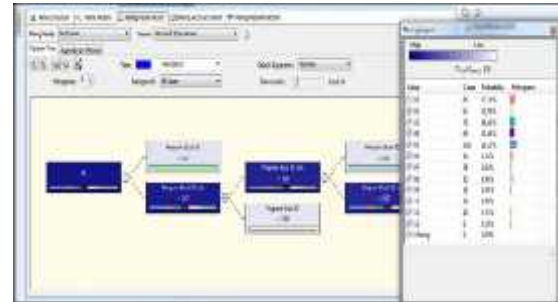
Figure 19. *Mining Model Viewer Decision Tree*

Mining model viewer decision tree in Figure 19 provides information about the tendency of faculty to achieve excellence in academics based on input field analysis ie FungsiinolID, ProgramStudiID and PangkatID, with the following results:

1. FacultyID with value 05 with probability 19.12%,
2. FacultyID with value 01 with probability 13.11%,
3. FacultyID with value 03 with probability 11.61%,
4. FacultyID with value 04 with probability 10,56%,
5. FacultyID with value 02 with probability 10.26%,
6. FacultyID with value 08 with probability 8.46%,
7. FacultyID with value 06 with probability 8.31%,
8. FacultyID with value 11 with probability 6.21%,
9. FacultyID with value 07 with probability 5.61%,
10. FacultyID with value 10 with probability 3.80%,
11. FacultyID with value 09 with probability 1.85%,
12. FacultyID with value 12 with probability 1.10%.

The information that can be drawn from the decision tree is that the code of the Faculty of Education with a value of 05 ie the teacher's faculty and the science of education has an excellent opportunity in academic, so that the university leader can decide to immediately formulate a strategic plan for the faculty.

5. Conclusions

Business Intelligence is used as a solution to consider the process of making decisions on the academic management of the university as well as solutions for improving academic management performance in achieving academic excellence or academic excellence, where the university's Business Intelligence system begins with the stages of data integration and then analyzes the data, analysis and create a web portal which then reports are integrated with the web portal. The University Intelligence business process system flow includes data source, data integration, data warehouse, data analysis and web portal.

Web portal system Business Intelligence universities have information in the form of statistical reports faculty, lecturer statistics, and student statistics and academic dashboard that can be used as a tool of academic analysis to support in academic decision making at the university.

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5. AUTHOR'S BIOGRAPHY

Yaslinda Lizar, S.Si, M.Kom is a Student sDoctoral Program Faculty of Engineering and Vocational State University of Padang. His research interests include: Expert System, Data Mining, Business Intelligence. His contact E-mail is yaslindalizar@gmail.com

6. AUTHOR'S CONTRIBUTIONS

Asriwan Guci, S.Kom, M.Kom is a Lecturer of Sekoloah Tinggi Ilmu MERCUBAKTIJAYA Padang. His research interests include: Expert System, Data Mining.

7. ETHICS

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved.

SOIL STABILITY USING CEMENT PCC IN LUBUK MINTURUN PADANG, INDONESIA

Yocky Syaida Adha Putra[1], Tengku Ahmad Fauzan Syah[1]
Dr. Azwar Inra,M.Pd[2], Totoh Hadayono,ST.,MT[2]
[2]Faculty Of Engineering, Universitas Negeri Padang, Indonesia

ABSTRACT: This study was intended to determine the required semen content to be stable and optimum. Research is an experimental study. From the results At the test well yield the groundwater face is at a depth of 0.57 meters. In Hand Boring The rising of USCS soil type C. From Sieve Analysis known type of graded sandy gristle is not good. From Gs Analysis. Gs 2.61. At Water Content Test was 39,62%. From weighing test the contents of heavy data Content of Wet Wetlands average of 1.59 and data Average Dry Land Content weighted by 1.08. From Atterberg Limit testing obtained Liquid limit value = 45,81%, Plastic limit value = 38,34%, Plasticity index value = 7,47%. From Compression Test Result Obtained d and air content: At 0% addition of PCC cement compaction result of 1.12 with moisture content 35%, At 4% addition of PCC cement compaction result of 1.19 with moisture content 37%, At 7% velocity PCC cement compaction resulted at 1.24 with moisture content of 35%. In 10% of PCC cement semen obtained compaction of 1.28 with 35% air content.

Keywords: Soil Stability, Soil Investigation, Stability Using Cement PCC, Lubuk Minturun Land

1. INTRODUCTION

Based on the Padang City Planning Agency's plan for the development of Padang City in 2008-2028 at point 3 "Encouraging the development of settlement areas to the north, east and south of the city (Koto Tangah District, Kuranji District, Pauh District, Lubuk Kilangan District and Bungus Teluk Kabung District)''.

To realize the plan of Bappeda Padang City, Padang City government must establish supporting infrastructure or facilities and infrastructures such as road construction, irrigation and channel and supporting buildings for community needs. The development plan of Bappeda will also attract the community to establish housing towards the development plan of the city of Padang. All the buildings will be erected on the ground, so the land as a cross section of the building must be ensured in a stable state.
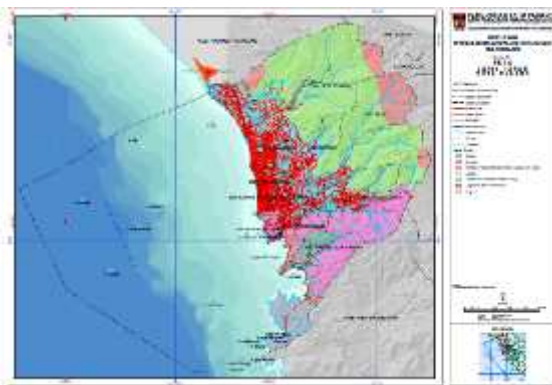
Fig.1 Figure is Map of Padang Land Section

Land is a land parameter that determines the occurrence of landslides, shifts, and collapse. Type of land in the city of Padang based on the map of Padang city land (Fig.1), scale 1: 210.000 then the type of land area that will be used as research (Padang City) is generally dominated by reddish yellow latosol complex and pink yellowish complex. there is also a type of soil andosol, alluvial gray association, dark gray alluvial, and brown regosol. The location that will be the focus of research is Cold Water Area kenagarian Lubuk Minturun dominated reddish yellow latosol land identified Expansive clay.

The properties of clay (Hardiyatmo, 1999) are as follows:
a. Fine grain size, less than 0.002 mm
b. Permeability is low
c. Capillary water rise is high
d. Very cohesive
e. High shrinkage levels
f. The consolidation process is slow.

The direct development of the land can cause physical damage to buildings, especially the road building as a means and infrastructure of road access, therefore efforts are needed to reduce the rate of infrastructure damage by the land.

The depth of the soil solum of the research area is generally between 30cm-100cm which is classified as shallow, depending on the slope conditions that make up the land, the texture is generally sandy clay, and the permeability value is generally rather fast and very fast. This indicates that the research location is generally quite critical and has experienced high degradation of soil physics.

Especially in areas with a slope of> 20% (Hermon, 2009).

The soil classification system is made essentially to provide information about the characteristics and physical properties of the soil. Due to the varied nature and behavior of soils, the classification system generally classifies the soil into a common category where soils have similar physical properties. The classification system is not an identification system for determining the mechanical and geotechnical properties of the soil. Therefore, land classification is not the only way used as a basis for planning and design construction.

Most soil types consist of many mixtures or more than one particle size. Clay is not necessarily composed of clay particles, but can be mixed with grains of silt and sand and there may also be organic material mixtures. In order to support the study and research on "Soil Stability With the addition of Portland PCC Cement Type", it requires good knowledge and understanding of soil properties based on existing theory consisting of physical properties (Index Properties) and engineering properties these two traits are very important to know as the basis for taking a decision related to foundation engineering (roads, bridges, dams and others).

One effort to obtain soil properties that meet certain technical requirements is by soil stabilization methods. Soil stabilization methods can be divided into 2 main classifications based on their technical nature and based on their objectives, where several variations can be used. From its technical nature, the stabilization can be divided into 3 types namely: mechanical stabilization, physical stabilization and chemical stabilization. (Ingles and Metcalf, 1972).

soil stabilization is to increase the soil's carrying capacity and increase in strength to be calculated on the pavement thickness design process. Therefore, soil stabilization requires more rigorous design and implementation methods than land modification. Many soil materials in the field can not be used as a base material in construction work. The condition of this unqualified soil material can be improved on its technical properties so that its strength increases. Improving the soil properties can be done by means of compaction (technically), mixing with other soil, mixing with cement, lime or sulfur (chemically), heating with high temperature, and so forth. Soil stabilization efforts have long been conducted both traditional and technological research and implementation.

Expansive ground stability is cheap and effective is to add certain chemicals, with the addition of chemicals can bind clay minerals into solid, thereby reducing expansive clay soil expansion (Ingles and Metcalf, 1972).

The physical properties and properties of soil engineering are more determined by the type of soil classification itself. Soil classification is intended to facilitate the grouping of various soil types into soil groups according to their engineering properties and characteristics. Grounding places soil in 3 groups, coarse grained soil, fine grained soil and organic soil. Based on USCS the coarse grained soils are those that have percentage of pass filter 200 <50%, and fine-grained soil (clay / loam) if more than 50% passes filter 200. The soil is divided into 2 groups: gravel and gravel and sand and soil sandstone. The fine-grained soil is divided into Lanau (M), Clay (C) based on the liquid limit and the plasticity index.

Organic soils are also included in fine grained clusters. The consistency of clay soils and other cohesive soils is strongly influenced by moisture content. Plasticity index and liquid limit can be used to determine the development characteristics. Characteristics of development can only be estimated using the plasticity index, (Holtz and Gibbs, 1962). Since the plastic properties of a soil are caused by water absorbed around the surface of the clay particles, it can be expected that the type and amount of clay minerals contained in a soil will affect the plastic limit and the corresponding liquid water limit.

According to Ingels and Metcalf (1972), the properties of improved soil with stabilization may include: volume stability, strength/carrying capacity, permeability, and conservation /durability And lime stabilization can convert soil into particle clumps. The amount of lime used ranges from 5-10%, which results in a greater concentration of calcium ions than is actually needed.

In soil matter it is important to know the influence of water content on soil mechanical properties, eg mixing water to a fine grained soil sample (silt, clay or mud clay) to reach the liquid state. When the mixture is dried bit by bit so the sample of the soil will go through certain circumstances from liquid until it is frozen (solid).

In addition, SNI 15-0302-2004 regarding portland pozolan cement (PPC-Portland pozzoland cement). Portland pozolan cement is a cement made from a homogeneous mixture of portland cement together with materials having pozolan properties. Concrete and mortar mixtures using PPC have easy working properties, but there will be extended binding times.

The compressive strength of concrete with pozolan cement at early age is lower but in old age

will be higher because there is still reaction between pozolan active silica with Ca (OH) 2 to form CSH compound. Other types of cement are arranged in SNI 15-7064-2004 concerning composite portland cement (PCC-Portland Composite Cement) which is cement made from grinding slags of portland cement and casts with inorganic materials. The mixed inorganic material may be more than one kind eg high kiln slag, pozolan, silicate compound, limestone and so on. There is also masonry cement arranged in SNI 15-3758-2004. Masonry cement is defined as a mixture of portland cement or cement hydraulic mixture with additive (such as limestone, hydrated lime or hydraulic lime) along with other materials used to enhance one or more properties such as time setting, workability, water retention, and durability.

The term modification is used to describe a stabilization process that is only intended for the improvement of soil properties, but is not intended to increase the strength or durability of the soil. The purpose of modifying the soil is to create a working platform for the machine, regardless of the effect of the modified soil on the pavement design count. Although the actual modification of the soil also shows a stabilization process, the main objective is to improve the technical properties of the soil, such as reducing plasticity, enhancing ease of use and reducing development potential.

The clay particles have a negative electric charge. In an ideal crystal, the negative and positive charges are balanced. However, due to the isomorphic substitution and the continuity of the split, there is a negative charge on the surface of the clay particles. To compensate for such a negative charge the clay attracts a positive charge ion (cation) from the salt present in the pore water. This is called ion exchange. The cations may be arranged in order of strength of attraction, as follows:
$Al^{3+} > Ca^{2+} > Mg^{2+} > NH^{4+} > K^+ > Na^+ > Li^+$

The sequence gives the meaning that Al^{3+} ions can replace Ca^{2+}, Ca^{2+} can replace Na^+ and so on. This process is called cation exchange. The bonds between soil particles composed by clay minerals will be greatly influenced by the magnitude of the network of negative charges on minerals, types, concentrations and distribution of cations that serve to weigh the load.

Several methods have been proposed in the selection of added ingredients. Some of the proposed methods depend on the experience of the organization of the country of origin. The following will be studied, some pointers from how the material-added selection for soil stabilization has been used. Here are some additional material selection methods:

a. Alaska Department of Transportation and Public Facilities Research & Technology Transfer
b. Ingles and Metcalf (1972)
c. Department of The Army and The Air Forces
d. Indiana Department of Transportations
e. Another method to consider in the addition of cement

After the type of added material is determined from the preliminary test in the laboratory, other factors to consider in selecting the type of add-on materials for stabilization are:
a. Climate
b. Laboratory Test
c. Availability of Costs, Tools, Personnel and Materials
d. Soil Contains Organic Material
e. Soil Containing Sulphate
f. Water
g. Time of Bonding

The test well is a ground investigation by making a hole dug with a certain depth. Test wells can be excavated using a backhoe or fronted loader, but these have limited depth and require a large enough space and are quite expensive.

The test well is best suited for the source of the material for development because the many samples can be seen directly. The test well can be used to obtain "Undisturbed samples" samples taken neatly and thoroughly for laboratory testing. In addition, the test well can be used as a testing ground-usually a load test using a flat metal plate. The plates are laid on the ground and gradually loaded to simulate a foundation. This is called "plate-load test", and the largest plate load capacity is associated with recommended permit soil pressure to planners for foundation design.

Original soil samples can be taken with sample tubes or cone barrels. This sampling can be done in various ways such as Hand Borring, SPT, and others. This example is taken using sample tubes. This tool is a thin walled cylinder connected with drill handlebar with a device called sample tubes holding device, used for soft to medium clay. How to use that is by inserting the sample tube to the bottom of the drill hole then beaten into the original soil to be taken for example. The commonly used sample tube has a diameter of 6 - 7 cm.

The grain size analysis of a soil is the determination of the variation of the particles present in the soil. The variation is expressed in the percentage of total dry weight, the variation of the grain size of the soil and the proportion may support the load present therein, for example, if the soil consists of various grain sizes, the soil will be denser and stable than the soil composed of granules -

uniform grains. Since the soil that contains of various grain sizes has good properties, this soil is called well graded. On the contrary, the soil consisting of slight granular variations, poorly supporting the load, the soil is called poorly graded soil, which is generally very difficult to solidify, especially when dry. Sea sand is generally gradually poor and can not be solidified properly, so it can not support large loads.

The soil type of soil is the ratio between the weight of the soil and the weight of the water present in the soil at a certain temperature. The result of determination of the soil type of soil from most of the soil shows that the BJ (specific gravity) of the soil usually ranges from 2.4 to 2.8. Berta type of soil is determined by the quartz content of the soil. The higher the quartz content of the soil, the higher the density.

Soil density is required to calculate the soil properties index (eg pore rate, soil content weight, degree of saturation) and other important soil properties. In addition, the weight of the soil type can also be determined by soil characteristics in general, such as organic soils have a small density, whereas the presence of other heavy mineral content (eg. iron) is indicated by heavy soil type.

The water content is the ratio of the percentage of the water weight and the dry weight of the soil. Water content is one of the important parameters to determine the correlation between soil behavior with soil physical properties, which is done routinely in the implementation of soil testing laboratory. Water content testing is a laboratory test to determine atterberg boundaries, compaction testing and shear strength testing. When testing the moisture content of drilled soil, moisture content or moisture content from the drilled soil will be obtained. Natural moisture can help us in predicting decline or collapse. The relationship of aiar content and depth of drill soil can be used to detect capillary rise of the groundwater, or the location of the water source, if all related factors are taken into account.

Usefulness of Atterberg Boundaries: The liquid limit and plastic limit do not directly give usable figures in the design. What we get from this Atterberg Boundary experiment is an outline of the properties of the soil. Soils with high liquid borders usually have poor technical properties, ie low strength, "compressibility" is high, and difficult to solidify for example for road construction. For certain kinds of land Atterberg boundaries can be linked empirically with other properties, for example with shear strength or "compression index", and so on. Plastic index is usually used as one of the requirements for materials to be used for road construction.

Compaction is an attempt to increase the density of the soil by the use of mechanical energy to produce compression of particles. The soil compaction energy in the field can be obtained from the roller machine, vibration compaction devices, and from heavy objects dropped. In collaboration, the test samples for obtaining quality control are compressed using the collision (or dynamic), pressure-suppressing, or static pressure using pistons and press machines.

Soil can be worked initially by drying, adding water, aggregates (grains), or with stability materials such as cement, limestone, coal ash, or other materials. Other additional work can be done by tearing, plowing, or using a mixing machine, all of which can be done depending on the circumstances of the soil.

The purpose of compaction is to improve the soil's technical properties. Some of the advantages of this compact are:
a. Reduced subsidence, ie vertical movement within the soil itself due to reduced pore number.
b. Increased soil strength.
c. Reduced depreciation due to reduced volume due to reduced moisture content of benchmark values during drying.
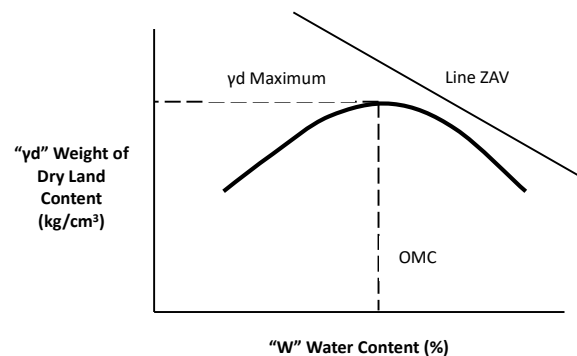
Fig.2 Chart of Relation Weight Dry Content (d) and Water Content (W)

In figure (Fig.2) there is a line called "Zero Air Void's line (ZAV)" or a 100% saturation degree line. This line is the theoretical relationship between the weight of the dry content and the moisture content when the degree of saturation is 100%, if the soil pore does not contain the air of the line it can be calculated by the formula:

$$ZAV = \frac{Gs \cdot xw}{1 + w \cdot Gs} \qquad \textbf{(1)}$$

Eq. (1) Determined Zero Air Void (ZAV).

The relevant research in this research is: Sutikno dan Budi Damianto (2009) : "Stabilisasi Tanah

Ekspansif Dengan Penambahan Kapur (*Lime*) : Aplikasi Pada Pekerjaan Timbunan" dan Andreas Dharmawan Hur,dkk (2009) : " Stabilisasi Tanah Dengan *Fly Ash* dan Semen Untuk Badan Jalan PLTU Asam-Asam"

This study aims to determine the maximum density before and after the addition of PCC cement on Stabilized soil.

2. RESEARCH METHOD

This study was designed to see how much soil stabilization with the addition of PCC cement on the sample soil. The implementation of this research was conducted in collaboration with soil mechanical engineering. Based on the research implementation, it is known that this research type is experimental research.

The sample in this research is the ground with a depth of 40 - 100 cm which is in Cold Water Lubuk Minturun Padang City with disturbed and uninterrupted condition and Cement Type PCC that can be obtained from the building store. Taking the test data is done by testing as follows:
a. Soil Sampling: Disturbed Sample's (Undisturbed soil samples) and Undisturbed Sample's (eg undisturbed soil)
b. Testing Filter Analysis
c. Specific Gravity Test (Gs)
d. Water Moisture Test
e. Consistency Limit Tests (Atterberg Limit): Liquid Limit (Limit Liquid) and Plastic Limit (Plastic Limit)
f. Standard Proctor Test (Compaction)

3. DISCUSSION/RESULTS OF RESEARCH

3.1 Sampling

a. Disturbed Sample (Disturbed Sample), In the disturbed soil sampling obtained at the Ground Water Level at 0.57 meters by making the test well.
b. Undisturbed Sample, In undisturbed soil sampling using Hand Boring with a depth of 2.5 meters.

3.2 Sieve Analysis Test

Based on the test that has been done, then obtained data as follows: Cc = 1.4 and Cu = 2.3.

3.3 Atterberg Limit Test

a. Liquidity limit, Based on the test that has been done, then the value of water content to reach the liquid limit (at 30-40 beats) is 45,81%.

b. Plasticity limit, Based on the test that has been done to obtain plastic limit at average water content = 38,34%
c. Value of Plastic Index, Based on testing that has been done, the value of plastic index is: 7,47%

3.4 Specific Gravity Test

Based on the tests that have been done in the laboratory, the data Specific Gravity test average of: 2.61

3.5 Water Content Test

Based on testing of water content that has been done in the laboratory, then the data as follows: 39.62%

3.6 Content Weight Test

Based on the test of content (unit weight) that has been done dilaboratorium, then obtained data as follows:
a. Weight of wet soil content = 1.55 gr/cm^3
b. Weight of dry soil content = 1.07 gr/cm^3

3.7 Compaction Testing with PCC Cement Enhancers

3.7.1 Method of Material Selection of Stabilization Mixture

In standard compacting the proctor will be done by modifying the PCC Cement on the ground to be stabilized clay soil to be tested. Before melakukkan addition of PCC cement in clay so it is necessary to fulfill the criteria of mixed materials as follows:
a. Based on the initial guidance table for the selection of stabilization methods (Hicks, 2002) obtained from test data Filter Section no.200 of 11.57% <25% with PI 7.47% <10% known from the table that the soil to be modified suitable to be added with PCC cement.
b. Based on the table of application of suitable soil stabilization (Ingles and Metcalf, 1972) it is known that coarse clay soil with stabilization plan using PCC cement obtained is effective stabilization but quality control is difficult.
c. Soil classification according to unified system (MIL-STD 619B), LL and PI constraints according to method 103 in MIL-STD-62 Given value of PI (Plasticity Index) of
   - 7,47%. $PI < \{20+ ¼ \text{ x } (50\% \text{ lolos saringan no. } 200)\}$
   - $7,47\% < \{20+ ¼ \text{ x } (0.5 \text{ x } 11,57)\}$
   - $7,47\% < 21,44\%$ … (Worthy addition of PCC Cement for stabilization)
d. Based on the Department of Army and the Air Force (1994) it is known from the comparison graph between percent fine pass filter no.200 to percent sand, the material passes filter no.4 and

stay filtered no. 200 land was found in the area of 1C and the soil was feasible for stabilization with PCC cement.

e. Based on the Indiana Department of Tranportations (INDOT, 2002) decent soil mixed with cement, the soil has a PI   10 and percent pass filter no.200 <20%. So based on the results of soil testing is feasible to do the addition of cement with the amount of additional cement 3-10%.

f. Based on Portland cement association (1979) the soil tested has entered predetermined criteria. Once the soil meets the feasibility criteria for the addition of cement then dilakukkan compaction on the land to be stabilized.

3.7.2 Calculation of Compaction Research Data

a. Determination of Water Content
In the determination of water content dilakukkan mixing water as much as 18%, 21%, 24%, 27%, 30%, 33%.

b. Determination of Density
Compaction was performed by the addition of PCC cement 0%, 4%, 7% and 10%.

3.7.3 From Compression Test Result Obtained d and moisture content of:

a. At 0% addition of PCC cement obtained compaction of 1.12 with moisture content of 35%

b. At 4% addition of PCC cement obtained compaction of 1.19 with moisture content of 37%

c. At 7% addition of PCC cement obtained compaction of 1.24 with moisture content of 35%

d. At 10% increase of PCC cement obtained compaction of 1.28 with moisture content of 35%

4. CONCLUSION

a. At the test well obtained groundwater face is at a depth of 0.57 meters.

b. In Hand Boring obtained classification of USCS type C1 soil

c. From Filter Analysis known graded sandy clay is not good.

d. From Analysis Gs obtained Gs 2.61

e. At Water Content Test obtained 39.62%

f. From the weight weighing test, we found that the average weight of Wet Land Content was 1.59

and the average dry matter contents of soil was 1.08.

g. From Atterberg Limit testing obtained Liquid limit value = 45,81%, plastic limit value = 38,34%, Plasticity index value = 7,47%

h. From Compression Test Result Obtained d and moisture content of:
- At 0% addition of PCC cement obtained compaction of 1.12 with moisture content of 35%
- At 4% addition of PCC cement obtained compaction of 1.19 with moisture content of 37%
- At 7% addition of PCC cement obtained compaction of 1.24 with moisture content of 35%
- At 10% addition of PCC cement obtained compaction of 1.28 with moisture content of 35%

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INFLUENCE THE LEARNING STRATEGY AND ENTRY BEHAVIOR TO YIELD LEARNING BUILDING CONSTRUCTION AND DRAWING 1 OF STUDENT

Yuwalitas Gusmareta [1,] Fahmi Rizal [2,] Nurhasan Syah [3]

Engineering Faculty State University of Padang

ABSTRACT: The aim of this research is to find out (1) the influence of learning courses learn strategy against the construction of buildings and drawing 1, (2) the ability to learn early influence results courses t he construction and drawing 1 (3) an interaction between learning strategy and ability to learn early in Influencing the outcome courses college-boy construction of buildings and drawing 1. This research is quasi his experiments with populations totaling 108 people. Instrument used is the test. Before data do first performed validation instruments. Statistics used in this research are the statistics descripti ve and inferential statistics (t test and ANOVA test). The result Showed th at the testing of hypotheses: (1) there are differences courses the construction of buildings and drawing one group of students who unteachable with learning strategy of advance organizer with the student who unteachable with conv entional strategy of learning, i ndicated by t count = t 2,74 table = 1,771 (2) there are differences courses the construction of buildings and drawing 1 having ability early high and low, the early indicated resources by t count = 5.57 t table = 1.895 (3) the Guiler interaction between the preliminary learning strategy in Influencing the outcome, learning indicated resources of 5.35 by count 1 with probabilities 0.001> 0.05. Based on the research is expected the construction of academic courses and drawing 1 to implement strategies advance in learning organizer.

Keywords: Learning Strategies, Early Capability, Learning Outcomes

1. INTRODUCTION

Wrong one course available the curriculum Department of Civil Engineering Faculty of Engineering, University of Padang (FT UNP) is the Building Construction and Drawing 1. Course of Building Construction and Drawing 1 are included in the group of the Scientific and Skills Course (MKK) which serves as a supporting courses Course Construction and Drawing 2, as well as other subjects demanding mastery of building construction knowledge and the ability to read pictures.

From the interview result of the researcher with several lecturers of Building Construction and Drawing Lecture 1 in Civil Engineering Department, various efforts have been done by lecturers in improving student learning outcomes in Building Construction and Drawing Course 1, for example, providing training with guidance to students who do not understand pictures to be done and question and answer during the lecture on the part of the material that is still not mastered. However, these efforts do not seem to provide optimal results so that in the course still encountered many obstacles in terms of learning outcomes. One of the learning strategy to orient students on the material to be learned and help them to recall information that is related and can be used to assist in bringing new information to be learned

is the *Advance Organizer.* By learning strategy *Advance Organizer* will help students to be able to associate information or new ideas with cognitive structures he had. Ausubel, in Dahar (1998: 118), said that the *Advance Organizer* to direct students to the material to be learned and help them to recall the information associated with and can be used to help infuse new knowledge. Typically, *Advance Organizer* associated with the material is factual or less abstract than the preceding. *Advance Organizer* arise integrally associated with the information about the learning materials.

New information or ideas with the cognitive structure they possess are related to the student's own early ability. Initial capability between each student has different, it is because every student has a different level of intelligence. Sri Mulyani (2004) explains that the students 'early ability to influence students' learning outcomes. That is, students who have a high initial capability then have a tendency to be the achievement of learning outcomes is also high. Ali (1996) explains that the initial ability of students before starting to learn a material or materials known as *entry behavior*. Muhammad Ali explained that the *entry behavior* is basically a state of abilities and skills that must be possessed in advance by the student before he learned the ability or skill. Demonstrated knowledge of students as the initial *entry* is individual *behavior.* Based on the experience of teaching and the researchers did a

survey, it appears that conventional learning strategies that have been applied to the Course of Building Construction and Drawing 1 not provide optimal results on student results. The conventional learning strategy applied is that there is no structured presentation of the material. Lecturers who do not arrange the order and make the link between what the subjects of Building Construction and Drawing 1 wherein each step is designed and presented separately with other measures, as a result students will not be able to associate information or new ideas with cognitive structures that have been held in a systematic and comprehensive.

The occurrence of behavioral changes in a person is the result of learning gained from the learning process. Behavior change is intended as a change of knowledge, attitudes and skills. Djamarah (1997: 23) explains that "learning outcomes are achievements in the form of impressions that result in changes in the individual as a result of learning activities". Winkel (1993: 102) "learning process experienced by a person produces changes in the field of knowledge / understanding, skills, values and attitudes". The existence of such changes is apparent in the learning achievements derived from the tasks assigned by the teacher / lecturer. Merill (in Reigeluth, 1994: 287) states that "the knowledge acquired k's are grouped into four sections namely: facts, concepts, principles and procedures". The fact there was a relationship between time and events, or related to a name and parts thereof. Concept, a set of objects, events or multiple symbols with the characteristics and traits of the same. The principle is causality (cause and effect), while the procedures are sequences of activities to achieve goals. Assessment of learning outcomes for Building Construction and Drawing Course 1 used in the Department of Civil Engineering Faculty of Engineering State University of Padang according to Leightbody in Anonymous (2009) argues that the assessment of psychomotor learning results include: ability to use tools and work attitude, ability to analyze a job and arrange work sequences, speed of doing the task, ability to read pictures and symbols. , harmonious shape with expected/ predetermined size.

According to Slavin (1997: 138) to make learning relevant and enable the ability to previously used strategies: (1) *Advance Organizer strategy* to orient students on the material to be learned and help them to recall information that relates that can be used to assist in brings together new information to be learned; (2) The analogy strategies that help students learn new information by linking concepts that have been previously owned. Provision of *Advance Organizer* in learning by Nasution (2003: 16) includes three phases: the

first phase, the presentation of *Advance Organizer,* the second phase of learning material provision, the third phase, approvals reinforce student cognitive structure.

Initial ability is the capital for students in facing the learning process. Because the teaching and learning activities need to provide the ability to start and help the learning experience associated with early ability of students while expanding and showing openness to the perspectives and how to follow everyday.

Initial ability between each student has a difference, this is because each student has a different level of intelligence. Sri Mulyani (2004: 20), explained that the initial ability of students has an influence on student learning outcomes. That is, students who have a high initial capability then have a tendency to learn ya ng results will be achieved is also high.

2. RESEARCH METHOD

This study belongs to the quasi-experimental research with factorial design 2 x 2. The population in this study amounted to 108 maha students with the withdrawal of samples are taken to determine the experimental and control classes conducted the draw with coins. Before the draw coins carried the researcher, lecturer of courses Const ruksi Building and Drawing 1 along the majors help map the two classes. This is done so that the samples obtained really new students take the Course Building Construction and Drawing 1 (not a student who has repeated). Both classes have an opportunity to serve as control class and experiment class. Coins consisting of two sides are defined as the side of the experimental class and the control class. The draw is done by dropping the coin on the floor, the side facing up is the experimental class and the down side facing is the control class. So that the number of students in the experimental class and control class, each of 14 people. This type of research involves two classes: experimental class and conventional class. Data collection techniques by administering an instrument conducted through tests.

Data were analyzed using normality test that aims to determine whether the data taken from the population distribution is normal or not. The test data is done with SPSS version 17. With the decision if a small probability of 0, 05, the data are not normally distributed, and vice versa if the probability greater than 0.05 then the normal distribution of data. After the subsequent normality test is carried out homogeneity test aims to see whether the two samples have a homogeneous variance or not. To get the test used to test the homogeneity m aka F. With the decision if the probability is greater than 0, 05, then H_0 is

accepted and if the probability of less than 0.05 then $_{H0}$ is rejected. If both classes are obtained normally and homogeneously then followed by hypothesis testing. Testing of hypotheses one, and two, is done using t test. While the third hypothesis by using Anova Two Line also performed with SPSS version 17.

3. RESULT AND DISCUSSIONS

From the results of research hypothesis testing is known there are three main variables that become the source of variance, namely: (1) Learning Strategies *Advance Organizer* and conventional learning strategies, (2) ability early in two categories: the ability of high initial and early ability is low, (3) Results learn.

Based on the analysis of the data in this study show that, learning strategies and capabilities *Advance Organizer* early overall mean more impact on learning outcomes Course Construction and Drawing 1. This is because every student has the same role in developing itself towards mastery of the material is being studied, the direct interaction between students, and the opportunity to discuss each other to solve problems in the same material with the guidance and direction of the lecturer. This study was supported by the theory that the use of the initial organizing or *Advance Organizer* is a teaching tool recommended by Ausubel (1960) to relate new learning materials with prior knowledge. Organizing the beginning, according to Ausubel in Nur (2011: 12) underlines the main ideas in a new learning situations and mengakitkan new ideas with existing knowledge to students. The initial organizing Ausubel described as a hook or intellectual *scaffolding* to help students activate prior knowledge relevant.

Differences in learning results are also caused early ability high by Arai *(1995)* is quick thinking, menegososiasi, understand the curiosity which is quite high, abstract thinking, and see the connection, while the ability to initial low by Arai (1995) is not fast enough to understand, less abstract thinking, less sharp in the imagination, less clever remember associate, and analyze. Initial capability will basically take effect on learning outcomes are achieved. By knowing the student's early proficiency a lecturer can determine where learning should begin. Nur (2011: 74) said initial ability of students is the state of knowledge / skills that must be possessed by students, before he learned the knowledge / new skills. Initial ability is the capital for students in facing the learning process. Because the teaching and learning activities need to provide the ability to start and help the learning experience associated with early ability of students while expanding and showing

openness to the perspectives and how to follow everyday.

The results of data analysis and hypothesis testing showed an interaction between learning strategies with initial ability to influence learning outcomes. Interaction is indicated by the graph intersecting between learning strategies *(Advance Organizer* and conventional) with initial capabilities (high initial capability and low initial capability).

4. CONCLUSIONS AND SUGGESTION

After conducting research and analysis of the research hypothesis influence learning strategies and ability early on learning outcomes of Building Construction and Drawing 1 student of Civil Engineering Department, Faculty of Engineering, State University of Padang, found some of the conclusions of which are: 1. There is a significant difference between the learning outcomes Course Construction and Drawing 1 students are taught strategies to learning outcomes *organizer Advance* Course of Building Construction and Drawing 1 students taught by conventional teaching strategies in the Department of Civil Engineering. Where learning outcomes Course Building Construction and Drawing 1 students taught by Learning Strategies *Advance Organizer* higher than the learning outcomes Course Building Construction and Drawing 1 students taught by conventional learning strategies, 2. There is a significant difference between the learning outcomes Course Construction Building and Drawing 1 students who have high initial ability and students who have low initial ability in the Department of Civil Engineering. Where the learning result of Building Construction Course and Drawing 1 students who have high initial ability higher than the student learning outcomes that have low initial ability, 3. There is no interaction between learning strategy *Advance Organizer* and early ability in improving learning outcomes Course Building Construction and Drawing 1 in the Department of Civil Engineering Faculty of Engineering, Universitas Negeri Padang. Students are taught by learning strategies *Advance Organizer* with high initial ability to get a higher learning outcomes than students taught by learning strategies *Advance Organizer* with lower initial ability. Students who are taught with conventional learning strategies with high initial ability get higher learning outcomes than students who are taught with conventional learning strategies with low initial ability.

After doing research many of the deficiencies found in this study. It is advisable: First, it is expected that the lecturer of Building Construction and Drawing Course 1 in Civil Engineering

Department can choose a more effective learning strategy. This can be done by selecting the *Advance Organizer* learning strategy, because strategy *Advance Organizer* is useful for faculty to improve student results overall. Second, natural d *Advance Organizer* application of learning strategy should be the first one to know the principles involved in learning srategi *Advance Organizer* so that there are no obstacles in the implementation of learning. Thus lecturers are expected to encourage and arouse student interest in learning. Third, Prior to the implementation of Building Construction and Drawing Course 1 should be tested the initial ability to see the ability of students as a whole in drawing and mastering the lecture material. Fourth, It is important to consider the use of learning strategies *Advance Organizer* in other subjects whose characteristics are the same as the Course of Building Construction and Drawing.

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7. AUTHOR'S BIOGRAPHY

Yuwalitas Gusmareta is a civil lecturer in State University of Padang. She teaching at 2011 after now. Mr. Fahmi Rizal and Mr. Nuhasan Syah are civil lecturer too.

8. AUTHOR'S CONTRIBUTIONS

Yuwalitas Gusmareta: Conception, design, acquisition, analysis and interpretation of data and drafting the article. Dr. Fahmi Rizal, M.Pd, MT and Dr. Nurhasan Syah, M.Pd: Critical reviewing and final approval of the version to be submitted.

9. ETHICS

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved.

IMPLEMENTATION OF DISASTER PREPARED SCHOOL (SSB) IN WEST PASAMAN DISTRICT WEST SUMATERA PROVINCE

Yuwalitas Gusmareta [1,] Nurhasan Syah [2,] Laras Andreas Oktavia [3,] Rizki Indra Utama [4,] Muvi Yandra [5]

Department of Civil Engineering, Faculty of Engineering, University of Padang

ABSTRACT: Be some a region in West Sumatra prone disaster flood and soil landslide. Wrong only are the districts of West Pasaman which is disaster subscription area annually. One district in this district is a vulnerable area, especially landslide disaster. Good landslides and flooding have the same potential cause casualties. Flood and landslide in West Pasaman Regency cannot be separated from the human influence that is not good in managing the environment at around their settlement. Awareness of environmental management should continue next with various programs. The program is called SSB (Disaster Alert School). SSB is a new program and still needs to be developed, especially in Pasaman West District. Some of Elementary School (SD) located in disaster-prone areas need socialization to achieve the goals discussed earlier. The whole district is a region that has many hills with houses and places of study in the form of an elementary school in slope - the slope The hill is very necessary to prepare the next generation of the current-generation pre-disaster and post-disaster occur. This is done to anticipate the number casualties. Results research obtained is 12,8% of 49 respondents not yet understand about preparedness to disaster-related problem prevention to disaster flood and landslide. Awareness respondents to the environment to respond problem disaster this including in category enough.

Keywords: Disaster Preparedness School, Floods, Landslides

1. INTRODUCTION

West Sumatra (Sumbar) is one of the provinces flanked by hill ranks and the Indian Ocean. Precisely, the location of this province is 1 ° 54 'north latitude and 3 ° 30' south latitude and 98 ° 36 'and - 101 ° 53' east longitude (General Studies. 2016(http://ilmupengetahuanumum.com/Kabupaten- and- city- in- province- Sumatera-west accessed April 17, 2017). Geographical conditions like this make Sumbar into areas that are *vulnerable* or prone to disasters, as seen in Figure 1 below:

Figure 1. Map of West Sumatra

The condition of West Sumatera Province shown in Figure 1 above indicates that the province is very disaster-prone. Several disasters in the past 10 years have occurred in West Sumatera Province as shown in table 1 below.

No	Type Disaster	Time	Impact
1	Earthquake and Tsunami Mentawai	2010	Dozens died world, and hundreds home destroyed
2	Disaster Avalanche and Flood in district Agam	2016	Home citizens in some districts submerged with an average height of 50-70 cm and 280 souls no can evacuate because access Street material covered ground
3	Disaster Flood and Avalanche in district South Solok	2016	6 people buried 2000 home awash and 100 hectares rice fields terndam water
4	Disaster Flood and Avalanche in 50 city districts	2017	5 people died world, 250 homes submerged flood

5	Disaster Flood and Avalanche West Pasaman	2017	100 house submerged flood, 600 residents evacuate

Source: some online media, such as antaranews.com.

Based on the data contained in table 1 it can be seen that some disasters that occurred in West Sumatera province have a negative impact. All of these potentials will reappear, even greater if there is no preventive activity on this issue.

Some of the affected districts in the previous table 1, such as Kabupaten Pasaman Barat, are disadvantaged areas each year. One district in this district is a vulnerable area, especially landslide disaster (Bambang Warsito in Melda, 2016). Generally, both landslides and floods together have the potential to cause casualties.

Flood and landslide in West Pasaman Regency cannot be separated from the influence of human is not good in managing the environment around their settlement. Awareness in managing this environment must be reawakened with various programs. The program is called SSB (Disaster Alert School).

SSB is not only devoted to disaster mitigation but also to anticipate the disaster. Especially in West Pasaman District, awareness of the environment can be generated by introducing disasters that arise from the poor management of the environment. SSB was formed to create future generations that are ready, resilient, responsive to disaster and aware of the causes of the disaster, one of which is environmental indifference.

SSB is a new program and still needs to be developed, especially in Kabupaten Pasaman Barat. Some elementary schools (SD) located in disaster-prone areas need this socialization to achieve the objectives discussed earlier. This district overall is an area that has many hills with houses and places of learning in the form of the elementary slope of the hills are very necessary to prepare the next generation of the current-generation pre and post-disaster. This is done to anticipate casualties that fall, later.

Disaster recognition program in the form of SSB is a follow-up plan of community service program of the State University of Padang by some civil engineering lecturers in some areas of West Sumatra. The introduction of disaster with KIDS (Kyoto International Disaster Prevention School) method has been done in Padang City and Pesisir Selatan Regency (Totoh Andayono and Fitra Rifwan, 2013 and 2015). However, this activity has not yet been done in Agam Regency. The targets of flood and landslide disaster are the development of KIDS method to SSB.

2. RESEARCH METHODS

Research this is descriptive quantitative. amount sample and population from research this was 49 elementary students. Data collection was conducted with use questionnaire. Data analysis was performed on simple with using the Microsoft Excel program.

3. RESULTS AND DISCUSSION

From the results research obtained percentage elementary school students understand materials provided is 87, 20% and percentage elementary school students who do not understand is 12, 80%. Based on Data analysis research this shows that elementary school students already understand with good implementation school standby disasters (floods and soil landslides) in West Pasaman West Sumatra Province.

4. CONCLUSIONS AND SUGGESTIONS

Implementation School Standby Disaster (SSB) given to Elementary students in West Pasaman can conclude, that activities socialization to prone areas flood and Avalanche walk with well, this seen from party school as well pupils were very enthusiastic to activities this. Results from a content questionnaire given to students could categorize as that disciples followed socialization implementasi school standby disaster (SBB) understand material that has been given by Nara source as well of drama displayed. Socialization this give impact positively, where students and teachers can knowing How means that the area they no happen disaster flood and landslide.

Socialization Implementation School Standby Disaster (SSB) need to be held in other schools that are on area prone disaster and flooding. Socialization on periodically could give useful knowledge on constantly to applied students good in environment school as well environment the place residence.

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Yuwalitas Gusmareta, Mr. Nurhasan Syah, Laras Oktavia Andreas, Rizki Indra The main, and Muvi Yandra is Lecturer Major Technique Civil Faculty Technique University Negeri Padang. To moment this fifth author still active mengampu eye lecture corresponding field respectively.

8. AUTHOR'S CONTRIBUTIONS

Yuwalitas Gusmareta: Conception, design, acquisition, analysis and interpretation of the data and drafting the article. Dr. Nurhasan Shah M.Pd: Critical reviewing and final approval of the version to be submitted.

9. ETHICS

This article is original and contains unpublished material. The corresponding author confirms that all authors have read and approved the manuscript and no ethical issues involved.

USING MOBILE TELECOMMUNICATIONS -2000 INTERNATIONAL FOR ANALYZING TECHNOLOGY NETWORK ERA 4G-LTE

Zulham Sitorus[1], Ganefri[2], Nizwardi Jalinus[3]

[1] Doctoral StudentsFaculty of Technology and Vocational Education,PadangState University – Indonesia Lecturer Faculty of Computer Engineering,University of Panca Budi Medan-Indonesia
[2]Lecturer Faculty of Technology and Vocational Education,State University Padang-Indonesia
[3]Lecturer Faculty of Technology and Vocational Education,State University Padang-Indonesia

ABSTRACT: Technology long-term evolution(LTE) is the latest standard of mobile network technology, development of GSM (Global System for Mobile Communication) / EDGE (Enhanced Data Rate for gsm evolution) and UMTS (Universal Mobile Telephone Standard) / HSDPA (High-Speed Downlink Packet Access). 4G is a technology development from 3G. 4G system will provide comprehensive IP solution where voice, data and multimedia flows can be up anywhere and anytime, and 4G has a higher average data from the previous generation.Customers may also use their cellular terminals for video conferencing and in time to exchange information via e-mail or multimedia mail.

Keywords: TechnologyLong TermEvolution, 4G-LTE, IMT-2000

1. INTRODUCTION

Today the development of internet and wireless communication technology is one of the necessities to communicate with everyone. Internet and also the mobility of communication anywhere through wireless communication technology is called mobile broadband. The need for telecommunication services will increase due to increasing user demands as well; however, the need for voice facilities is still a major requirement for telecommunication service users.

LTE which is a 3GPP standard can be the answer to the challenge. LTE is designed as a 4G technology that provides multi-megabit bandwidth because the advantages of LTE technology can be implemented simultaneously on existing 2G and 3G networks, so the implementation of LTE technology is low cost.

IMT-2000 is a third-generation mobile communications system (3G) designed to provide global services, diverse service capabilities, and significant performance improvements.This technology will integrate pager, mobile phone, and mobile satellite system; in addition, with IMT-2000 later users are expected to be able to access globally with the same number wherever it is. Therefore, IMT-2000 can be said as the basis for integrated global communication access.

2. OBJECTIVES OF WRITING

The objective to be achieved is to produce and know the specifications and standardization of mobile communication systems in the third generation IMT-2000. Gaining optimizations that can improve system performance and gain the advantages and disadvantages of this system from the technical point of view.

3. 4G LTE Network Architecture

The emergence of 4G LTE (Long Term Evolution) network with all its advantages can promise super-fast mobile data communications. To be able to enjoy 4G services at some 4G points, people can exchange their 3G sim card with a special 4G sim card named USim, the form of a 3G sim card with USim 4G is the same, the difference is only on the technology embedded in it. The architecture of LTE 4G networks can be seen from the picture below.

Figure 1. 4G LTE network architecture

4. MOBILE COMMUNICATION SYSTEM

Communication technology continues to grow with years.Wireless communication is quite popular in various countries as one of the solutions to meet the needs of telecommunication facilities.

The role of mobile telecommunications, especially mobile communications systems is felt increasingly needed. Due to the existence of mobile telecommunication facilities is expected to make it easier for users to communicate.

A. CELL CONCEPT

The basic concept of a cellular system is the division of services into small areas called cells. Each cell has its own coverage area and operates specifically. Cell sizes in mobile communication systems can be affected by:

1. Density of traffic.
2. Power transmitters, namely Base Station (BS) and Mobile Station (MS).
3. And natural factors, such as air, sea, mountains, buildings, and others.

B. FREQUENCY REUSE

The use of the same frequency on different cells at the same time by multiple users is at the core of cellular communication.

In the concept of frequency reuse, a certain frequency channel can serve multiple calls at the same time. Then it can be said that efficient frequency spectrum usage can be achieved. All available frequencies can be used by each cell, so that it can reach the capacity of a large number of users using an effective frequency band.
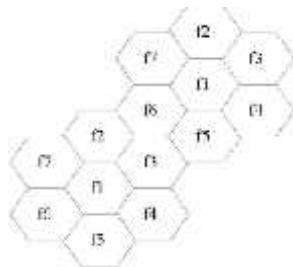

Figure 2. *Frequency Reuse*

On frequency reuse, use of the Canal does not depend on the same carrier frequency for some areas of coverage.

In Figure 2.3. repeated use can be seen the channel frequency, in a cell that uses the radio channel, f1 has radius R can be used in different cells of the same range at a distance D from the previous cell.
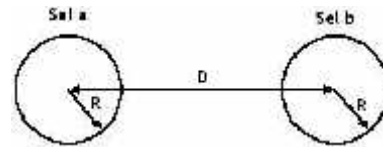

Figure 2. Reuse Frequency

While the relative separation distance to the cell radius is expressed by D / R.

Equation of formula below:

$$D/R = \sqrt{3K}$$

Where : D = distance between BS and other BS

R = cell radius

K = number of frequency patterns

The concept of frequency reuse can improve efficiency in the use of frequency spectrum but must be followed with a certain pattern and orderly to avoid channel interference.

C. MOBILITY

Mobility is one of the important things of a mobile communications system. On matters relating to mobility, it is expected that cellular calls which are made wherever and whenever within the service area, able to keep the call (conversation) without service interruption or breaking the call while in a state of motion.

D. ROAMING

There are many mobile operators in the same city, which use radio switches equipment, and different cell sites. However, subscribers are registered on one operator only.
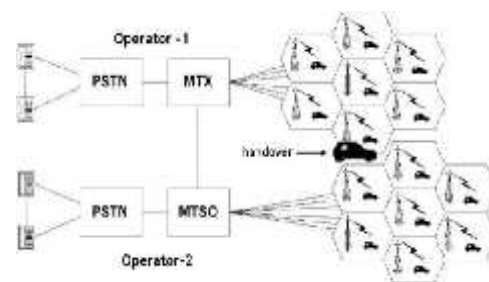

Figure 4. Roaming

The description of the roaming itself is shown in Figure 2.5. Roaming can occur when there is a link between mobile switches.

So, users who move out of their area and make a call (call) from a foreign region called roamer. However, the process of the call is called roaming.

5. BASIC CONFIGURATION OF MOBILE SYSTEM

The mobile phone or mobile radio is also a practical and reliable method of voice and data communications between mobile users and regular telephone systems.

In mobile cellular communication system there are three main component parts, namely:

a. Mobile Telephone Switching Office (MTSO)
MTSO serves as a central connection of the conversation and recording pulse. MTSO is also known as MSC (Mobile Switching Central) and better known as "central".

Calls to and from mobile customers are connected by and through MTSO. In addition MTSO also set up signaling required to make calls.

b. Base Transceiver Station (BTS)
Base Transceiver Station is often called Radio Base Station (RBS). BTS is a liaison between customer and central terminals through radio frequency channels. The BTS series consists of:

a.Control Unit

The control unit is used for data communication with MTSO as well as data signaling with Mobile Station (MS) in the radio network.

b. Channel Unit

The transmitting and receiving devices will be equipped or supplied in each channel unit.Most of the channel units are the speech-channel units.
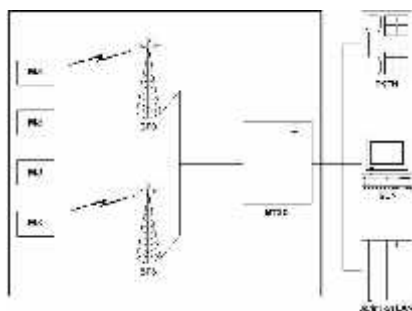

Figure 5. Basic Configuration of Cellular System

c. Mobile Station (MS)
Mobile Station is small and light equipment used by customers. In other words, Mobile Station (MS) is known as a handset or handphone.

6. THE DEVELOPMENT OF MOBILE TELECOMMUNICATION SYSTEM

Communication systems evolve along with the development of human needs. In the past, people were quite satisfied with the one-way communication system, but because it was felt less efficient, then a two-way communication system is created.But the demand to communicate anytime and anywhere becomes a major demand in the telecommunications system.

7. IMT-2000 NETWORK ARCHITECTURE
IMT-2000 network architecture is defined in such a way that various technologies that process various information can be used to realize IMT-2000.

International Mobile Telecommunication-2000 (IMT-2000) is a specification of a functional architecture, which will give freedom to some mobile telecom equipment manufacturers to create their own network architecture design and their own better equipment to meet their implementation objectives.

The IMT-2000 network is composed of three parts of the architecture, namely:

1. Access network
The IMT-2000 access network provides basic radio transmission functions such as handover and local switching functions required to enable access from mobile phones to fixed network centers or sources via the radio interface.

Figure 11. IMT-2000 Network Architecture

2. Backbone network
The backbone network provides a basic fixed network infrastructure and network centers that have the necessary call control and link control for IMT-2000. The backbone network concept consists of Core Network and the core part of Service and Mobility Control Network.

3. Service and Mobility Control Network/Intelligent Network
Service And Mobility Control Network provides service control or provides mobility associated with the highest level of functionality such as handover decisions and storing customer-related data to support access to mobility networks.

8. Research Findings

In the simulation, the propagation model is required to determine the radius of the cell, such as Okumura Hatta model for 900 MHz frequency and Cost Hatta for 1800 MHz frequency. The equation for propagation used is:

$$L = A + B \lg \left(\frac{f}{M}\right) - 1 , 8 \lg \left(\frac{h_b}{m}\right) - \left(\frac{a(h_M)}{m}\right) + s \lg \left(\frac{d}{k}\right) + L_c$$

with,

Table1. Path loss parameters

Propagation	Frequency	A	B
Okumurra Hatta	150 – 1500 MHz	69.55	26.16
Cost Hatta	1500 – 2000 MHz	46.3	33.9

L   : Maximum of pth loss

f   : Carrier Frequency (MHz)

h_{bs} : Height of eNodeB (m)

h_{MS} : Height of EU (m)

$a(h_{ms})$: The correction factor of the height between MS can be calculated by

$$a(h_m) = \begin{cases} 3.2[\lg (1 .7 h_m)]^2 - 4.9 & ; \\ [1.1\lg (f) - 0.7]h_M - [1.5 \lg (f) - 0.8] & ; \end{cases}$$

9. ADVANTAGES AND DISADVANTAGES OF IMT-2000 SYSTEMS

IMT-2000 as a third generation mobile communications system (3G) certainly has many advantages over second-generation mobile communications systems that are still used in some countries.

There are several advantages that can be found on the IMT-2000 mobile communication system. The advantages include: greater capacity, expanded coverage, personality and the addition of other services.

10. CONCLUSION

From the discussion on this final project, the conclusion that can be taken is:

1. IMT-2000 has a difference compared to the second generation telecommunication system, namely in the second generation system, the existing service is in the form of voice and data services with low bit rate.

2. IMT-2000 is a third generation mobile telecommunication system that has a bit rate of 2 Mbps and operates at 2 GHz frequency.
3. In IMT-2000, Transmission data used is packet data instead of data circuit as in second generation system. Therefore data transmission on IMT-2000 can be faster.

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FACTORS AFFECTING STUDENTS IN CHOOSING COMPUTER ENGINEERING DEPARTMENT IN STT PAYAKUMBUH

Zulkifli, M.Kom[1], Dilson, M.Kom[2] and Rahmad Al Rian, M.Kom[3]

[1] DIII Teknik Komputer, STT Payakumbuh, Indonesia; [2]STT Payakumbuh, Indonesia; [3]UMRI, Indonesia

ABSTRACT: Many factors influence students in choosing Computer Engineering majors in Sekolah Tinggi Teknologi Payakumbuh (STT Payakumbuh) such as parent factor, peer factor, individual personality factor, university image factor and job prospect. To find out it was taken the sample data using the instrument on computer engineering students in STT Payakumbuh and in the analysis by using multiple regression correlation techniques. Based on the result of t test, it is known that the two independent variables have an effect on the decision of the students to choose Computer Engineering department at STT Payakumbuh because it has sig value <0.05 that is individual personality factor and factor of parents whereas the other four independent variables are stated have no influence to the student decision Computer Engineering at STT Payakumbuh because it has sig value> 0,05.

Keywords:Factors, T test , Variables, Sig

1. INTRODUCTION

The era of globalization not only has a positive impact on human life in general, but also bring negative effects. One of the negative effects is the excluded and left behind people who are not ready to face global challenges.[1]

To prepare the community to compete in the globalization era, Education is the right phase for improving the quality of human resources that will impact on improving the quality of life of the community.

Basically there are several factors that affect a person in the development of his career, including in choosing the majors in education level. These factors include factors parents, peer factors, gender factors, individual personality factors.[2]. At Sekolah Tinggi Teknologi payakumbuh (STT Payakumbuh) there are 3 departments namely Civil Engineering Department, Computer Engineering and Informatics, Number of Students in Civil Engineering Department from year to year tends to rise, Department of Informatics is a new department in STT Payakumbuh which acceptance of Prime student in academic year 2017/2018 while the number of students majoring in Computer Engineering since 2011 until 2017 tends to decline so it is necessary in the analyst of factors that affect students in choosing Computer Engineering majors in STT Payakumbuh.

2. THE PURPOSE OF THE RESEARCH

The purposes of this research are:
a. Knowing the influence of parents factor on the decision of students in choosing Computer Engineering Department.

b. Knowing the influence of gender factors affect the decision of students in choosing Computer Engineering Department.
c. Knowing the influence of peer factors affect the decision of students in choosing the Department of Computer Engineering.
d. Knowing the influence of personality factors Individuals influence the decision of students in choosing the Department of Computer Engineering.
e. Knowing the influence of university image factor has an effect on to student decision in choosing Computer Engineering Department.
f. To know the effect of future job prospects on student's decision in choosing Computer Engineering Department.

3. RESEARCH METHOD

The research method used is Quantitative Method as scientific method because it has fulfilled the scientific norms that is concrete or empirical, objective, measurable, rational, and systematic. This method is called quantitative method because the research data in the form of numbers and analysis using statistics.[3]

3.1 Design of research

In order to know the results of multiple regression research then conducted the dissemination of questionnaires to students majoring in Computer Engineering force 2015, 2016 and 2017. Here is a description of this research design.
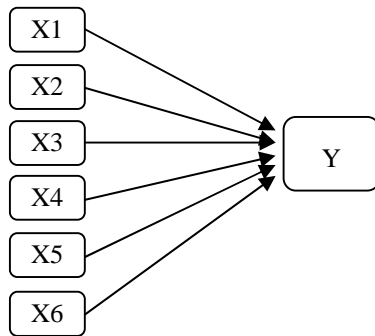
Figure 1 Research Design

Information :
  X1 = Parent factor
  X2 = Peer factor
  X3 = Gender Factor
  X4 = Individual Personality Factor
  X5 = University image factor
  X6 = Job prospects factors
  Y   = The student's decision to choose a
        computer engineering department

3.2 Population and Sample

1) Population

Population is a generalization region consisting of, subject objects that have certain qualities and characteristics set by the researchers to be studied and then drawn conclusions. So the population is not just people, but also objects and other natural objects. [4] In this study, the population to be taken is a student majoring in Computer Engineering at STT Payakumbuh force 2015, 2016 and 2017 are active as many as 115 people. (based on academic data)

2) Sampel

In this study the sample used is students majoring in Computer Engineering force 2015, 2016 and 2017. In order to find the sample then the research using sampling technique that is simple random sampling. In this study, in taking samples using Slovin technique and with a 5% error rate. Namely with the following formula:[6]

$$n = \frac{N}{1 + Ne^2}$$

Information:
  n = sample
  N = total population
  e = estimated error rate

Then:

$$n = \frac{115}{1 + 115\,(0,05)^2}$$

$$n = \frac{115}{} = 89,32$$

$$1 + 115\,(0,0025)$$

The results of these calculations used as a guide for sampling, which is 89.32 rounded to 90 people who will be the respondents in this study.

3.3. Teknik Pengolahan Data

In this research, data processing techniques are done, namely, editing, codeting, tabulation. [5] following each explanation:
1) Editing is the activity of checking or examining data that has been collected from the field, sorting and checking the eligible data and correcting errors and lack of data contained in the field notes.
2) Coding / scoring is the activity of coding or a particular score in a study.

Table 1 Criteria of Scorers Likert Scale

No	Alternative answers	Score
1	Strongly Agree (SS)	4
2	Agree (S)	3
3	Disagree (TS)	2
4	Strongly Disagree (STS)	1

3) Tabulation is the process of placement of data into the form of tables that have been given the code or score according to the needs of data analysis.

4 RESULT AND DISCUSSION

4.1 Validity and Reliability Test Results

In quantitative research, there is a test of validity and reliability used to determine the size of whether an instrument will be used in a study. Usually this test is done on research using questionnaire instrument. Questionnaires are tested first by spreading to the original participant as many as 30 questionnaires, Here is a description of the validity and reliability test results.

1) Test Validity and Reability of Parent Factor (X1)

Based on the validity test in the known number Calculate in sequence, for XA1, XA2, XA3, XA4, XA5, XA6, XA7, XA8 are 0.327, 0.564, 0.319, 0.499, 0.663, 0.753, 0.498, 0.771 Based on these results 1 to 8 is Valid because the value of r Calculate is greater than 0.3 (r minimum). And based on the results of reliability test known cronbach's Alpha is 0.652 so the questionnaire is expressed (0.652) greater than the minimum value of cronbach alpha 0.6 then the instrument used to measure the variable factor of parents (X1) is said reliable.

Table 2 Reliability Statistics

Cronbach's Alpha	N of Items
.652	8

2) Test of Validity and Reability of Peer Factor (X2)

Based on the validity test in the calculated r number, XB1, XB2, XB3, XB4, XB5, XB6 are 0.159, 0.752, 0. 746, 0.866, 0.856, 0.774. Based on the results it shows that questions 2 to 6 are Valid because the value of r Calculate is greater than 0.3 (r minimal). And based on the results of reliability test known cronbach's Alpha is 0.805 so the questionnaire is expressed (0.805) greater than the minimum value of cronbach alpha 0.6 then the instrument used to measure the parent factor variable (X2) is said reliable or reliable.

3) Test of Validity and Reliability of Gender Factors (X3)

Showing Gender Factor (X3) is valid and reliable with cronbach's Alpha number is 0.909.

4) Test Validity and Reliability of Individual Personality Factor (X4).

Showing Personality Factor (X4) is valid and reliable with cronbach's Alpha number is 0.859.

5) Validity and Reability Test of University Image Factor (X5).

Shows College Image Factor (X5) valid and reliable with cronbach's Alpha is 0.813.

6) Validity and Reliability Test of Job Prospect Factor (X6).

Shows the Job Prospect (X6) is valid and reliable with Cronbach's Alpha is 0.890.

7) Test Validity and Variable Reability of Student Decision Selects Computer Engineering Department (Y).

Shows Student Decision Choosing Department of Engineering Koputer (Y) valid and reliable with the cronbach's Alpha is 0.788.

4.2 Data Analysis

1) Multicollinearity Test Result

Multicollinearity test aims to test whether in the regression found the correlation between independent variables (independent). This test is usually only found in multiple regression testing, a regression study belonging to a good category should have no correlation between independent variables.

The result of multicolinearity test through SPSS program becomes a benchmark of whether the independent variable in this research is multicolierity that is by looking at the results contained in Collinearity Statistic (tolerance) and Variance inflation factor (VIF) column, the result of multicoloniality test in this research is described as follows:

a. Results multicolierity by looking at tolerance

Tabel 3 Multicollinearity test results

No	Variable	Tolerance > 0.10	Decision
1	Parent Factor	0.687	Does not occur Multicolierity
2	Peer Factor	0.617	Does not occur Multicolierity
3	Gender Factors	0.746	Does not occur Multicolierity
4	Individual Personality Factor	0.696	Does not occur Multicolierity
5	University Image Factor	0.477	Does not occur Multicolierity
6	Job Prospect Factor	0.506	Does not occur Multicolierity

b. Results multicolierity by looking at the VIF

Table 4 Results of multicollinearity test with VIF provisions

No	Variable	VIF < 10,00	Decision
1	Parent Factor	1.455	Does not occur Multicolierity
2	Peer Factor	1.621	Does not occur Multicolierity
3	Gender Factors	1.340	Does not occur Multicolierity
4	Individual Personality Factor	1.436	Does not occur Multicolierity
5	University Image Factor	2.096	Does not occur Multicolierity
6	Job Prospect Factor	1.978	Does not occur Multicolierity

2) Heteroscedasticity Test Result

Heteroscedasticity test is used to examine the occurrence of variance difference of residual nialy in a period of observation to another observation period. Heteroskedasticity test results can be seen in Figure 2.
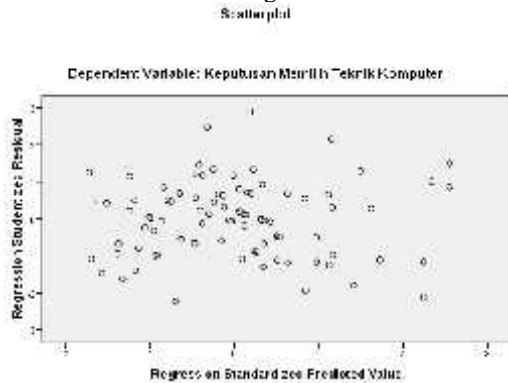

Figure 2. Scatterplot results in the Heteroscedasticity test.

From the graph above, shows that the data points spread randomly or irregularly below or above the point orgin (number 0) on the Y axis so it can be concluded that in this study the data used did not occur heterokedastisitas but homoskedastisitas. This means that data is included in the category of good in regression research, because good regression research does not occur heterosdistisitas

3) Normality Test Result

Normality provisions are when the significant level> 0.05 then the data is normal, and vice versa if significant level <0.05 then the data is not normal. Based on the normality test using Kolmogorov-Smirnov Z can be a significance value of 0.911. Can also be seen from the results of p-plot and **histogram.**
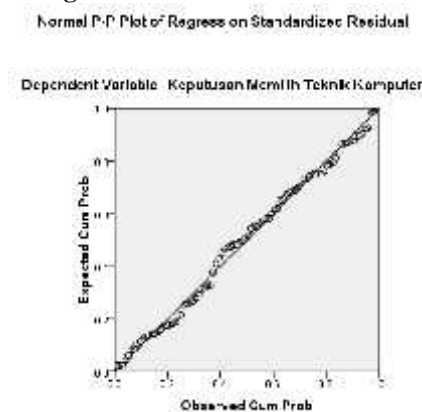

Figure 3 Normality Test Results Using P-Plot Graph

In Figure 3 we see spots spread around diagonal lines, and their distribution follows the direction of the diagonal line. This illustrates the data used in this study normal. While the histogram graph gives a near normal distribution pattern.
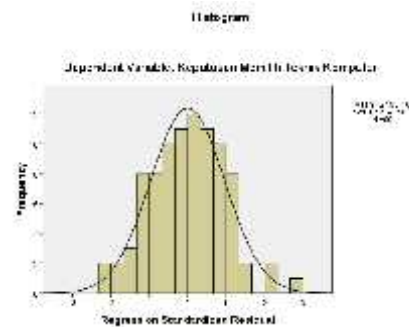

Figure 4 Distribution Pattern Results using Histogram

Based on the histogram graph the regression model is feasible to be used because of the assumption of normality.

4.3 Hypothesis Testing Research

1) Determination Coefficient Test (R2)

The results of coefficient of determination test can be seen in table 5:

Table 5: Determination coefficient test results (R2)

Model Summary^b

Model	R	Std. Error of the Estimate	Change Statistics			
			R Square Change	F Change	df1	df2
1	.599a	3.299	.359	7.735	6	83

a. Predictors: (Constant), Job Prospect Factors, Gender Factors, Parent Factors, Peer Factor Factor, Individual Personality Factors, University Image Factors

b. Dependent Variable:Decision Of Choosing Computer Engineering

From table 5, the adjusted R Square is 0,359 or 35,9%. This shows that the decision of students in choosing Computer Engineering majors can be explained by the variables factor of parents, peers, gender, individual personality, university image and employment prospects 35.9%, while the remaining 64.1% (100% 35.9%) is explained by other factors.

2) Significance Test Result of Regression Coefficient Partially (t test)

Table 6 Test Results t through SPSS program
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.672	3.989		3.427	.001
	Parent Factor	.283	.138	.217	2.045	**.044**
	Peer Factor	.225	.152	.166	1.479	.143
	Gender Factors	-.206	.235	-.090	-.880	.382
	Individual Personality Factor	.390	.113	.364	3.459	**.001**
	University Image Factor	.202	.170	.151	1.185	.239
	Job Prospect Factor	.027	.214	.016	.125	.901

a. Dependent Variable:Decision Of Choosing Computer Engineering

T test is done to analyze further, which variable among independent variable that influence to student decision in choosing Computer Engineering Department by comparing t-count value with t-table of significance level (that is 0,05) Parent factor variable (X1) has value sig of 0.044, peer factor factor (X2) has a sig value of 0.143, the gender factor variable (X3) has a sig value of 0.382, the individual personality variable (X4) has a sig value of 0.001, the college image variable (X5) has sig 0.239, and job prospect variable has sig value 0.901Based on sig value on each independent variable can be described that:

a. Hypothesis testing results showed H0 rejected then parents factor has a significant influence on the decision of students in choosing Computer Engineering majors

b. Result of hypothesis test show H0 accepted hence peer factor have no significant effect to student decision in choosing Computer Engineering majors.

c. Hypothesis testing results showed H0 accepted then gender factors have no significant influence on the decision of students in choosing Computer Engineering majors.

d. Hypothesis testing results showed H0 rejected then individual personality factors have a significant influence on the decision of students in choosing computer engineering majors.

e. Hypothesis testing results showed H0 accepted then the image factor of college does not have a significant influence on the decision of students in choosing Computer Engineering.

f. Hypothesis testing results show H0 in accepted then the job prospect factors have no significant influence on the decision of students in choosing the Department of Computer Engineering.

Based on the results of hypothesis testing can be concluded that the individual personality factor and Parents Factor has a significant influence on the decision of students in choosing computer engineering majors Prospect factors Employment, peers, gender, and college image has no significant influence on student decisions in choosing majoring in computer engineering at STT Payakumbuh.

3) Total Significance Test of Coefficient Regression (F Test)

Table 7 F Test Results through SPSS software
ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	505.132	6	84.189	7.735	.000[a]
	Residual	903.357	83	10.884		
	Total	1408.489	89			

a. Predictors: (Constant), Job Prospect Factors, Gender Factors, Parent Factors, Peer Factor Factor, Individual Personality Factors, University Image Factors

b. Dependent Variable: Decision Of Choosing Computer Engineering

In the table, shows the results of the F test contained in column F that is equal to 7.735 with a significance level of 0.000. Because probability value 0.000 <0,05 it can be said that multiple regression model can be used to predict student decision to choose Computer Engineering majors in STT Payakumbuh influenced by parent factor, peer factor, gender factor, individual personality factor, university image factor and factors of job prospects.

5. CONCLUSION

From the result of the research by hypothesis test by using multiple regression analysis, it can be concluded that there are two factors that influence the student's decision in choosing the Computer Engineering majors of the six factors tested hypothesis, the influencing factors are Parent Factor

and individual personality factor. It is obtained based on sig value on two variables that have value <0,05. In detail the Sig value of the parent factor variable (X1) has a sig value of 0.044, peer factor factor (X2) has a sig value of 0.143, gender factor variable (X3) has a sig value of 0.382, individual personality variable (X4) has value sig 0,001, college image variable (X5) has sig 0,239, and job prospect variable (X6) has sig value 0,901.

6. ACKNOWLEDGEMENTS

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FACTORS AFFECTING ELEMENTARY SCHOOL TEACHER READINESS ON IMPLEMENTING CURRICULUM IN WEST SUMATERA

Zuryanty[1], Hamimah[2,] Mulyani Zein[3]

Elementary School Teacher Education Department, School of Education, Universitas Negeri Padang

ABSTRACT*:* This research aims to confirm and measuring four-factor model effects that predicting correlated to elementary school teachers readiness in implementing the curriculum. These four indicator factors are mindset transformation, the curriculum concepts comprehension, ability to analyzing subjects matter, and teaching design. These four factors designed as indicators variable to elementary school teachers readiness, as a latent variable. The quantitative data treated as interdependency relationship, analyzed by multiple correlation, partial correlation, and a confirmatory factor analysis techniques. Confirmatory factor analysis results indicated that only 47 of 53 research questions are appropriated for the four-factor model. The first factor, mindset transformation explained 29.44% of teacher readiness, Second-factor curriculum concepts comprehension explained 20.32%, Third factor, ability to analyzing subjects matter explained 12.63%, and the fourth factor, teaching design explained 8.43% variance of teacher readiness. Totally 70,82% variance of teacher readiness as a latent variable can be explained by the model. Partial correlation analysis finding that a very significance correlation among four-factor and elementary school teachers readiness: factor 1 ($RX_1Y_{,234} = 0,997$: p<0,00), factor 2 ($RX_2Y_{,134} = 0,995$: p<0,00), factor 3 ($RX_3Y_{,124} = 0.972$: p<0,00), dan factor 4 ($RX_4Y_{,123} = 0.983$: p<0,00). This research confirming that four-factor model as indicator variables are appropriate and very significantly correlated to elementary school teachers readiness in implementing the curriculum. This research confirming that mind set transformation, curriculum concepts comprehension, ability to analyzing subjects matter, and teaching design are significantly suitable and correlates to elementary school teachers readiness as a latent variable. Refers to norm reference the quality of elementary school teachers readiness should be improved. There are needs, consciousness, and climate to imply educational innovations, but it seems hard to change the mindsets, to maintain learning and research climate, and lack of curriculum concepts comprehension. Elementary school teachers capacity in information technology and applying authentic assessment also have to be improved.

Keywords: Mind Set Transformation, Curriculum Concepts Comprehension, Ability to Analyzing Subjects Matter, Teaching Design, Elementary School Teachers Readiness, Four Factors Model

1. INTRODUCTION

Implementation and revision of competency-based curriculum are one of the national education development strategies. The implementation of the 2013 curriculum, for example, has been carried out in the form of pilot curriculum in since the 2011/2012 academic year at some elementary school. Elementary School piloting was chosen to begin the implementation of the curriculum and to study the weaknesses and implementation constraints for further improvement [1]. Implementation is related to teacher readiness, school conditions and availability of infrastructure, principal management, school environment, school/community committees, and education funding. The implementation success will be determined by the readiness of functional elements in carrying out their respective roles. Some variables are expected to greatly affect the success of implementation is change thought patterns (mindset), readiness, willingness, openness and the ability of teachers to implement the curriculum, such as the ability to analyze teaching materials, the design model of learning, and various other variables, both internal and external [2]. Teachers are a very dominant determinant variable in the educational process because

teachers play a role in the learning process refers to a particular curriculum. The teacher's role is not a single factor but also determined by other factors such as principals, supervisors, and support of the Central Government and Local Government [3]. The learning process is a process that contains a series of actions of teachers and students in an educational situation. In the process of education and teaching, contained multi-role of a teacher. The role of the teacher includes many things, such as the educator, class leader, mentor, learning environment regulator, learning planner, supervisor, motivator, and as an evaluator. The teacher's role is also related to the competence of teachers, including the ability to develop skills of self, develop the potential of children and as a curriculum developer at school (planning a, implement assess the curriculum). Implementation Curriculum with the integrated thematic approach, using scientific teaching methods and authentic assessment does require more severe preparation for elementary school teachers, both in terms of time required, resources/materials, and the preparation of other supporting tools. In the field, there are still schools, including elementary schools whose teachers still find it difficult to implement the curriculum. On the other hand, information was also obtained on January 15, 2015, from two elementary

school teachers (R and A), that some teachers still had difficulty utilizing information technology to supplement the source of the teaching materials and conduct the assessment of authentic learning outcomes. Other problems or obstacles that appear are still found a difference in understanding and mastery or confusion and feel busy and burdened to implement the Curriculum to be easily implemented and students feel happy and passionate about the content of the lesson. Lack of teacher understanding of the nature of the curriculum can lead to a delayed implementation of the curriculum. There are still teachers who find it difficult to implement the curriculum through integrated thematic learning, as teachers have not received intensive training, such as understanding the theme network, implementing learning by scientific methods, and assessing the outcome of learning with authentic assessment. There are still teachers who find it difficult to leave the habit of learning activities that presentation based on subject/field of study. In implementing Curriculum teacher motivation is also different. Implementation Curriculum is also constrained facilities and infrastructure in a school that is considered less supportive. Another obstacle of teachers has still figured out that student learning outcomes are more dominated than cognitive aspects. for example to pursue a certain target [4]. Regardless of the internal and external conditions of the teachers, they role in implementation process still critical, because in the daily teaching and learning activities, the teachers are directly interacting with the students. The implementation process will take a long time, and in the early stages of curriculum implementation, all elementary school teachers must have inner birth preparedness. This study aims to confirm the preparation of elementary school teachers in implementing the curriculum. Thus, for the implementation of the curriculum policy to achieve the objectives, it is necessary to have data that can be used to describe the current condition in the implementation of the curriculum which contains changes and different ways of thinking with the previous curriculum. The implementation process includes as well as evaluation activities and expansion of mutually adjusting activities. On the way, the implementation will face various obstacles that need to be monitored and evaluated because the constraints faced can make a program to be successful or fail to achieve goals. To avoid failure, the implementation of a program must always be monitored, evaluated and improved. At least there are four variables critical in the implementation of a public policy or a program such as communication or clarity of information, consistency of information *(communications),* the availability of resources in the amount and quality of certain resources *(resources),* attitude and commitment to implementing program or policy bureaucrats *(disposition)* and the structure or standard operating procedures (SOPs) governing the working procedures and administrative *(bureaucratic structure)* [5] .

2. METHODS

This research is done with quantitative approach. The symptoms or phenomena encountered in the field are measured using a questionnaire and the results are quantified into numerical data. Seen from the research objectives, this research includes correlational research group by measuring intercorrelation between question items, product moment correlation, partial correlation, and factor analysis. The research instrument in the form of a questionnaire developed refers to factors that are theoretically predicted to affect the readiness of primary school teachers during the implementation of the Curriculum. Questionnaires consisting of 53 questions, analyzed and improved derived from the development of four factors and 12 sub factors.

3. RESULTS AND DISCUSSION

Factor analysis of the proposed model resulted in confirmation that all four of these factors can explain the vast majority (70.82%) variance readiness, with each factor one was able to explain 24.37%, factor two explain 17.68%, factor three explain 16 72%, and the fourth factor explains 12.03% of the variance of readiness of teachers. Kemdikbub (2013a: 21), to implement the curriculum there are several things that must be possessed by a teacher such as (a) a strong desire to implement the curriculum, (b) a profound understanding of curriculum, (c) the skills to analyze the relationship between Graduation Competency standards, Core Competence, Standard Competency, Master's books, and Students Books, (d) the skills to draft the learning Program, (e) teaching skills by applying the approach Scientific correctly, (f) the teaching skills to implement problem based learning, project-based learning, and discovery-based learning , (g) skills properly implement authentic assessment, and (h) have oral and written communication skills with a coherent, correct and polite.

An elementary teacher needs to understand and master the aspects above aspects of readiness in order to implement the curriculum [6]. Successful implementation of the curriculum to be achieved depends on the variability of the ability possessed by a teacher. That is, the teacher is the person in charge in an effort to realize everything that has been stated in the official curriculum.

Teachers must also have to formulate instructional materials that fit the contents of the curriculum into the form of learning activities and then carry out what has been programmed. A teacher who directly faces various problems that arise in connection with the implementation of the curriculum in class. Teachers are also looking for efforts to solve all the problems or obstacles encountered [7]. In relation to curriculum development, problems that often arise and must be faced by teachers are issues related to objectives and expected outcomes of an educational institution, such as issues relating to the content/lesson

materials and organization or way of execution of the curriculum Problems in relation to the curriculum development process and curriculum revision/improvement.

Teachers should play an active role in curriculum development and development, whereas experienced teachers are usually involved in providing input in the form of suggestions, ideas, and/or responses to possible implementation in schools. In the field of implementation, the teacher is fully responsible for the implementation of the curriculum. In the process of mentoring or monitoring and evaluation, the implementation/implementation of the curriculum will be assessed how far the level of achievement.

In conclusion, it can be explained that a teacher must have a responsibility to develop the curriculum, in addition to its main task as a curriculum coach. This means that teachers are required to always seek new ideas for the perfection of educational practices and learning practices in particular. This should be done so that learners' learning outcomes can be improved from time to time. To that end, a teacher should consider that the curriculum as a learning program should be given to learners not as a dead item so that what is contained in the curriculum can be described by the teacher into an interesting material to be presented to the learners during the learning process takes place. In the early stages of curriculum implementation with integrated Thematic Learning approach still seen some obstacles both from school, teachers and from students themselves.

For the school level, m compassionate found limited understanding of elementary school teachers about the meaning, purpose, and objectives of the curriculum. Data/information on variable variables that affect the readiness of SD in the early stages of Curriculum Implementation will be very useful as an evaluation and reflection for future improvement. Implementation is defined as the implementation or implementation of a policy/program that has been established/decided by a body or institution. The policy/program that has been established will be a program implemented or consisting or various activities.

For example put forward the notion of implementation as an activity that mutually adjusts, so that a program can be implemented according to the intended purpose [8]. In practice in the field, the implementation process of a policy/program is not only about the behavior of the administrative body responsible for implementing the program, but the success rate also concerns other power forces around, such as political, economic and social power as stakeholders. implementation is the process of practicing/applying a new idea, program or collection of activities for people who are trying or are expected to change. The process of implementing a program requires changes to change. In curriculum implementation, this change in practice requires changes to the teachers, students, and support systems [9]. In other words, the influence of these factors is at a level that should not be ignored at all. In the case of

curriculum implementation, curriculum studies show vulnerability, and it is likely that the curriculum changes or even completely different from what has been planned and decided earlier. Therefore, social, cultural, economic, and political aspirations must be considered and considered in the curriculum socialization and curriculum implementation. the implementation of the curriculum is the effort of implementation or application of curriculum that has been designed/designed, so it is required all-hearted papaya and a strong desire in the implementation [10].

Another meaning of the successful implementation of the curriculum as a program, promoted to the position of diversity as the independent variable was located at the level of the school and the community in which a curriculum was developed and is expected to be a modifier formidable in accordance with the needs of people who can be expected (perceived needs of a society). The real effect is on the teacher who is responsible for the implementation and further development of the curriculum and the students undergoing the curriculum [11]. Based on the above description, it is concluded that the implementation of the curriculum is the operationalization of the concept of written curriculum to be actual in the form of learning activities, which is the result of teacher translation to the curriculum described in syllabus and RPP. The success of this implementation is influenced by teacher readiness, school conditions and the availability of infrastructure, principal management, school environment, school committee, community, and education funding. That is, the success rate of curriculum implementation is determined by the readiness of other supporting elements to perform their respective roles [2]. Curriculum development into the curriculum has been done Depdikbud through several stages [12].

The first stage, the drafting of the curriculum in Kemdikbud and Kemenag -Directorate of Islamic Religious Education by involving a number of experts from various disciplines and education practitioners. The second stage is the presentation of Curriculum design in front of the Vice President as the Chair of the Education Committee and in front of Commission X of the House of Representatives. The third stage, the implementation of public testing to get responses from various elements of society. The fourth stage, the completion of the draft for the next set into the Curriculum. After the draft of the curriculum is considered to be perfect, in the next stage trials are prepared for various schools to implement in 2013 in some schools that are considered ready to use the Curriculum. The next stage is the government's determination to implement the curriculum in the learning process throughout the school by teachers starting the academic year 2014/2015 (July 2013). Implementation The curriculum that embraces an integrated thematic approach is considered a more appropriate strategy for elementary school teaching. The implementation of curriculum policy in integrated thematic learning is based on the consideration that the process and learning outcomes

will be better than the results and processes of the curriculum applied before [3].

The policy of implementing the curriculum has been implemented in all elementary schools in West Sumatera starting from 2014 because it is judged by the policy makers in accordance with the level of personality development of elementary students so that the quality of learning will be better. However, there are some things that need to be considered for the implementation can run well according to the plan. No doubt that the curriculum is developed based on competence is needed as an instrument to lead students into a qualified human capable and proactive answering the challenges of an ever-changing age. The curriculum should be used to produce educated human beings who are faithful and devoted to God Almighty, possessing noble character, healthy, knowledgeable, capable, creative, independent; and democratic and responsible citizens. To support the readiness of the Elementary School to implement the curriculum, teacher readiness is needed in the form of the desire and understanding of all teachers and education personnel in SD about the rationale of curriculum development, elements of change element, implementation strategy and various other matters concerning the content and substance of the curriculum. Although the government has prepared everything for the curriculum to go according to plan, still found some obstacles, including confusion of educational units and teachers. the obstacles are (1), the teacher is not ready and difficult to change his mindset. Teacher preparation is done one of them through training that has been programmed by government hierarchy starting from the selection of national instructors, core teachers, class teachers, and subject teachers.

Furthermore, in the implementation, classroom teachers and subject teachers remain in supervision and assistance. However, during the preparation process, the training took place in the same direction and gave priority to giving lectures to teachers that made the training work not optimal. In this way, it will be difficult to change the mindset of teachers in a short time. More dangerous if the implementation of the curriculum is implemented when the teacher is not ready, thus adversely affecting the learning process and the future of Indonesian children. Kemdikbud (2014: 4) defines that the curriculum is a set of plans and arrangements concerning objectives, content, and lesson materials and ways used as guidelines for learning activities to achieve specific educational objectives. The curriculum is a learning experience tool gained by learners as long as it follows an educational process. Officially, the curriculum is idealized or aspired [13].

The success of a curriculum as a guide for achieving educational goals depends on the ability of a teacher. That is, the teacher is the person responsible for the effort to realize everything that has been contained in the curriculum. Although a curriculum is considered to be good, the success or failure of the curriculum ultimately lies in the personal hands of the teacher. Thus, a teacher must be mentally prepared to teach in a classroom based on a curriculum.The preparation of an educational unit, including an elementary school in implementing the Curriculum, is largely determined by the teacher's readiness to plan, implement and assess student learning outcomes. On the other hand, teacher preparedness in implementing curriculum must be facilitated by the school

In the curriculum development process, problems that often arise and must be faced by teachers are usually associated with problems related to objectives and expected results. The role of teachers in active curriculum development and development at the national level is designed and formulated by experts from various disciplines of related disciplines, while experienced teachers are usually involved to provide input in the form of suggestions, ideas and/or responses to the possibility of implementation in school. In the field, teachers are fully responsible for the implementation of the curriculum, both overall and the task of delivering subjects in accordance with the syllabus that has been designed in a curriculum.

In the process of monitoring and evaluation, the implementation of the curriculum will be assessed how far the level of achievement. Teachers are asked for suggestions and assessments of the ongoing curriculum to see the good and the weaknesses that exist. Thus, the teacher must master the curriculum objectives, the program content (subject matter) that must be given to the learners. For example in the class and semester how much a subject is given and how to give it. Usually by compiling a chart of analysis of learning tasks and lesson plans

So that policy to implementation can successfully achieve the goal, then as a spearhead in front of the class, each elementary school teachers must have inner and outer readiness to face the internal and external constraint. Several factors related to the readiness of teachers, among others, willingness to change/adjust the mindset, increase understanding and mastery of the curriculum, the ability to analyze teaching materials, and the ability to design learning model. In this study, the definition of readiness of the teacher is the ability to perform activities of teachers for preparing, implementing and evaluating the learning outcomes of students who have performed in carrying out their daily task. change of mindset is required in the implementation of the curriculum includes a paradigmatic shift teachers including a change of mindset from the perspective towards competency content, teachers' perceptions of learners, perceptions of learning and perception about the assessment of learning outcomes [14]. Education in accordance with the needs of the future will only be realized if there is a change in mindset. This change can be achieved through a shift procedure for the organization of educational activities and learning in the classroom, or environmental education unit. Kemdikbud (2013b: 6), a change of mindset by shifting it covers the learning process as follows: (a). From a teacher-centered towards student-centered. (b). From one direction towards interactive. (c) From isolation

towards networking environment. (d). From passive to the active-investigate. (e). From virtual/abstract to the real-world context. (f). Of personal study toward team-based learning. (g). From the typical behavior empowers sweeping attachment rules. (h). The single-headed sense of stimulation in all directions. (i). From a single tool to the multimedia tools. (j) From the relationship in one direction shifts toward cooperative. (k). From mass production towards customer needs. (l) From a single conscious effort toward plural. (m). From the science shifts toward multi disciplinary knowledge. (n).From centralized control toward autonomy and confidence. (o). From the factual towards critical thinking. (p). From the transmission of knowledge to the exchange of knowledge [15].

A change of mindset in learning should also occur at some point of view of teachers, such as that Teacher and Text Books are not the only source of learning, furthermore, can learn from the surrounding environment. Teachers also need to encourage students to seek out and not given out, make the students like to ask, not the teacher often asked. Furthermore, teachers need to emphasize the importance of collaboration between teachers and students as a friend. The main process then results can be achieved. Another perspective not taught verbally, but through example and role model.

Factors mindset of teachers is one of the aspects that contribute to the readiness of teachers to implement the curriculum, and this factor is associated with a few changes such as a strong desire and acceptance or openness to accept the change, strategy implementation, management, and leadership learning.

Conclusion and Limitation

Research shows that the factor of change in the mindset of teachers, an understanding of the concept of curriculum, teaching materials analysis, and instructional design model can be used to become an elementary school teacher readiness indicator variables.

Research results are expected to contribute include:

Theoretically, the research will contribute to the curriculum development system and model and enrich the concept and theories about the readiness of elementary school teachers in implementing curriculum using an integrated thematic learning approach

The results can be used to confirm the suitability of the model and to measure the strength of the relationship between the variable of the indicator variable and the readiness of the SD teacher in the implementation of the curriculum. For the initial stage of the proposed model consisting of 4 (four) factors.

The results of the research will contribute as a reference to overcome or reduce barriers encountered in the implementation process, and as input to develop program improvement in the application of the curriculum.

For Preparatory Teacher Institution Institution research result can be used for input in designing curriculum of Basic Education Study Program, in order

to prepare a prospective elementary teacher who will educate the young generation through in-service training

Practically research is useful for teachers, managers or educational observers in disseminating, designing, and applying the curriculum through thematic learning approaches and better authentic assessment.The current portrait can be used for evaluation material, then to take future improvement policy

There is a research limitation, comparing the simple correlation coefficient with partial correlation coefficients showed that there is a strong relationship among four of the factors, which statistically should have a weak relationship. The strong association among these factors indicate a multicolleniarility among factors to explain the readiness of teachers.

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5. AUTHOR`BIO

Dra. Zuryanty M.Pd, Born in Padang Panjang, June 11th, 1963, Earned his Bachelor in Biology Departement (1986), School of Science, IKIP Padang, Undergraduate degree in Basic Education (2015), Universitas Negeri Padang, Lecturer in Basic Education Departement, School of Education, Universitas Negeri Padang.

Dra. Hamimah, Born in Betung Tebal, November 28th, 1962, Earned his Bachelor in History Departement School of Social Science, IKIP Padang, his Under graduate Degree in Basic Education (2015), Universitas Negeri Padang, Lecturer in Basic Education Departement, School of Education, Universitas Negeri Padang.

Dra. Mulyani Zein, M.Si, Born in Bukittinggi, July 2th, 1953, earned his Bachelor in Physics Department, School of Science, IKIP Padang, his Undergraduate Degree in Environtmental Science (2009), Universitas Negeri Padang, Lecturer in Basic Education Department, School of Education, Universitas Negeri Padang.