



## FOREWORDS

This proceeding aims to disseminate valuable ideas and issues based on research or literature review in the field of vocational, technical and engineering studies, which have been presented in 4<sup>th</sup> International Conference on Technical and Vocation Education and Training. This conference has taken place in Hospitality Center Universitas Negeri Padang, November 9-11, 2017.

The theme of Conference focused on the perspective of technical and vocational education and training for sustainable society to face the challenges of 21<sup>st</sup> century, globalization era, and particularly Asian Economic Community. To overcome the challenges, we need the innovation and change in human resources development. Technical vocational educational and training have essential roles to change the world of education and work in order to establish sustainable society.

Undoubtedly, TVET need to enhance the quality of learning by developing various model of active learning, including learning in the workplace and entrepreneurship. Create innovation and applied engineering as well as information technology. Improvement of management and leadership in TVET Institution, and development of vocational and technical teacher education.

Many ideas and research findings have been shared and discussed in the seminar, more than 176 papers have been collected and selected through scholars, scientists, technologist, and engineers'. as well as teachers, professors, and post graduates students who participated in the conference.

Eight keynote speakers have taken a part in the conference, namely Prof. Intan Ahmad, Ph.D. (Director general of learning and student affairs, Kemenristek Dikti) and Prof. Josaphat Tetuko Sri Sumantyo, Ph.D. (CEReS Chiba University) and Prof. Dr. Maizam Alias (UTHM Malaysia) and Prof. Ganefri, Ph.D. (Rector of UNP) and Prof. Dr. Ramlee bin Mustapha (UPSI Malaysia) and Prof. Nizwardi Jalinus, Ed.D. (Chair of TVET doctoral program, FT UNP) and Prof. Michael Koh, Ph.D. Dr. Fahmi Rizal, M.Pd., MT (Dean of FT UNP). They all have a great contribution for the success of the conference.

Finally, thank a million for all participants of the conference who supported the success of 4<sup>th</sup> International conference on TVET 2017 and most importantly, our gratitude to all scholars who support and tolerated our mistake during the conference.

Padang, 9 November 2017

**Prof. Dr. Nizwardi Jalinus, M.Ed**  
Chair of Scientific Committee

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# THE INFLUENCE OF PROJECT BASED LEARNING TOWARD ELECTRICAL MACHINE AND ENERGY CONVERSION STUDENT ACHIEVEMENT OF VOCATIONAL HIGH SCHOOL 1 PADANG

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**ABSTRACT:** This research started by less active students in following the learning process. Quasi experiments using the design of randomized two groups design, posttest only. The population in this research is 64 students. Class X TP-C for experimental class of 32 students is influenced by project based learning and class X TP-A for control class of 32 students influenced by conventional method. This result of this study showed that the model learning of project based learning can be influenced towards outcomes learning on Electrical Machine and Energy Conversion subject with the average value of experimental class is 82 higher than the average control class is 73. Based on the research can be concluded that the learning using the project based learning can improve student outcomes in the learning process compared with learning conventional method.

*Keywords: Project Based Learning, Learning Outcomes, Electrical Machine and Energy Conversion*

## 1. INTRODUCTION

Education is a container for developing human resources in order to have the ability to think creatively and actively. An active learning process will trigger the creativity of students in developing the cognitive domain. In the process of active learning that students could conclude, understand and apply the theory of material provided to the daily lives of teachers, so needed a learning model is right on target for students to develop the ability of their psychomotor. The learning process is an activity that occurs in the classroom or outside the class that involves the existence of interactions between teachers and students. According to Baharuddin and Esa (2015:20), the learning process is a series of activities that occur on the individual nerve centre study. While according to Syaiful Sagala (2013:61) learning is the process of two way communication, teaching is done by the teachers as educators, where as the study carried out by students. The development of the process of receipt of information from teachers to students do in some level of education, one of which is the vocational and technical education. According to Nizwardi jalinus (2014:50) education of vocational and technology education is to prepare the young generation to be competent to work in industry. A productive graduates resulting from the process of teaching and learning that is active and effective as well as proven by the result of study. The result of the learning students also become a parameter of the successfully of the goals of the curriculum in the schools. Some delivery information knowledge to students there is subject in Electrical Machinery and Energy Conversion. Less active students in following learning process also led to the low value of the students on the subject learning. According to asra and Sumiati (2012:91) activity in the learni g

activities that are reflected in the good being done by teachers or students with the following characteristics :

a. The existence of student involvement in drawing up or make planning, learning and evaluation.

b. The existence of intellectual-emotional involvement of students who either through experience, analyze, do and the formation of attitude.

c. The existence of a creative student participation in creating a situation that is suitable to the learning process.

d. The teacher as a facilitator (giver of ease) and coordinator of the learning activities of students, not the teachers (instructor) who dominated the action in the classroom.

e. Usually use a variety of methods, tools, and media are varied.

Based on observations of survey conducted by researcher at the Mechanical engineering Department of Vocational High School 1 Padang, the learning process to be monotonous and less active participation. This because teacher are not varied learning method and making less active students in the learning process that making students couldn't worked together with other students in terms of solving problem or creating the project together. Therefore, the project based learning can be used in the learning process of subject on Electrical Machinery and Energy Conversion. Made Wena (2014:144) extended the project based learning is a learning model that provides opportunities to teacher for manage their learning self in the classroom with engaging working project. On the other hand, according to Sani (2014:172) defined the learning model of project based learning as a study with long-term activity that involves students in designing, creating and displaying

products to entering the real world.

Based on explanation above background, then can be identified several problems that cause low level student learning outcomes are : 1) the learning method for learning process to take place have not varied; 2) the content of subject are boring cause students less attention and then making them enjoying dreamy than studying; 3) the learning process teacher centered; 4) Low grades the subject of Electrical machinery and Energy Conversion are less value; 5) students couldn't usually working on team.

This research is limited in scope on the problem that will be solved are learning project based learning towards a learning outcomes Electrical machinery and Energy Conversion subject for X grade in Mechanical engineering department students Vocational High School 1 Padang.

The formulation of this research is has been described to reveal the influence of model learning of project based learning with conventional method toward learning outcomes of students Vocational High School 1 Padang

The research objective such as : 1) Making students more active in learning Electrical Machinery and Energy Conversion subject; 2) Became a source for teachers to increasing student learning outcomes; 3) as consideration for implementing project based learning model; 4) given other researcher more information about project based learning model to continues this research in the future.

## 2. METHODS

### 2.1 Model of Research

This type research in this study using a experiment research. The design of the research using a quasi experimental design. According Nana Sudjana (1989:43) is a research quasi experimental design is the design of appropriate control experiments with existing conditions or controlling variable can not be done on a tight or full.

### 2.2 Population and Sample

The population of this research is a whole X grade Mechanical Engineering Department Vocational High School 1 Padang amount 96 students in 2016/2017 active teaching recorded. The techniques sampling in this study, taken at random way for determine which experiment class and control class.

### 2.3 Data Collection and Instrument usable

The type of data contained in this research is quantitative data. The source of the data collected in this research based on primary data. According Sugiyono (2014:193) the primary based oin directly

provides data to the data gatherer. Instrument in this research using objective test sheets. According Suharsimi (2010:193) test is a spate a question or exercises as well as other tools that are used to measure intelligence skills, knowledge, ability or talent that are owned by individual or groups. Test in this research has given in the end studying namely posttest.

Hypothesis testing with analysis data by 1) test of normality using Kolmogorov-Smirnov helped by SPSS 16. 2) analysis homogeneity of variance. Homogeneity tests is performed using a test of homogeneity of variances with the formula (Sugiyono, 2008:275); 3) hypothesis test used by t-test two variables are not related (Independent Sample T Test). According Riduwan and Sunarto (2012:126) the purpose test two free variables of is compare are both the same or different variables. According Dwi Priyatno (2008:92) two test samples do not touch used to find out whether there is a difference on average between two groups of samples that are not related.

## 3. RESULT AND DISCUSSION

This research was conducted at Vocational High School 1 Padang in Mechanical Engineering Department X grade year 2016/2017 on Electrical Machinery and Energy Conversion Subject. This research using random sampling technique as well as Class X TP-C as experiment class many as 18 students and class X TP-A as control class as many 18 student.

Based on the result of research we can finding that experiment class used model learning of project based learning have obtained higher score than control class used conventional method learning. Clearly, Score average two class in the below is the result of the analysis of the test data.

Tabel 1. Score of test experiment class

No	Subjek	Skor
1	Abdi Setia Putra	84
2	Akbar Putra	78
3	Andika Ahdan	88
4	David Shaputra	72
5	Febri Valentino	84
6	Ivan Arief Pramudya	78
7	Iwanda Bustami	84
8	Jerry Nofendri	84
9	Khairani Putri	96
10	Maizikri Hafni	84
11	Muhammad Fajrin	80
12	Muhammad Fauzi	78
13	Muhammad Soni Norzaman	78



14	Muhammad Yudha Pratama	86
15	Prisladhani	88
16	Rahul Putra P.	78
17	Robi Pratama Putra	72
18	Roby Apriyunus	84
Total		1472

In the below the diagram value of test experiment class

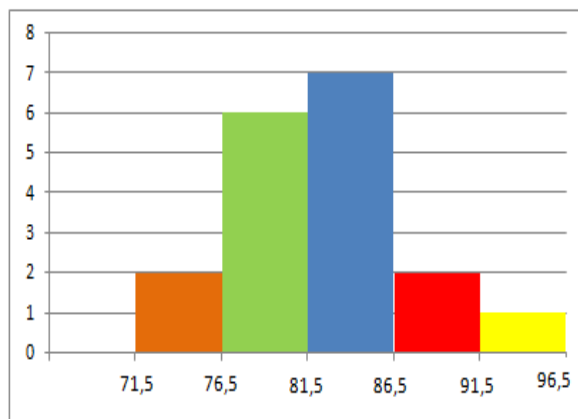


Figure 1. Diagram Value of Test Experiment Class

Table 2. Score of Test Control Class

No.	Subjek	Skor
1	Aldi Fajri	72
2	Aldo Arsenal	68
3	Alfandi Firmansyah	74
4	Chairul Idris	84
5	Doni Saputra	60
6	Faisal Zikri	78
7	Muhammad Rivandhio Anafi	74
8	Muhammad Rehan	60
9	Nugrah Ramill	76
10	Pedro Vernanda	78
11	Rahmad Agus Mulia	80
12	Ronaldi	72
13	Ryan	66
14	Taufik Hidayat	74
15	Yandra	78
16	Septian Arnoldi	78
17	Muhammad Ikhsan	74
18	Vicki Rama Rian	66
Total		1324

In the below the diagram test value of control class

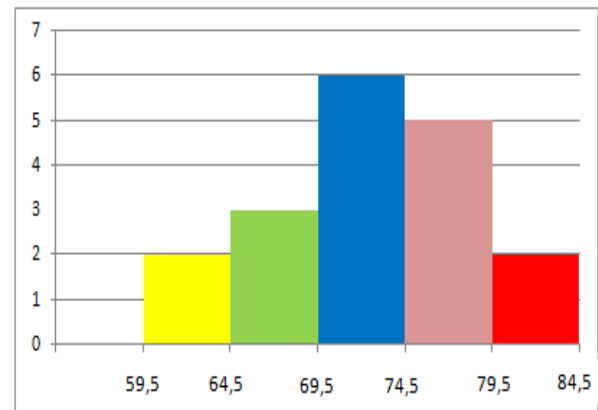


Figure 2. Diagram Value of test Control Class

Based on the data processing of the result in this research on Electrical Machinery and Energy Conversions subject obtained the score class experiment higher than control class. The analysis data of the test in the below.

#### 1. Test of Normality

Based on calculation using SPSS Program obtained the value of Kolmogorov-Smirnov that the value of the experiment class is 0.799 point and control class is 0.754 point. If Significant  $\geq 0.05$  means data has been distribution normality. Based on the above data that obtained experiment class :  $0.799 \geq 0.05$  and control class :  $0.754 \geq 0.05$ . It can be concluded two both value variables has been distribution normality.

#### 2. Homogeneity Test

Based on the analysis have been obtained that variance of experiment class is 45.59 and variance of control class is 54.76. The analysis by variances test can be obtained  $F(\text{count}) = 1.201$  with dk (numerator)  $n-1 = k-1$  and denominator  $n = n-k$  obtained F value table = 4.49. Furthermore,  $F(\text{count}) < F(\text{table})$  that means the variances of data has homogeneity.

#### 3. Hypothesis Test

Based on the result of the analysis of t-test can obtained of  $t(\text{count}) = 3.611$  while significant score for  $t(\text{table})$  on 0.05 with  $df = 18-18+2 = 34$  is  $t(\text{table}) = 2.03224$ . It can be concluded that learning outcome from experiment class used project based learning is better than control class used conventional method. Thus the research hypothesis ( $H_0$ ) is rejected and the hypothesis ( $H_a$ ) is received sounds "There difference learning outcome in Electrical Machinery and Energy Conversion X grade students in Mechanical Engineering Department used by model learning of project based learning and conventional method".

This research activity was started from January 2017. Determine for the content of subject by matter chosen appropriate basic competencies included in the syllabus of subject. Students made a simple electric circuit such as parallel and series circuit.



Learning outcome is getting in classroom of experiment class as X TP-C. Data analysis on a experiment class obtained based on the test at the end treatment namely posttest. Basen on analysis data of the posttest it can be seen that there is an increase in learning outcome and activty in the classroom after applied project based learning in X grade students in Mechanical Engineering Department. It is relevant with theory according by Ridwan (2014:172) Model learning of project based learning can be defined as learning with a long-term activity that involves students in designing, making, and showing the product. this is relevant too with the result of research by Febri Prasetya (2014) has conducted of research the influence of project based learning and motivation toward learning outcome in CNC programming subject students in Mechanical Engineering Department of Engineering Faculty State University of Padang. Research showed that the average score students using learning model of project based learning is higher with the average score of 73.1 than the average score using conventional method with the average score of 63.5.

#### 4. CONCLUSION AND RECOMMENDATION

Based on the result of the research as well as discussion in Electrical Machinery and Energy Conversion subject can be concluded that there is a difference in average score learning outcome X grade students in Mechanical Engineering Department Vocational High School 1 Padang between experiment class used project based learning is getting average score of 82 and control class used conventional method is getting average score of 73. That means there is increasing of learning outcome using model learning of project based learning is better than using conventional learning method.

On the other hand, for the other researcher whose want to research in same topic must to given attention that project based learning needed the time given to do research is long-term activity studying so research can provided that content of subject.

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