

# PROCEEDING

THE 8<sup>th</sup> INTERNATIONAL CONVENTION OF INDONESIAN ASSOCIATION  
OF TECHNOLOGICAL AND VOCATIONAL EDUCATION (APTEKINDO)  
AND 19TH INDOONESIAN CONGRESS OF FT/FPTK-JPTK

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Regional Association for  
Vocational Teacher Education  
in East and Southeast Asia

# **EDUCATIONAL TECHNOLOGY AND VOCATIONAL IN ASEAN ECONOMIC COMMUNITY, INTERNATIONAL CONFERENCE PROCEEDINGS**

**3-6 August 2016**

**Auditorium State University of Medan, Medan, North Sumatera, Indonesia**

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**FACULTY OF ENGINEERING  
STATE UNIVERSITY OF MEDAN  
NORTH SUMATERA, INDONESIA**

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INTERNATIONAL CONFERENCE PROCEEDINGS**

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## Preface

We feel thankful to Allah for the blessing so that the book of proceeding of National Seminar completely compiled in relating to the 8th National Convention of Indonesian Association of Technological and Vocational Education (APTEKINDO) and 19th Indonesian Congress of FT/FPTK-JPTK 3 - 6 August 2016 in State University of Medan.

The main objectives of the seminar is to improve the capability in vocational technology in theme: **The role of educational technology and vocational in Asean Economic Community (AEC)** which is adopted from the researches in order to upgrade the graduates to be International standard so that the output of LPTK-PTK be able to compete in AEC. Therefore, the National seminar, convention and workshop of Indonesian LPTK-PTK may emerge the thoughts how to strength the role of LPTK to improve the quality of the vocational teachers in Indonesia.

Hopefully this proceeding book will be useful to develop technology, art, and culture. This book also can be as a reference to intensify the National development.

The committee would express our gratitude to all participants and stakeholders in supporting the National seminar, convention and workshop of Indonesian LPTK-PTK

Medan, 6 August 2016  
Chairman,

Prof. Dr. Abdul Hamid K, M.Pd.  
NIP. 195802221981031001

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The opportunity and challenge of vocational education in facing Asean Economic Community (AEC)

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*Ira Meirina Chair, State University of Padang*
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- EI-04-003 EVALUATION OF PROGRAM WORK PRACTICE IN INDUSTRY (PRAKERIN) IN THE ERA OF CENTRALIZED VOCATIONAL EDUCATION IN THE WEST SUMATRA USING CIPPO MODEL  
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*Agus Hery Supadmi Irianti, State University of Malang*
- EI-04-007 THE DEVELOPMENT OF ENTERPRENEURSHIP CHARACTERISTIC BY INTEGRATING GOOD CHARACTER BASED PROJECT "THE SIX" IN BUSINESS MANAGEMENT (Study of strong-willed to success; action and result oriented; and consistent)  
*Any Sutiadiningsih, A. Sonhadji K.H, Eddy Sutadji, & Luthfiah Nurlaela, State University of Surabaya, State University of Malang*
- EI-04-008 SYNERGY OF SKILLED LABOR PREPARATION: A CASE STUDY IN BUILDING ENGINEERING PROGRAM VOCATIONAL HIGH SCHOOL  
*Isnandar, State University of Malang*
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- EI-04-010 DEVELOPING INTERNSHIP PROGRAM  
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*Windra Aini, Djoko Kustono, Ahmad Dardiri, Waras Kamdi, State University of Malang*

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- EI-05-005 AUTOMATED-KNOWLEDGE MANAGEMENT SYSTEM MODEL IN VOCATIONAL EDUCATION FOR ENHANCING LEARNING CAPACITY  
*Yeni Anistiyasari & Rina Harimurti, State University of Surabaya*



- EI-05-006 EVALUATION OF PRACTICE LEARNING COMPUTER SKILL COURSE DRAWING PROGRAM MODE CLOTHING EDUCATIONAL SYSTEM STATE UNIVERSITY MEDAN (UNIMED)  
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- EI-05-007 LEARNING SYSTEM IMPROVEMENT ON HYDRAULICS COURSES OF CIVIL ENGINEERING STUDENTS  
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- EI-05-008 INVESTIGATING EMOTIONAL HONESTY THAT EFFECT LEADER BEHAVIOR: A CASE STUDY ON VOCATIONAL HIGH SCHOOL HEADMASTER  
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- EI-05-010 INTEGRATING THE QUALITATIVE AND THE QUANTITATIVE SWOT FOR DEVELOPING THE EFFECTIVE STRATEGIS WITHIN THE TECHNOLOGICAL AND VOCATIONAL EDUCATION  
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- EI-05-011 THE OVERBURDEN BLAST PLANNING STUDY OF BANKO BARAT PIT I MINE PT BUKIT ASAM (PERSERO) TBK, TANJUNG ENIM, SOUTH SUMATERA  
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- EI-05-012 THE EFFECT OF ADDITIONAL ORGANIC MATERIAL AT TEMPERATURE ON ENVIRONMENT ROAD  
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- EI-05-013 AN EXPERIMENTAL REVIEW OF THE SQUARE THE FIN TUBE IN THE UPPER TANK OF RADIATOR AND THE ADDITION OF BIODIESEL INTO THE DIESEL TOWARD THE OPACITY OF DIESEL ENGINE  
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*Murad MS, State University of Padang*
- EI-05-021 AN ASSESSMENT OF ELECTRICITY CONSTRUCTION SERVICE INDUSTRIAL NEEDS-BASED ELECTRICAL INSTALLER  
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- EI-05-023 SAFETY EVALUATION OF CONSTRUCTION WORK ON BLASTING (CASE STUDY :KELOK 9 BRIDGE PROJECT, WEST SUMATRA)  
*Henny Yustisia, State University of Padang*
- EI-05-024 THE EFFECT OF ONLINE TRAVEL AGENCY CUSTOMER PERCEIVED VALUE TO SATISFACTION AND LOYALTY (A Case study at VALADOO.COM)  
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- EI-05-025 PERFORMANCE MULTI BLADE WINDMILL PLANITER TRANSMISSION SYSTEM USING DIFFERENTIAL FOR ELECTRICAL ENERGY CONVERSION  
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- EI-05-026 SAFETY SYSTEM DESIGN AS A SAFETY TRANSFORMER DIFFERENTIAL RELAY LABORATORY SYSTEM POWER ELECTRICAL ENGINEERING DEPARTMENT UNIVERSITY OF BUNG HATTA  
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- EI-05-027 STRUT-AND-TIE METHOD – ANALYSIS AND ITS APPLICATION IN DESIGNING OF REINFORCED CONCRETE STRUCTURE  
*Nevy Sandra, State University of Padang*
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*Ratna Suhartini, State University of Surabaya*



- EI-05-029 GROUNDING RESISTANCE REDUCTION OF PARALLEL ROD ELECTRODE AT UIN SUSKA RIAU  
*Liliana, Cahyono. K., State University of Padang*
- EI-05-030 THE EVALUATION OF LEARNING DEVICE IN THE EFFORT OF IMPROVING LEARNING QUALITY OF MATHEMATICS IN UNDERGRADUATE EDUCATION OF BUILDING ENGINEERING DEPARTMENT OF CIVIL ENGINEERING FACULTY OF ENGINEERING STATE UNIVERSITY OF SURABAYA  
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- EI-05-031 THE VOCATIONALISATION OF EDUCATION: SKILLS PROGRAM REVITALIZATION IN PRIMARY AND SECONDARY EDUCATION FOR BUILDING OF EARNING GENERATION  
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- EI-05-032 EFFECT OF FLUIDIZATION RATIO ON THE PERFORMANCE OF AN INTERNALLY CIRCULATING AERATED FLUIDIZED BED GASIFIER WITH CONCENTRIC CYLINDERS  
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*Sepannur Bandri, Padang Institute Of Technology*
- EI-05-034 EXPERT SYSTEM FOR DETECTING BREATHING DISORDERS IN HUMANS  
*Elvira Asril<sup>1</sup>, Fajrizal, & Pauzun, Lancang Kuning University*
- EI-05-035 MODEL IMPROVING THE QUALITY OF VOCATIONAL SECONDARY EDUCATION THROUGH THE UTILIZATION OF ACADEMIC INFORMATION SYSTEM BASED ON INFORMATION TECHNOLOGY IN REMOTE AREA  
*Louisa Kandoli, Djoko Kustono, Eddy Sutadji, & Rina Rifqie Mariana, State University of Manado*
- EI-05-036 MEDIA DEVELOPMENT BASED LEARNING INTERACTIVE MULTIMEDIA SKILLS SUBJECT CRAFTS  
*Dina Ampera & Efnarayi Artania Siagian, State University of Medan*
- EI-05-037 AUTOMATED-KNOWLEDGE MANAGEMENT SYSTEM MODEL IN VOCATIONAL EDUCATION FOR ENHANCING LEARNING CAPACITY  
*Yeni Anistyasari & Rina Harimurti, State University of Surabaya*

**EI-02-046**

**DEVELOPMENT OF LEARNING MEDIA USING INTERACTIVE  
MULTIMEDIA SUBJECT ASSEMBLY ON COMPUTER  
IN SMKN-8 PADANG**

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**ABSTRACT :** *The aim of research to develop an Interactive Multimedia good for the subjects of computer assembly and Networking Computer Engineering Department at SMK N 8 Padang. This study research and development by the method of Instructional Development Institute (IDI). This study begins by defining the problems that occur in the learning process, and continued to develop a multi-media interactive learning is able to overcome the problems. Furthermore, the resulting media testing the validity, practicalities, and effectiveness. Research result ; (1) Providing an Interactive Multimedia on the subjects of computer assembly majoring in computer engineering and networks, (2) Multimedia Interactive declared invalid on the content aspect with good criteria (72.8%), and the aspect of the design is very good (74.9%), (3) Test practicalities of interactive Multimedia based on the response of Master stated practical with a value of 89.38%, while on the practicalities of interactive Multimedia based student response is otherwise very practical with a value of 90.28%, and (4) Effectiveness of instructional media interactive multimedia in terms of the percentage complete learn student of 32 students, there are 28 students with grades above KKM and 4 students with grades below KKM with a percentage of 87.5%.*

**Keywords:** Interactive Multimedia, Validity, practicalities, Effectiveness

## **I. INTRODUCTION**

Sekolah Menengah Kejuruan (SMK) or Vocational High School is a technology and vocational education at the level of upper secondary education (SLTA), with the aim of producing graduates who are skilled and competent in the field of technology and vocational skills in accordance with the chosen spectrum. Vocational graduates are expected to become the supplier of labor-power professionals that are needed in support of national development, and able to compete professionally in the era of the Asean Economic Community (AEC), which has been in effect since the early 2016's.

One characteristic of vocational education, students are not only provided the science and knowledge is sufficient, but must be equipped with the skills to apply that knowledge in human life. Therefore science and the ability to implement equal importance in vocational education. That requires a variety of techniques and methods of effective learning in every learning process. Each method of learning requires a good learning media and effective for the learning process can run smoothly and effectively in achieving the learning objectives.

One of the subjects taught in vocational especially in the department of Computer Engineering Network (TKJ) is the assembly of the computer. Computer assembly is one of the subjects of the group C2 (Productive). Based on observations made on the subjects of computer assembly TKJ Department at SMK Negeri 8 Padang, there are still many learning outcomes of students who are under the minimum completeness criteria (KKM). The percentage of student learning outcomes in subjects Computer Assembling class X TKJ-1 only 44.8% of the 29 students who passed the boundary

KKM, while in class X TKJ 2 only 37% of the 27 students who passed the boundary KKM. This shows that student learning outcomes are low because there are many students who do not reach the limit KKM.

In addition, interviews were conducted on students and teachers in mind there are a number of factors that make the learning outcomes of students does not meet the standards KKM, including: (a) Less interactive learning media exist, (b) the difficulty of explaining material particular subject in the abstract without support effective media, and (c) the relatively low motivation of students to learn. Because the learning process requires knowledge of computer assembly supporting the much more abstract in its mechanisms and procedures, so it is often ditemui difficulty in explaining to the students effectively, so it would need to develop a medium that can help students better understand existing learning materials. Actually, there are a number of media slide show has been used by teachers in the learning process, but the media used it still has the disadvantage that only contains learning materials without any video / audio support and training / quiz therein so that the lack of interaction of students in learning. While learning media is one tool to facilitate the process of transfer of knowledge from the teacher to the student, in the learning process there are some important things that should always be considered by the teacher that is, teachers should not be focused on the media and teachers should develop instructional media that make students feel interested and motivated to learn

Based on the background of the problem, the problem is formulated as follows:

- a. What kind of interactive multimedia line with the subject computer assembly?
- b. How is testing the validity, practicalities, and the effectiveness of interactive multimedia that has produced them?

The purpose of this study are:

- a. Developing interactive multimedia on the subjects of computer assembly.
- b. Measure the validity, practicalities, and the effectiveness of interactive multimedia that has developed it.

## **II. LITERATURE STUDY**

Media is anything that can be used to deliver a message from the sender to the receiver so that it can stimulate the mind, feelings, concerns, and interests as well as the student's attention such that the learning process occurs (Sadiman, 2012:7)<sup>8)</sup>. Fleming (1987: 234)<sup>2)</sup> states the media serves to set an effective relationship between the two parties, namely students and content. Furthermore Latuheru (1988:14)<sup>5)</sup> states that the media is learning materials, tools, or techniques used in teaching and learning activities with the intent to educate the communication process of interaction between teachers and students can take place in appropriate and useful. Based on those opinions, it can be the sense that the learning media is all materials, tools, methods or techniques used to convey information





from the source (the teacher) to recipients of information (students) during the learning process so as to achieve the learning process better and effective.

While multimedia is taken from the word multi and media. Multi means many and media means media or intermediary. Multimedia is a combination of several elements of text, graphics, sound, video and animation that produces an interesting presentation. Vaughan (2006:2)<sup>12)</sup> states that "Multimedia is a combination of text, art, sound, animation and video delivered to users with computers or electronic equipment and other digital manipulation". This is in line with the opinion of Hofstetter (2001:2)<sup>4)</sup> which states that "Multimedia is the use of computers to display the information they combine text, graphics, audio and video so that users can navigate, interact, create, and communicate with the computer".

From the opinion of some experts can be concluded multimedia is the use of computers to create and combine text, graphics, audio, video and animation, where the result of the merger of these elements will display information that is more interactive.

The development of learning tools is a set of processes or activities undertaken to produce a learning device based on the theory of development that has been there. There are several models of development that are often used, among other things: (a) model of software development according to Kemp, (b) development model of learning by Dick & Carey, (c) Development Model 4-D, and (d) Model IDI.

IDI Model (Instructional Development Institute) developed by the University Consortium for Instructional Development and Technology (UCIDT). IDI Model has been validated by a consortium of four universities: Michigan State University, Syracuse University, the United States International University, and the University of Southern California. At IDI models prinsi principles apply a systems approach that involves three stages, namely invention (define), development (develop), and evaluation (Evaluate).

Of the four models of the development of learning tools described above, each of which has advantages and disadvantages, researchers are using IDI development model because this model according to the problem of the background for this study. Model IDI has steps are clear, simple and sequentially in conducting a research and development has been validated by a consortium of four universities.

### **III. DEVELOPMENT METHOD**

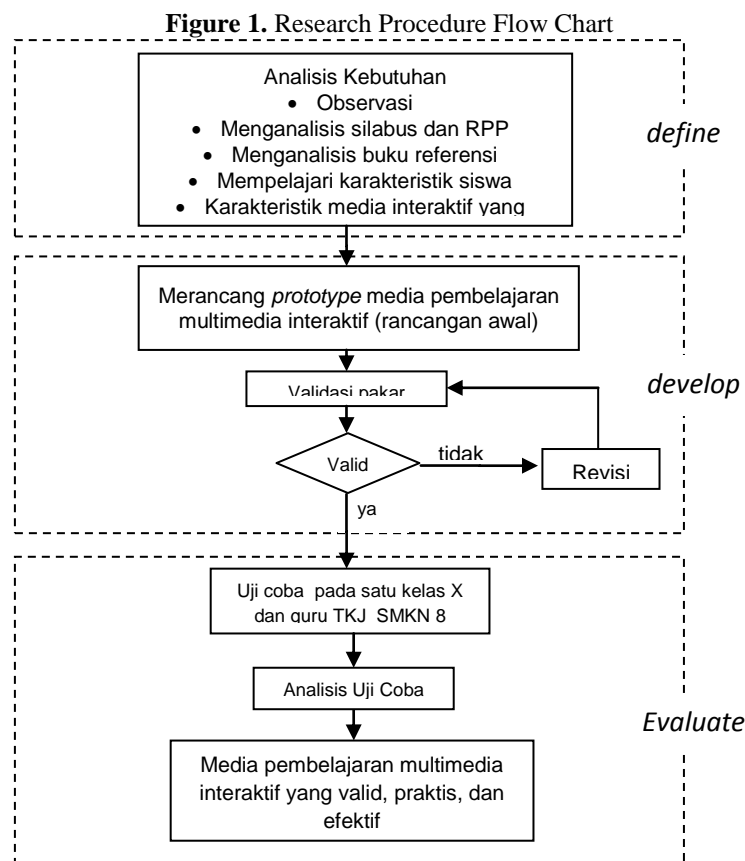
This research included in research and development (research and development). According Sukmadinata (2005: 164)<sup>10)</sup>, and Sugiyono (2012)<sup>9)</sup> research and development is a process or steps to develop a new product or improve existing products, which can be accounted for. The development model used is a model of Instructional Development Institute (IDI). According to Gustafson and Branch (1997: 58)<sup>3)</sup>, IDI apply prinsi guiding systems approach that involves three



stages, namely invention (define), which contains step-by-step analysis of the background and problem identification, development (develop) which contains the preparation of the initial form (prototype ) products and validation of the product, while the step third stage is the stage of evaluation / assessment (evaluate) which contains the steps of testing and analysis of test results coba.dengan research procedures as described in the chart below (Figure-1).

The data used in the development of this media is the primary data, meaning that the data obtained directly from the research subjects from experts / media experts, expert learning content, from students and teachers who are implementing learning with interactive multimedia. Data retrieved through the deployment of instrument and through statistical formulas. The instruments developed in this study through a validation process instrument and practicality test process through a team of experts.

Data analysis techniques used in this research is descriptive data analysis technique by describing the validity, practicality and effectiveness of using interactive multimedia. Data obtained from the questionnaire validity test material validation and media obtained from the experts / specialists.



**Figure 3.1. Research Procedure Flow Chart**

The data is then analyzed using Cohen's kappa coefficient with SPSS to determine the level of agreement of the experts / specialists in assessing the validity of. The test data obtained from the

practicalities of teachers, while the media keterpakaian level of students. Analysis by the practicalities of teachers and students using the following formula:

$$\text{Nilai Praktikalitas} = \frac{\sum \text{Skor masing - masing item}}{\sum \text{Skor maksimum item}} \times 100\%$$

As for determining the level of practicality guided by the following table (Table-1).

**Table 1.** Category practicalities of Interactive Multimedia

No	Tingkat Kepraktisan (%)	Kategori
1	$\geq 80$	Praktis
2	$\leq 79$	Tidak Praktis

*Sumber : Modifikasi dari Purwanto (2009: 82)<sup>7)</sup>*

Analysis of efficacy seen from the results of learning by measuring the level of mastery learning students obtained from the multiple-choice test. If the individual student learning outcomes is greater than or equal to the minimum completeness criteria (KKM), the students declared complete. Learning is said to be effective when the number of students who achieve mastery greater than or equal to 85% in the classical style.

#### **IV. RESULTS AND DISCUSSION**

Steps being taken in the development of interactive multimedia learning media, according to the model used IDI.

##### **A. Development Results**

###### **a. The discovery phase**

The discovery phase (define) is performed to get a picture of the conditions in the field. This stage is to analyze the needs (needs analysis) required for the process of making media interactive multimedia learning.

###### **b. Stage of Development**

The results of the discovery phase (define) is used for the next stage of the development stage (develop). At this stage the following steps:

- 1) Designing a prototype (preliminary draft)
- 2) The design of the display

After the process of making media interactive multimedia learning is completed, the next media interactive multimedia learning is validated by experts who will assess the validity of instructional media are subject matter experts and media experts. Each expert validation completed questionnaires that had been developed based on the aspects that have been determined. In the questionnaire provided the stuffing part to give suggestions for improvement of this interactive multimedia learning media. Therefore, from the questionnaire will be obtained by reference to the revision and improvement of



interactive multimedia learning media. Some of the visual results of the development are shown in the following (Figure 2).

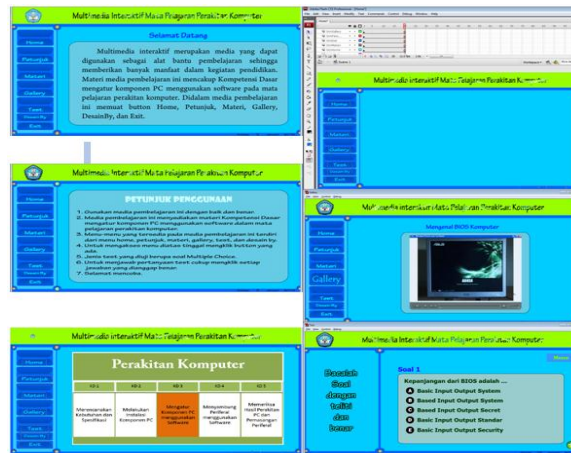


Figure 2 : Several Main Display Design Interactive Multimedia

## 1. Evaluation Results

### a. Validity test

Results of the assessment of each aspect of the indicator is given validator summed and calculated according to the percentage of votes aspect that has been made. Results validari validator concluded that both agreed on 11 aspects of the indicators provided, eight aspects of interactive multimedia content validation indicator located on the criteria of good and very good with a percentage of 72.8%, so the validation of interactive multimedia contents can be declared invalid.

While the design validation validator concluded that both agreed on 12 aspects of the indicators provided, 9 aspects of interactive multimedia design validation indicator located on the criteria of good and very good with percentages of 74.9%, thus validating the design of interactive multimedia can be declared invalid.

### b. Test practicalities

Test practicalities of interactive multimedia on the subjects of computer assembly taken from a questionnaire had been distributed and the teachers and students.

#### 1) Test the practicalities based on the response the practitioner / teacher

Practicalities related to the ease of use of interactive multimedia developed. The practicalities of data obtained through questionnaires filled out by two teachers TKJ SMK Negeri 8 Padang, from stuffing the questionnaire can be viewed practicality media. The results of an assessment of the practicality of multimedia in the aspect Ease of use on average 90% (practical), a 77.5% effectiveness (not practical), and the interpretation of the media 95% (practical), with an average of 86.33 (Practical).

#### 2) Test the practicalities based on responses Students

Student test results obtained on the practicalities of the ease of use of the media 90.83% (practical), the look and appeal of the media 88.33% (practical), and the efficiency of 91.67% with a mean time-rata 90,28% (Practical).

c. Test Effectiveness

In this study, the effectiveness of the test is done by looking at the percentage of students in the classical learning completeness, value posttest followed by 32 students, there are 28 students with grades above KKM and 4 students with grades below the KKM. Thus the percentage of students who reached the KKM is 87.5%. According to the theory, "A class is said to be complete learning (classical completeness) if in the class are  $\geq 85\%$  of students who have completed their study" (Trianto, 2010). So it can be concluded that the use of interactive multimedia learning media on the subjects of effective computer assembly.

## **B. DISCUSSION**

The results of the research and development of multimedia interactive learning media use which do have in common the results of relevant research conducted by Delianti (2013)<sup>1)</sup> about the development of instructional media Interactive Multimedia CD on the subjects of the first semester of ICT class X SMAN 2 Bukittinggi. Validity test results, the practicalities and effectiveness of Interactive Multimedia CD was declared valid, practical, and effective to be used as a medium of ICT. Similarly Maulana (2015)<sup>6)</sup> conducted a study on the development of instructional media CD Interactive on training eye Basic Networking computer and network engineering. Results obtained from this research and development as follows: (a) The validity of Interactive CD expressed very valid on the content aspect, and interest, whereas the aspect of media and languages declared invalid (b) the practicalities of Interactive CD based on the response of teachers after going through the validation otherwise practical, while on the practicalities of Interactive CD based on the responses of students after going through the validation is otherwise very practical (c) Effectiveness of Interactive CD affective from their improving student learning outcomes characterized by an increasing number of students who passed the KKM as many as 28 students.

The results of this study and the results of relevant research states that the interactive multimedia learning media can be used in various fields of science, by adjusting the teaching materials that will be developed with interactive multimedia designed. So it can be concluded that the Interactive Multimedia is one of the media that a valid, practical, and effective for use in the process of studying the subject of computer assembly department of Computer and Network Engineering class X semester of I.



## V. CONCLUSION AND SUGGESTIONS

### A. Conclusions

Based on the results of research and discussion it can be concluded as follows


- a. Interactive multimedia instructional media for subjects Assembling Computer has is developed using a model of Instructional Development Institute (IDI).
- b. Interactive Multimedia has been developed to support the subjects Computer Assembling turned out to meet the requirements of test validity, practicalities and effectiveness that deserve to be a good medium of learning.

### B. Suggestion

Based on the development constraints obtained during field trials, can be suggested some of the following:

- a. Suggested the teachers who teach the assembly of the computer to use this interactive multimedia learning media, in order to help improve student learning outcomes and support from the school to facilitate the use of multimedia tools are required of teachers
- b. For students who use this interactive multimedia learning media in order to further explore the potential of self so as to develop the understanding, skills-expertise, and creativity

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