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THE DEVELOPMENT OF LEARNING MEDIA IN DIGITAL TECHNIQUE SUBJECT BASED ON COMPUTER

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Abstract
This paper provides the information about how to develop the learning media in Digital Technique subject based on multimedia computer at Educational Electrical Engineering Department, Yogyakarta State University. There are four stages that should be completed to develop learning media based on computer, usually it is called software engineering, that it can described as follows: 1) user needs analysis, 2) designing of learning media, 3) implementation or coding, 4) testing and knowing the feasibility of learning media. According to software testing by using Black Box testing method, all of the function in the learning media was able to run well in accordance with program specifications on user need analysis. The feasibility of learning media was measured by 3 groups, the first is students that achieve 3.23 score in 4 scale rank, the second group is media experts that assess the learning media on 2.64 score in 3 scale rank, and the last group is material experts that provide the score 2.73 in 3 scale rank. According to the assessment from students, media experts and material experts, the learning media that was developed is feasible to use in Digital Technique subject.

Keywords: *Learning Media based on Computer, Digital Technique subject.*

Introduction

Educational Electrical Engineering Department (EEED) as one of architect in birthing vocational school teacher must prepare the students and its alumni to be capable at teaching in the international vocational school (IVS) through innovative learning process. One of the efforts is improving the learning quality. The quality of learning is much affected by the quality of the teachers, facilities, infrastructures, learning strategy and learning media.

Relating with preparation for the teacher candidates in the IVS, the lecturers need to equip the students with the very clear image of how to conduct the creative and innovative learning process. One of the forms of innovation in learning process is developing the learning model and learning media. Learning media take the crucial role in succeeding the learning process. Various articles suggest that the well developed learning media could enhance the student's interest in learning, improve the result of learning evaluation and ultimately inspire the students which benefit them in the future when being a teacher.

Digital Technique subject has been one of basis subject in EEED since a long time ago. This is an practical subject and provided to students in the even semester (semester 2). It weighs 2 credit points (*SKS*). This subject for the most students is classified to difficult enough subject because it is not preceded by theoretical subject in the before semester. According to the observation so far, the learning process of the subject is preceded by introductory speech from the lecturer for 45 minutes. Then, it continues to practical session followed by the students which is guided by the lecturer. The learning process is conducted by means of computer and LCD projector. It is also supported with the teaching materials arranged in the pointer format. Although this learning media is helpful enough for the students in acquiring the adequate understanding but it is actually less efficient. It is because the lecturer necessitates to explain in quite detail the practice procedure, how the practice run and another material related things to the students.

Problems revealed above requires problem solving efforts which is not easy to carry on. Through this preceding paper, the writer hypothesize that computer based learning media is expected to be motives for the students to learn independently so that they will be more well-prepared to follow the practical class. This paper is also expected to be able to contribute in

improving learning achievement in the Digital Technique subject. Computer based interactive learning model is targeted to facilitate the independency of learning for the student so that consequently make the learning process more interesting and more concrete by visualizing the abstract material in form of animated media. The learning model therefore can bring the learning material go hand in hand with the continuity of the development of science and technology so that it could be always up-to-dated with the real world. That transformation of learning material ultimately makes the students more motivated to learn and construct their knowledge. The implementation of learning process using this media is hoped to give the students an impact of being more prepared to be teacher in the IVS.

Materials

Learning Media

The word media comes from the Latin "medius" which literally means the intermediary or the introduction. Media serves as any kind of tool that people use to convey messages or information. Gagne cited in Sadiman Arif (2002) states that the media are different types of components in the environment that can stimulate students to learn. Meanwhile, Briggs cited in Sadiman Arif (2002) argues that the media is all the physical tools to deliver compelling messages and stimulate students to learn such as books, films and tapes.

To obtain optimal results in teaching and learning in the classroom, it is necessary to consider two main components, namely the method of teaching and learning media. These two components are interrelated and inseparable. The use and selection of one particular teaching method has consequences on the use of appropriate types of learning media. Function of media in teaching and learning is to enhance the stimulation of students in learning activities. Ali, M (2005) in the dissemination of his study result stated that the use of computer-assisted learning media has a significant influence on the attraction of students to learn the competencies being taught. Thus, the interaction between the learners with the media is a concrete manifestation of the act of learning. Meanwhile, the form of teaching and learning is one component in the delivery of the strategy, whether learners are regrouped into a large group, small, private or independent.

The Adoption of Learning Media

Changes on knowledge, skills, attitudes and behavior can occur due to interactions between the new experiences with the experiences never experienced before. According to Bruner cited in Arsyad (2005), there are three main levels of learning mode, which is a direct experience (enactive), pictorial experience / drawing (iconic), and the experience of the abstract (symbolic). One illustration of the most widely referenced as the basis for the theory of media use in teaching and learning are Dale's Cone of Experience (Dale Cone of Experience cited in Nugroho, 2007). Influence of media in learning can be seen from the level of learning experience that will be received by the students. Dale draw a cone shape (Figure 1), the learning results obtained from the direct experiences by a person (concrete), the fact that there are in the neighborhood of one's life and then through mock objects, until the verbal symbols (abstract). The upper the learning results of someone be located at the top of the cone, the more abstract message delivery media. It should be noted that these sequences do not mean the learning process should be started from direct experience, but it should be begun with the kind of experience that best suits to your needs and abilities of the students faced with taking their learning situation into account.

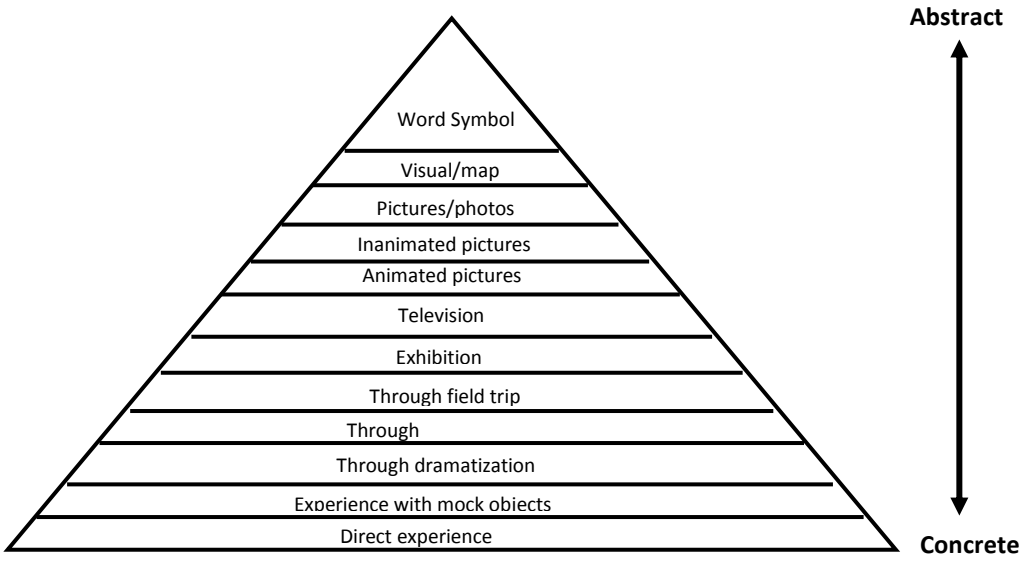

Figure 1. Experience Cone Edgar Dale

Benefit of Learning Media

The learning media targeted to clarify the presentation of messages and informations that can facilitate and enhance the learning process. Some experts such as Derek Rowntree, John M. Lannon, McKnown, and Edgar Dale expressed his opinion about the meaning, benefits and functions of media in education (Latuheru cited in Ali, 2005), as follows:

1. Learning media wakes up the motivation for learning motivation, attracting the attention of students.
2. By using the learning media, the students can repeat what they have already learned.
3. By using the learning media, it can provide a powerful and reliable data about something.
4. Learning media can stimulate students to learn with passion.
5. Learning media to enable more the responsiveness of students
6. Using the learning media can be expected with immediate effect.
7. By using a learning media, it is easy in collecting and processing data.
8. The process of learning becomes more interactive, efficient time and labor.

Result And Discussion

Methodology of Learning Media Development

Software development for Digital Technique media learning technique uses a sequence of sequential models (Pressman: 2002). The stage in the development of this software, namely:

1. **Analysis**

   This stage of analysis undertakes the analysis of user needs. The identification of user needs analysis are:

   a. The software is expected to attract users to use this program as a learning media for Digital Techniques subject.
   b. Software should be easy to use.
   c. The software should be able to provide clear information.

2. **Design**

   After data collected at this stage, the next stage is to make the design. The design can be

defined as the process of implementing various kinds of techniques and principles with the aim to define the equipment, process or system in detail so easy to use. The details of the design used is as follows:

a. context diagram

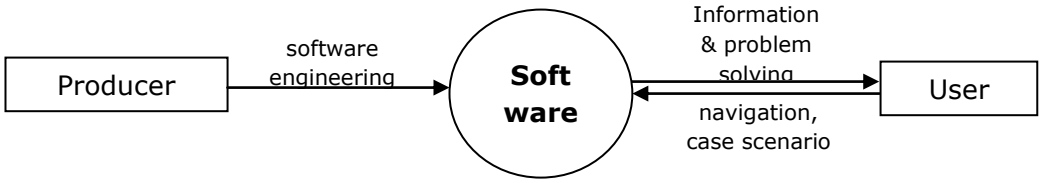

Figure 2. *Data Flow Diagram* (DFD) Level 0

Context *diagram* or called by Data Flow Diagram (DFD) Level 0 is a tool used to document the process in the system. The goal is to provide a view of the process in the system in general. There are those who provide inputs to the system and there are those who receive the output of the system.

In Figure 2 above, the maker is the person doing the engineering to software. While the user is the one who enables to navigate and require solving the problem of the desired case scenario.

b. Design menu

The menu design of this software is made with a model of hypo (Hierarchy Input-Process-Output). This menu design is created with the intent of the programmer in making its application easier. For more details about the design of this menu can be seen in Figure 3.

c. Display Design

Display design or interface is designed to enable programmers in translating into a form of programming language. The design of the display in this application uses the appropriate display design with the design of visual programming application, as shown in the image below.

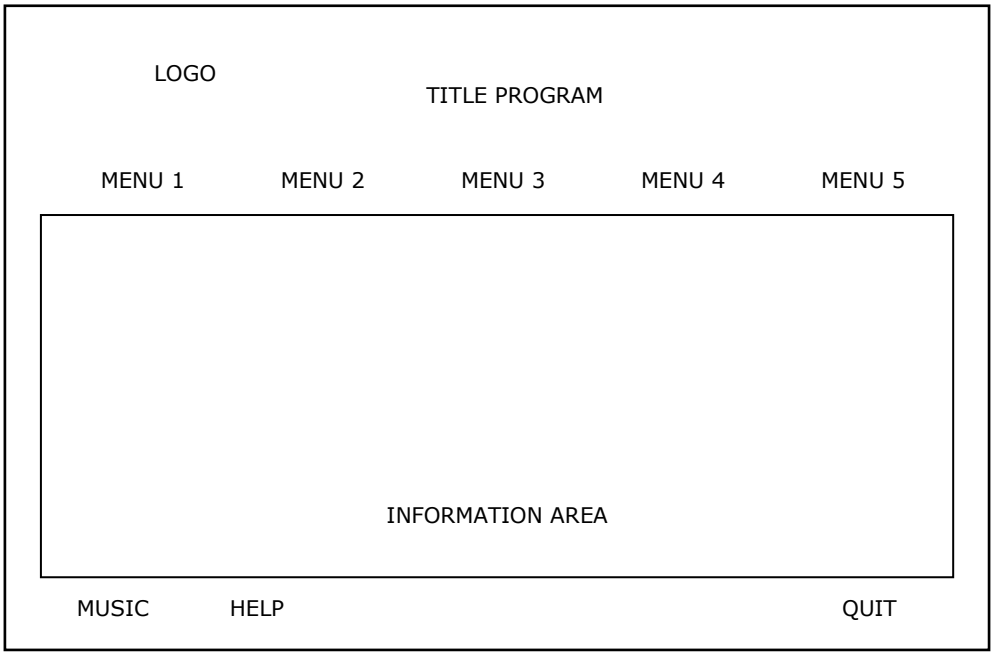

Figure 4. Display Design

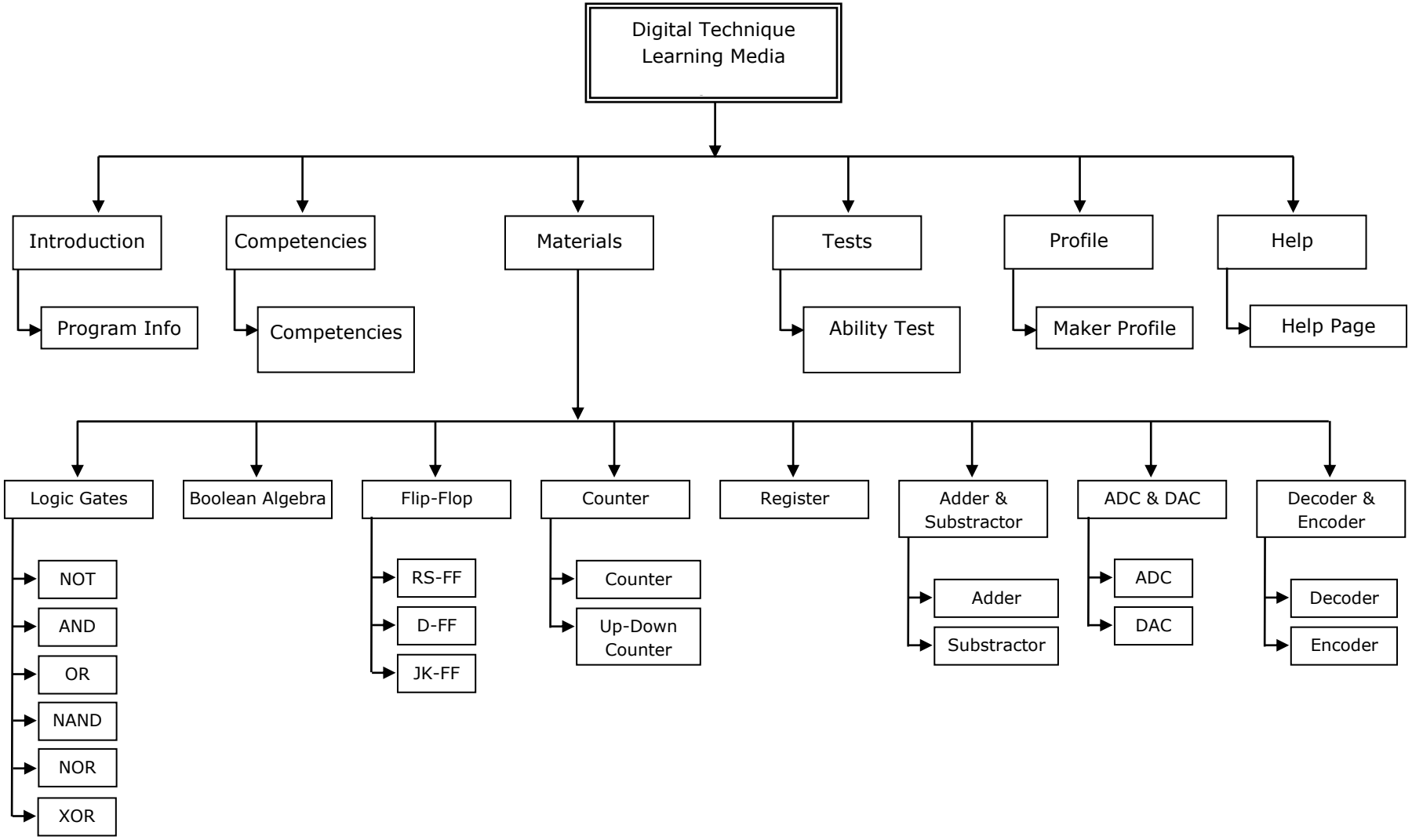

Figure 3. Menu Design

3. Implementation

This implementation phase is the result of the translation stage of the design into a form of programming language. Development of software used is Macromedia Flash. With the help of the diagram contents, menu design and display designs that have made it in the form of program-making procedures and modules easier.

As for the result of software implementation can be seen in the image below.

Figure 5. Main Display of Implementation Result.

The picture below shows the results of the application program when there is animated learning material.

Figure 6. Display when there is animation

4. Testing

Testing phase consists of two parts, the first is software testing (software) using the method of Black Box Testing, and the second is to use a measuring instrument to determine the functionality of the program eligibility level, graphics visualization, application products in terms of the student as an end-user, media experts and content experts.

a. Black Box Testing

Black Box Testing conducted by a team of software makers to determine the functions of the program can run correctly. In this test contained 30 items tested, as shown in the table below.

Table 1. Table Testing Black Box Testing

No	Test Items	Results		Decision
		Passed	Failed	
1.	Halaman Intro	√		visually proper
2.	Tombol Masuk	√		visually proper
3.	Tombol Music On/Off	√		visually proper
4.	Tombol Bantuan	√		visually proper
5.	Tombol Keluar	√		visually proper
6.	Menu Pendahuluan	√		visually proper
7.	Menu Kompetensi	√		visually proper
8.	Menu Materi	√		visually proper
9.	Menu Ujian	√		visually proper
10.	Menu Profil	√		visually proper
11.	SubMenu Gerbang Logika	√		visually proper
12.	SubMenu Flip-Flop	√		visually proper
13.	SubMenu Counter	√		visually proper
14.	SubMenu Adder & Substractor	√		visually proper
15.	SubMenu ADC & DAC	√		visually proper
16.	SubMenu Dekoder & Enkoder	√		visually proper
17.	Materi Gerbang NOT	√		visually proper
18.	Materi Gerbang AND	√		visually proper
19.	Materi Gerbang OR	√		visually proper
20.	Materi Gerbang NAND	√		visually proper
21.	Materi Gerbang NOR	√		visually proper
22.	Materi Gerbang XOR	√		visually proper
23.	Materi Counter	√		visually proper
24.	Materi Up/Down Counter	√		visually proper
25.	Materi Adder	√		visually proper
26.	Materi Substractor	√		visually proper
27.	Materi ADC	√		visually proper
28.	Materi DAC	√		visually proper
29.	Materi Dekoder	√		visually proper
30.	Materi Enkoder	√		visually proper

b. The instrument of Data Collections

The validity of the instruments carried by the student as a user program, media experts as the evaluator of the media, and content experts as evaluator suitability of material. Instruments used are listed in the appendix.

Table 2. Results of Validity Assessment by Students

No.	Indicator	Mean Score	Decision
1.	material aspect	3,29	
2.	beneficial aspect	3,35	
3.	media aspect	3,06	
4.	whole aspect	3,23	
	Conclusion of the judge		Proper with revision

Notes: 1. strongly disagree
2. disagree
3. agree
4. strongly agree

As for the table 3 shows the results of validity assessment carrying out by learning media experts.

Tabel 3. Result of Validity Assesment by Media Experts

No.	Indicator	Mean Score	Decision
1.	The clarity of the usage	3	
2.	Literacy of text or handwriting	3	
3.	The proper of selecting and color composition.	2,5	
4.	Quality of picture depicting	2,5	
5.	Animated providing	2,5	
6.	Musical support and sound effect	2,5	
7.	The clarity of the voice	2	
8.	The ease of usage	3	
9.	Efficient in the usage of the screen	3	
10.	The speed of program	2,5	
	Mean Score	2,64	Proper with revision

Notes: 1. less
2. moderate
3. good

Table 4 shows the results of validity assessment carrying out by experts in this matter that have a good grasp on the material Digital Techniques.

Table 4. Results of Validity Assessment by Content Experts.

No.	Indicator	Mean Score	Decision
1.	Relevance of the material with the competency standards	3	
2.	Clarity of instructions to learn	3	
3.	The preparation and organization of material	3	
4.	Suitability of the indicators of success with basic competence	3	
5.	Coverage of material	3	
6.	Level of difficulty	2	
7.	Content analysis	3	
8.	Provision of training	2	

9.	Giving feedback on learning motivation	2	
10.	Suitability test questions with the standard of competence and success indicators	3	
11.	Ease of the language used	3	
	Mean Score	2,73	Proper with revision

Catatan : 1. less
2. moderate
3. good

Conclusion

Software performance in this paper was measured by a test of the software by using the testing Black Box Testing. Tests conducted consisted of 30 test items in accordance with Table 1.

Tests conducted by a team of developers and software makers is to know that all the functions contained in the software was able to run in accordance with program specifications. From the 30 test items, all of test items can be done properly, correctly and in accordance with the results of visual observation or can be inferred 100% item test can be run in accordance with program specifications.

Feasibility level of instructional media in this paper was measured using measurement instruments and instrument response program functionality for product eligibility. The validity of the instruments made by students as end-user, media experts as the evaluator of learning media and materials experts as the evaluator for the subject matter of the digital technique.

The validity of the instruments made by students in accordance with Table 2, where the assessment is based on three aspects, namely the material aspects, benefits, and aspects of the media, obtained a mean score for all aspects of the value of 3.23 with the scale of 1 to 4. On aspects of the value of benefits earned the highest average score is 3.35, indicating that students benefit greatly from the use of digital media learning this technique.

For the results obtained from the assessment conducted by media experts in accordance with Table 3, showed a mean score of 2.64 for all aspects with the scale of 1 to 3. This suggests that the medium of learning is good enough to be used when viewed from the side of the media.

While the assessment made by experts associated with the material content of digital techniques, the results obtained in accordance with Table 4, showed a mean score of 2.73 for all aspects with the scale of 1 to 3. This shows that the materials, instructional media are classified in the category of either approach (maximum scale value of 2.73 3).

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