

## **THE LEARNING MEDIA BASED ON MULTIMEDIA COMPUTER FOR IMPROVING STUDENT COMPETENCE IN DIGITAL TECHNIQUE COURSE**

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### **Abstract:**

The learning media is one of the ways for the lecturer to provide information about everything that have relationship with the field of subject. By using learning media, the lecturer could get easier and more precisely to convey the knowledge. This paper presents the usability of the learning media based on multimedia computer to improve the student competence in Digital Technique course. There are four stages that should be taken based on the Classroom Action Research method to utilize the learning media in the classroom, first of all is planning for action, the second step is implementation of the action by using learning media, the next step is observation of the learning and teaching process and the final stage is reflection based on the observation data. Students competence improvements are measured by students test scores, when using the media (the average test score 85.02) compare with when not using the media (the average test score 71.97). According to the final score data, it can be clearly seen that there is score improvement of 20.9 % when the student using learning media.

*Keywords: Multimedia Learning Media, Digital Technique subject.*

### **Introduction**

Department of Electrical Engineering Education must prepare its students and graduates, as teacher candidates in vocational high schools of international, to become competent and professional teachers. One effort to achieve this is by improving the quality of learning. Quality of learning is strongly influenced by the quality of educators, facilities and infrastructure, as well as strategies and instructional media used in the learning process.

As part of the preparation of teacher candidates of vocational high school with international standards, lecturers need to give students the examples of creative and innovative learning. One innovation in learning is the development of learning media. Instructional media has a crucial role in the success of the learning process. Various researches shows that a well-developed learning media can increase student interest in learning, improve learning outcomes and can be a good example for the students as future teachers.

Digital Techniques Course is one subject that has long been taught in the Department of Electrical Engineering curriculum. This course is two credit labwork course and is given in the second semester. Digital Techniques Course is a course that have a high difficulty level as it is new to most students, they have not yet received the basic theory in previous courses. To give understanding to students, the basic theory is given prior to doing the labwork. The content of the course covering Digital Logic Gates, Boolean Algebra, Flip-Flop circuit, Counter circuit, Register circuit, Adder and Subtractor circuit, Decoder-Encoder circuit, as well as analog-to-digital conversion and vice-versa circuit. These materials have a high level of abstractness that lecturers need a way to give the theory that is easily understood by the students..

The lectures usually preceded by the explanation of theoretical concepts and labwork procedures by the lecturer for about 45 minutes. Subsequently it will be followed by a labwork done by the students, guided by the lecturer or the assistant. The delivery of the material, which is prepared in the pointer format, is done by using computers and LCD projectors. This instructional media is capable to help students to understand the material to be practiced but is less efficient because the lecturer also needs time to explain the detail lab work procedures. This time constraints

cause some students can not complete the lab work satisfactorily because they have not fully understand the labwork concepts and procedures, or able to complete the labwork but still have not understood the basic concept.

Problems that have been mentioned above require solving efforts. Through preliminary research, researchers hypothesized that a computer-based instructional media can motivate students to learn independently so that they can be better prepared to do the lab works. Computer-based interactive learning media is intended to facilitate student self-learning. Abstract theoretical concepts can be visualized in animated media and accompanied by an explanation of the related lab works as well as examples of real applications, so that students can be motivated to learn and construct knowledge by themselves. Finally, this research is expected to produce media and procedures to improve student's learning achievement at the Digital Techniques course.

### **Learning Media**

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

To obtain optimal results in the process of learning and teaching in the classroom, the two main components need to be considered, 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 process is to enhance the stimulation of students in learning activities. Ali, M (2005) in his research report 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 strategy, whether learners are grouped into a large group, small, or individual.

General characteristics of learning media, namely:

1. Learning media has a physical sense, or commonly referred to as the hardware, which is an object that can be seen, heard, or touched with five senses.
2. Learning media has a non-physical sense, known as the software content of the message contained in the hardware that is content to be conveyed to students.
3. Learning media has an emphasis on visual and audio aspects.
4. Learning media is use as a helping tool in the learning process both inside and outside the classroom.
5. Learning media are used as a means of communication and interaction of teachers and students in the learning process.
6. Learning media can be used in very large groups (eg radio, television), large groups and small groups (eg films, slides, video, OHP), or individual (eg, modules, computer, radio tape / cassette, video recorder).

### **The Using of Learning Media**

Knowledge and skills, attitudes and behavior changes can occur due to interactions between the new experience with the experience never experienced before. According to Bruner 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 of the most widely referenced illustration as the basis for the theory of media use in teaching and learning are Dale's Cone of Experience (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), a person learning result is obtained from direct experience (concrete), the facts that exist in one's life environment and then through mock objects, to the verbal symbols (abstract). Getting up to 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 begins with the kind of experience that best suits with student needs and abilities, as well as taking into account the learning situation..

The cone's development principle is not the level of difficulty, but the level of abstractness as well as the number and type of the senses, which are involved when learners receive instruction or message content. Direct experience will give the most intact and most meaningful impressions of information and ideas contained in that experience, because it involves the senses of sight, hearing, feeling, smell, and touch. Level of abstractness message will be higher when the message was conveyed in symbols such as charts, graphs, or words.

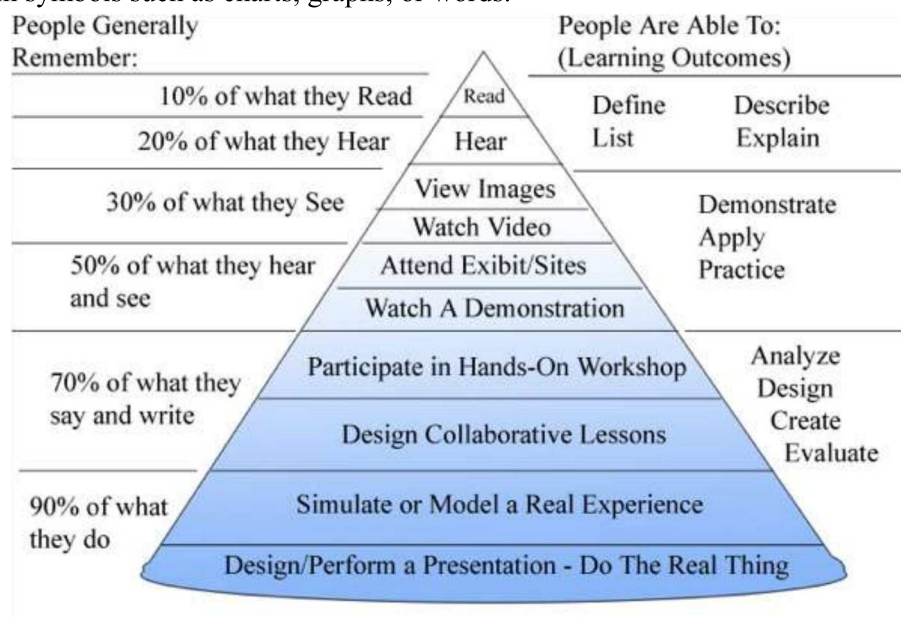


Figure 1. Dale's Cone of Experience  
 < <http://teacherworld.com/potdale.html> >

**Benefits of Learning Media**

Ali (2005) describes the role of media in the learning are as follows: 1) Media can conveys important information, 2) The media can be used to motivate learners at the start of classes; 3) The media can add to the enrichment in the learners; 4) Media may indicate relationships; 5) Media can provide experiences that can not be demonstrated by lecturer; 6) Media can help individuals learn, and 7) Media can bring the things that exist outside into the classroom. Meanwhile, according to Latuheru (1998), the role of media in the study were: 1) motivating learners to learn, 2) to repeat what has been learned by learner, 3) stimulate learners to study vigorously; 4) enable the learner to response, and 5) obtained immediately feedback from learners.

In this regard, the discussion will focus on computer-based learning media. As part of the learning system, the media has a practical value of the ability to: 1) make abstract concepts become concrete, for example, concepts that occur in the transformer flux and the human circulatory system, 2) bring an object that is difficult to obtain or harmful to the learning environment, like wild beasts; 3) displays the objects that are too large into the classroom, such as temples, markets, 4) show that objects can not be seen with the naked eye, such as micro-organisms; 5) allows learners to interact with the environment (Sadiman, 2002).

### **Learning Media Selection**

Instructional media to be used in the learning process requires good planning. Heinich, et al in Arsyad (2005) proposed a model of effective planning of the use of media known as ASSURE. This model consist of six step, namely A (stands for Analyze the learner), S (stands for State objectives), S (stands for Select or modify the media), U (stands for utilize media and material), R (stands for Require learner participation), and E (stands for Evaluate and revise).

Media selection should take into consideration that the media is part of the instructional system as a whole. Some considerations in media selection process are as follows (Suparman: 2001).

1. Low cost, both at the time of purchase and maintenance.
2. Compliance with instructional methods.
3. Compliance with the characteristics of students.
4. Practical considerations, such as:
  - a. Ease of media to be transferred or stored.
  - b. Suitability of the media with the existing facilities in the classroom.
  - c. Safety of the media utilization.
  - d. Media durability
  - e. Ease of media to be repaired if broken.
5. Media and spare parts availability in the market for both the teacher and the student.

### **Implementation Steps**

Classroom action research is a type of research that has the following characteristics.

1. Problems to be solved is the practical problem faced by researchers.
2. There is treatment carried out by researchers to improve the quality pembelajaran.
3. Stages of research is a cycle that includes the planning, implementation, observation and reflection, followed by a revision of the plan and proceed with the implementation of the next cycle.
4. The existence of reflective activities to improve program activities until the goal is reached. Methods to be used in this study using actionJ research model developed by Elliot class, which is a modified version of the model of Lewin. The selection of this model because this model is more detail and more complete, especially in the elaboration of the activities of observation / monitoring and reflection.

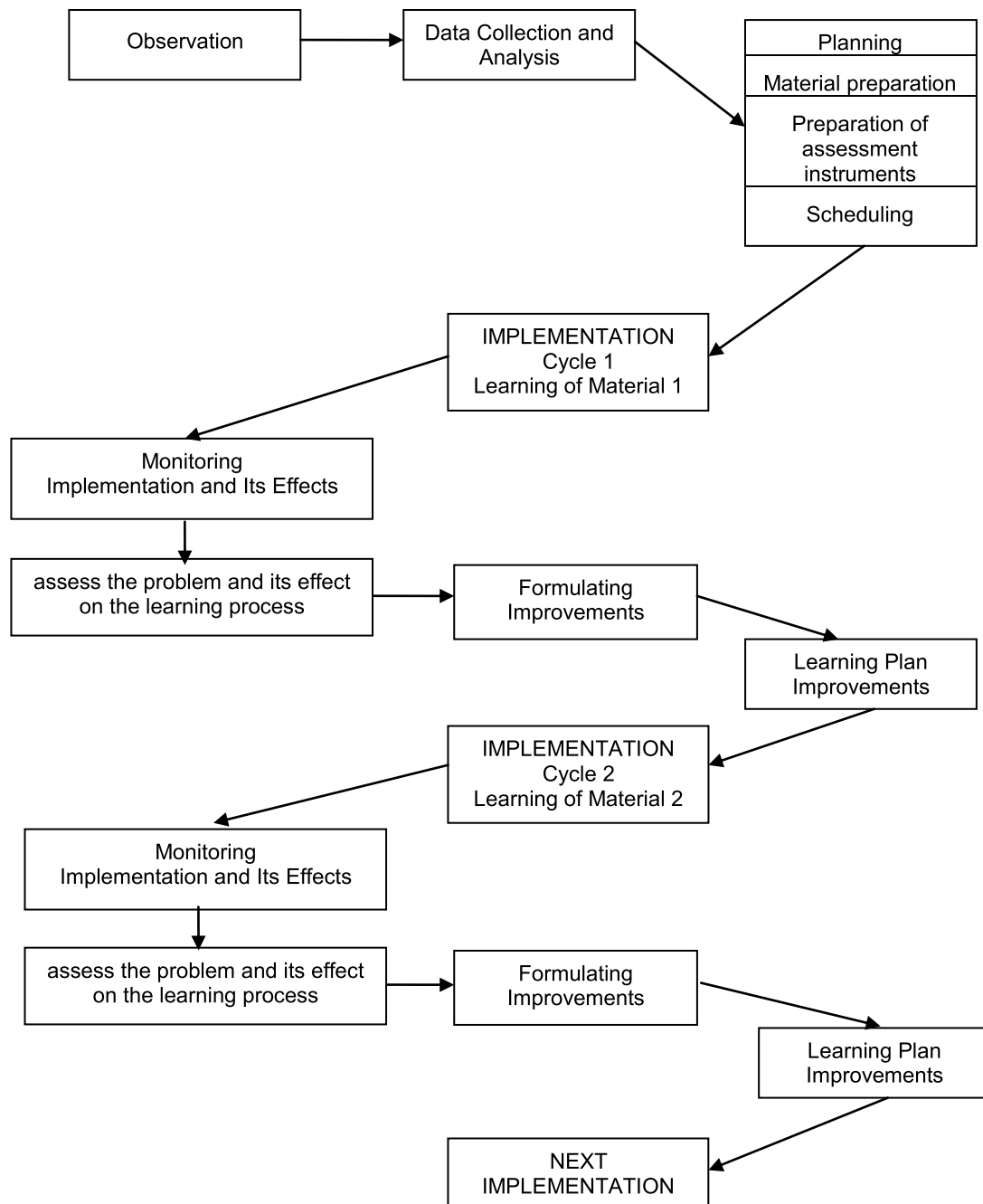


Figure 2. Development Steps of Learning Model with Computer-Based Learning Media in Digital Techniques Course

Plan of action taken in this study consists of several cycles. Each cycle consists of activities which include: planning, implementation, reflection, evaluation and corrective action. Before the first cycle is executed, pre-study activities will be conducted which include: observation, preparation of materials, development of computer-based instructional media, and preparation of assessment instruments. Procedures and steps in this study can be seen in figure 2.

At the stage of pre-research activities, one of the most important step is the preparation of media. At this stage, students are also asked to provide feedback on learning media that is being built. After pre-study activities has been completed, the first cycle began. Because the media preparation stage takes a long time, the beginning of first cycle delayed almost until mid-semester.



Figure 3. The user interface of computer-based learning media

At this cycle, students are asked to use the learning media at the school. Prior to the development of media, teachers need a lot of time to deliver the material. At this cycle, teachers just give a little bit of introduction, and then students are asked to learn on their own with the media. After that the students are asked to do the lab works and complete the related tasks. The evaluation process is done by observing student's lab works results.

In the second cycle, students are asked to use the media in the home, prior to the class. At the start of the next class, the lecturer only briefly discuss the theory, and then students were asked to do the lab works and complete the related tasks. As in the previous cycle, the evaluation is done by observing students' work in practice. In addition, assessments are also conducted by giving exams to students, in which the exam questions related to the practice that has just done.

Evaluation results showed an increase in the average of test results. Actually there are still some drawbacks, namely there were several students whose test scores declined, but the next cycle can not be implemented due to time constraints.

**Result And Discussion**

Improvement in student competency is measured by comparing test scores after using the aid of computer-assisted learning media with an initial value when the learning media have not been used. Based on the assessment exam, the student's test scores are shown in Table 1.

Table 1. Student's Test Scores

No	Name	Score Without Learning Media	Score With Learning Media	Improvement (%)
1	Student 1	60.98	80	31.19
2	Student 2	53.13	97.5	83.51
3	Student 3	69.82	64	-8.34
4	Student 4	66.13	90	36.11
5	Student 5	62.70	95	51.51
6	Student 6	71.81	95	32.29
7	Student 7	75.48	82.5	9.31
8	Student 8	76.07	80	5.16
9	Student 9	62.14	80	28.74

No	Name	Score Without Learning Media	Score With Learning Media	Improvement (%)
10	Student 10	82.50	100	21.21
11	Student 11	81.24	100	23.09
12	Student 12	73.07	72.5	-0.78
13	Student 13	82.54	95	15.10
14	Student 14	60.34	95	57.45
15	Student 15	90.69	92.5	2.00
16	Student 16	84.31	80	-5.11
17	Student 17	83.89	60	-28.48
18	Student 18	49.42	76	53.79
19	Student 19	71.01	80	12.66
20	Student 20	74.61	90	20.63
21	Student 21	72.08	87.5	21.39
22	Student 22	79.42	78	-1.79
	Average	71,97	85,02	20,94

Comparisons of test scores before and after the use of learning media are shown in Table 1. Table 1 show that the average score before using the learning media is 71.97, while the average score after using the media is 85.02. It can be seen that there are an increase in the average score of students after using the computer-based learning media of 20.94%. Nevertheless, there are some students whose score were declining, which is 5 of 22 (22.7%) students. The cause of this decline cannot be studied further, because of limited research time and the end of the course in the second semester of the school year 2010/2011.

### Conclusion

Teaching and learning process in Digital Technique course by utilizing computer-based interactive learning media had improved student competence of 20.94%. Competence of students are measured by student test scores, when using the media (the average test score 85.02) compare with when not using the media (the average test score 71.97). However, there are students who experienced a decline in test scores. It should be further investigated whether the decline is related to the use of multimedia computer-based instructional media or not.

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