



THE EFFECT OF THE APPLICATION OF LOGIC GATE LEARNING MEDIA IT-BASED TO IMPROVE MOTIVATION AND LEARNING OUTCOMES STUDENTS

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Published: 30 Apr' 2024

Abstrak

Penelitian ini bertujuan untuk mengetahui penerapan media pembelajaran gerbang logika berbasis IT untuk meningkatkan motivasi dan hasil belajar siswa. Penelitian ini berupa penelitian kuantitatif. Sampel yang digunakan satu kelas, diambil menggunakan teknik sampling jenuh dengan kelas Sebelum perlakuan (pretest) diajarkan dengan metode konvensional/ceramah dan kelas setelah perlakuan (posttest) diajarkan dengan media pembelajaran logic gate berbasis IT, yaitu Macromedia Flash. Teknik pengumpulan data menggunakan metode tes dan dokumentasi metode untuk data hasil belajar siswa. Teknik analisis data menggunakan uji-t. Kriteria tes adalah jika skor angket yang diisi lebih besar dari mean, maka siswa ini termasuk dalam kriteria motivasi dan sebaliknya, jika nilai angket yang diisi siswa lebih kecil dari mean, siswa termasuk dalam kriteria tidak termotivasi. Dari hasil analisis, terdapat 15 siswa dan 2 siswa yang tidak termotivasi. Uji hipotesis ini dilakukan dengan menggunakan uji-t terhadap nilai hasil belajar sebelum perlakuan (pretest) dan setelah perlakuan (posttest) dengan menggunakan uji-t dengan taraf signifikan 5%. Kriteria pengujian adalah sebagai berikut: H_0 Diterima / H_1 ditolak jika $t_{hitung} < t_{tabel}$ dan H_0 ditolak / H_1 diterima jika $t_{hitung} > t_{tabel}$. Dari hasil analisis uji hipotesis diperoleh $t_{hitung} = 12,33$ dan $t_{tabel} = 1,746$ Karena $t_{hitung} > t_{tabel}$. Dengan uji hipotesis diperoleh $t_{hitung} (12,33) > t_{tabel} (1,746)$ maka H_0 ditolak.

Kata kunci: efek, gerbang logika, hasil belajar

Abstract

This study aims to determine the application of learning media IT-based logic gates to improve student motivation and learning outcomes. This research is in the form of quantitative research. Sample used one class, taken using a sampling technique saturated with classes Before the treatment (pretest) taught by conventional methods / lectures and classes after treatment (posttest) is taught with IT-based logic gate learning media, namely Macromedia Flash. Data collection techniques using test methods and methods documentation for student learning outcomes data. Data analysis techniques using t-tests. The test criterion is if the questionnaire score filled is greater than the mean, then the student This is included in the criteria for motivation and vice versa, if the questionnaire value smaller than the mean, the student is included in the criteria unmotivated. From the results of the analysis, there were 15 students and 2 students who unmotivated. This hypothesis test is carried out using a t-test against the result value learn before treatment (pretest) and after treatment (posttest) with using a t-test with a significant level of 5%. The test criteria are as follows: H_0 Accepted / H_1 rejected if $t_{count} < t_{table}$ and H_0 rejected / H_1 accepted if $t_{count} > t_{table}$. From the results Analysis of the hypothesis test obtained $t_{count} = 12.33$ and $t_{table} = 1.746$ Because $t_{count} > t_{table}$. By test the hypothesis obtained $t_{count} (12.33) > t_{table} (1.746)$ then H_0 is rejected.

Keyword: effect, logic gate, learning outcomes

INTRODUCTION

Education is an inseparable thing in human life. Education is carried out so that there are changes to the development of human life processes. (Afni, et al., 2023). Along with the development of today's sophisticated era, of course, almost all fields have applied such sophisticated technology. (Yusnidah, et al., 2023). Teaching and learning activities are a condition that is deliberately created. Be the teacher who created it to teach students. Human interaction was born by utilizing material as a medium (Syaiful & Aswan, 2010). Communication in learning is often not in line so that communication exists being ineffective which will cause learners no passion to follow learning. A good collaboration is between learning media and approaches that can help achievement in learning objectives. The results of questionnaires were found problems: 1) Attention in learning: 52.94%, 2) Satisfaction in obtaining material: 52.94%, 3) confident in learning: 41.176%. Problems from observations students, it can be concluded that the motivation to learn the course logical electronics that have less impact on the low known learning outcomes of The average score of the previous test was still low, namely from 17 students, 11 of them scored 65 with a KKM of 70. One of the causes is the learning media that Applied lecturers do not attract students to learn. According to Robertus & Kosasih (2007) states that media can also be interpreted as something that can used to channel messages, stimulate thoughts, feelings, attention, and students' willingness, so that they can be encouraged to be involved in the learning process.

Popular learning media today are learning media that use computer as a media controller, one of which is Macromedia Flash media (Hamzah & Nina, 2010). Macromedia Flash is considered suitable as a learning medium that can be applied to these subjects. Macromedia Flash is one of the software programs that is able to present audio visual messages consisting of images, text, simple moving animations and effects others clearly to students with various animated images so that participants Learners are more interested in learning, better understand the material delivered by educators, and can bring new freshness to the learning experience of students. Logic gate learning media are lacking. Questions and answers that are applied now are felt to be lacking for students. Therefore, there must be other learning approaches that are considered effective enough to improve motivation and learning outcomes of students course. Siregar & Nara (2010) revealed that learning is a process that a complex that happens to everyone and lasts a lifetime, since he was a baby until the grave later. One of the signs that a person has learned is the presence of changes in behavior in him. Changes in behavior are good changes in knowledge (cognitive) and skills (psychomotor) as well as those includes values and attitudes (affective). The development of digital technology facilitates human work that brings significant changes in human life. (Hidayat, 2020)

According to Baharuddin & Wahyuni (2007) "earning is an activity carried out a person to gain change in himself through trainings or experiences". Aunurrahman (2012) also revealed that "learning can be defined as any change in behavior that is relatively fixed and occurs as a result of practice or experience". From some of the definitions above, it can be concluded that there are several learning characteristics according to Baharuddin & Wahyuni (2007), namely:

- a. Learning is characterized by changes in behavior (changer behavior)
- b. Behavior change is relatively permanent.
- c. Changes in behavior do not have to be immediately observable when the learning process is being ongoing, the change in behavior is potential.
- d. Changes in behavior are the result of training or experience.
- e. That experience or practice can provide reinforcement.

The word media comes from the Latin *Medius* which literally means middle, intermediary, or introduction. But more specifically, the understanding of media in the learning process tends to be interpreted as graphic, photographic, or electronic tools for capturing, processing and reassemble visual or verbal information. Media can also be interpreted as something that can be used to channel messages, stimulate the mind, feelings, attention, and willingness of students, so that they can be encouraged to be involved in the learning process. Media is something that can be used to channel messages and can stimulate the mind, arouse the enthusiasm, attention and willingness of students so that they can encourage the learning process in students. Syaiful & Aswan (2010) have different sense. "Media is any tool that can be used as a Transmission of messages to achieve teaching objectives". Sadiman et al (2012) said "in general, learning media have the functions as follows:

- a. Explain the presenter of the message so that it is not too verbalistic (in the form of words written or oral only)
- b. Overcoming limitations of space, time and sensory power, for example:
 - 1) Objects that are too large can be replaced with micro projectors, films, pictures, film frame, film, or model.
 - 2) Small objects assisted by micro projectors, frame films, films, or picture.
 - 3) Motion that is too slow or too fast, can be helped by timelapse or high-speed photography.
 - 4) Events or events that occurred in the past can be displayed again through film recording, video, film frame, photo or verbally.
 - 5) Objects that are too complex (e.g. machines) can be presented with model diagrams, etc.
 - 6) Overly broad concepts (volcanoes, earthquakes, climate, etc.) can be visualized in the form of films, frame films, images, etc.
- c. Appropriate and varied use of learning media can overcome attitudes passive protégé. In this case educational media is useful for:
 - 1) Generate excitement for learning
 - 2) Enable more direct interaction between students and Environment and reality
 - 3) Enable students to learn individually according to their abilities and Interest
- d. With unique traits in each student plus the environment and different experiences, while curriculum and educational materials are determined The same for every student, so teachers have a lot of difficulties when everything is It must be overcome by yourself. This will be more difficult if the background of the teacher's environment with students is also different. This problem can be overcome with learning media, namely with his ability to:
 - 1) Provide the same stimulants
 - 2) Equalize experiences
 - 3) Cause the same perception

The gate of Logic according to Ibrahim (1996) is a state device, that is, it has output two states: output with zero volts stating logic 0 (or low) and output with a fixed voltage expressing logic 1 (or high). Logic Gate can have multiple inputs that each have one of two conditions logic , which is 0 or 1. Logic Gates can be used to perform functions specifically, such as AND, OR, NAND, NOR, NOT, or XOR. Hamzah & Nina (2010) argue that Information technology is a technology which is used to process data. That processing includes processing, getting, compile, store, manipulate data in a variety of ways to produce quality information that is relevant, accurate and timely information. Information these are later used for personal, business, and

government purposes and is strategic information for making decisions. According to Fauzi (2008), IT is a technology that utilizes computers as the main device for converting data into information as the main device for processing data into useful information. Wikipedia (2023) describe information technology is the field of technology management and covers a wide range of areas that include but is not limited to things like processes, computer software, systems information, computer hardware, program languages, and construction data. Munir (2008) also states 6 parts of Information Technology, namely:

- a. **Input Technology**
Input Technology is any device used to capture data / information from the source of origin, for example barcode scanners and keyboards.
- b. **Output Technology**
In order for information to be received by users who need information, it is necessary presented in various forms. It is generally presented in a monitor but there are Sometimes in print (hard copy) or in sound form.
- c. **Software Technology**
To create information requires software or often called program. A program is a set of instructions used to control computer hardware. A word processor is an example of a program which is widely used by computer users to create documents.
- d. **Storage Technology**
Storage technology concerns any equipment used for Store data such as hard drives, floppy disks, zip disks.
- e. **Communication Technology**
Communication technology is a technology that allows long distance relationships. The Internet and ATMs are examples of technologies that utilize technology Telecommunications.
- f. **Processing Mechine or CPU**
Processing machines are the most important part of information technology that function to remember data / information (in the form of memory components) and execute programs (in the form of CPU components) [11].

According to Madcoms (2007) the definition of macromedia flash professional is an animation program that has many used by animators to produce professional animation. Between animation programs, the Macromedia Flash Professional is a program that flexible in the creation of animations, such as interactive animations, games, companies profiles, presentations, movies, and other animated displays. According to Rahman et al, (2008) mentioned that Macromedia flash is software that widely used by web professionals because of its amazing ability in displays multimedia, combining elements of text, graphics, animation, sound, and interactivity for users of Internet animation programs. Use of learning media computer-based with proper utilization of Macromedia flash application software aims to improve the ability and learning outcomes of students cognitively, affective and psychomotor. Improve cognitive abilities and learning outcomes of learners because laptops / computers / notebooks can teach the concepts of rules, principles, steps, complex processes and calculations. According to Madcoms (2007) advantages of Macromedia flash over other programs Similar ones, among others:

- a. Can create interactive buttons with a movie or other objects,
- b. Can make changes in color transparency in movies,
- c. Make animation changes from one shape to another,

- d. Can create animation movements by following a predefined flow.
- e. Can be converted and published into several types, including are .swf, .html, .gif, .jpg, .png, .exe, .mov.
- f. Can process and create animations from Bitmap objects,
- g. Flash vector-based animation programs have flexibility in the creation of objects. Vector

Fathurrohman & Sutikno (2007) describe motivation is a psychological condition that encourages someone to do something. In learning activities, motivation can be It is said to be the overall driving force within the student that gives rise to, ensure continuity and provide direction of learning activities, so that expected goals the existing can be achieved. As for according to Sardiman (2012) "Motivation can also be It is said to be a series of attempts to provide certain conditions, so that a person willing and willing to do something, and if he doesn't like it, then he will try to negate or avoid that dislike". According to Hamalik (2015) mentioned that "motivation is a change in energy in one's (personal) self characterized by the onset of feelings and reactions to achieve purpose".

Muslich (2011) states that "learning outcomes are abilities that the learner has after he or she receives the learning experience". Meanwhile, Sudijono (2009) said evaluation of learning outcomes is carried out well if in Its implementation always adheres to three basic principles, namely "(1) the overall principle, (2) the principle of continuity, and (3) the principle of objectivity". According to Purwanto (2014) learning outcomes can be explained by understanding two words that form it, that is, "results" and "learning". The definition of results (product) shows in an acquisition due to the performance of an activity or process that results in functional change of input. Production results are gains obtained because there are activities to convert materials (raw materials) into finished goods (finished goods).

METHOD

The research method used in this study is an experimental research method. The experimental research method was carried out on grade XI students of Budi Setia Vocational School majoring computer network engineering which is taken one class. The learning methods are experimental method using one group pretest-posttest design, because only conduct research with one class. A measured or observed group is not only after treatment. Research is arranged according to the variables involved. The variables are Involved in this research is a reflection of the data that will be obtained after treatment. Sugiyono (2016) explained that the research variables are basically everything in any form that is determined by the researcher to be studied so that Information was obtained about it, then conclusions were drawn. Then it can it is formulated that the research variable is an attribute or trait or value of people, objects or activities that have certain variations that the researcher sets out to study and conclusions were drawn. In this study there are two variables used, so that can be analyzed and conclusions made.

RESULTS AND DISCUSSION

The pretest conducted in this study is to provide test questions before carrying out the learning process using logic gate learning media IT-based. Data was obtained from a sample of 17 students. Based on the data obtained it is known that the minimum value is 40 and the maximum value = 65. In addition, it is obtained mean value = 53.529, median = 55, mode = 50 and 60. Furthermore, from the test scores of learning outcomes achieved by students (pretest scores). Classified frequency distributions can be arranged as shown in Table 1.

Table 1. Tabulation of Learning Outcome Test Score Data before treatment (Pretest)

No	Class Interval	Number of Respondents (f)
1	40-45	4
2	46-51	4
3	52-57	2
4	58-63	4
5	64-70	3
	Jumlah	17

Based on the data in Table 1, learning outcomes before treatment is carried out in the form of learning using learning media IT-based logic gates, can be described as follows:

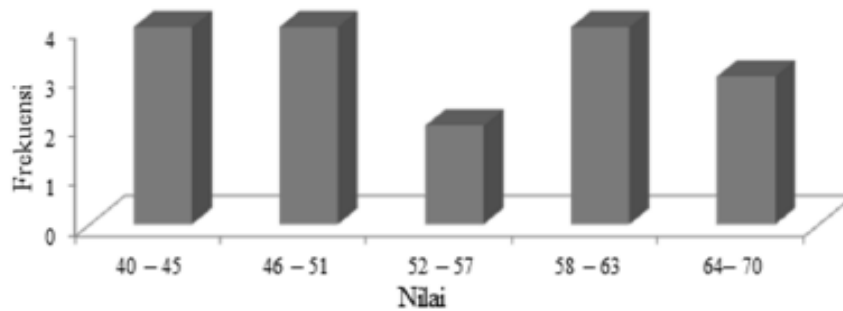


Figure 1. Pre-treatment Learning Outcomes Test Score Histogram (Posttest)

After the implementation of learning using learning media IT-based logic gate, conducted test (posttest) to obtain learning outcome data student. Test score data (posttest) was obtained from a sample of 17 students. Based on the data obtained, it is known that the minimum value is 70 and the value maximum = 95. While the mean value = 82.647, the median = 80, and the mode = 80. Next, from the test scores of learning outcomes (posttest scores) can be arranged in a classifying frequency distribution such as shown in table.2.

Table 2. Tabulation of Learning Outcome Test Score Data after treatment (Posttest)

No	Class Interval	Number of Respondents (f)
1	70-75	4
2	76-81	5
3	82-87	3
4	88-93	5
5	94-99	1
	Jumlah	17

Based on the data in Table 2, learning outcomes after treatment in the form of learning using IT-based logic gate learning media, can be described as follows:

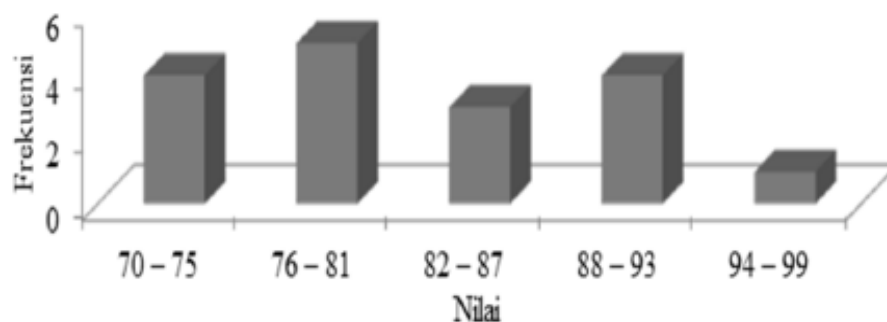


Figure 2. Post-treatment Learning Outcomes Test Score Histogram (Posttest)

Based on the data collection that has been done, data from student tests are obtained pretest and posttest showed that the average learning outcomes of students in the posttest after treatment were more higher than before treatment using logic gate-based learning media IT (pretest) on histogram. Based on this, it shows that the use of IT-based logic gate learning media can improve learning outcomes grade XI students of Budi Setia Vocational School majoring computer network engineering.

The normality test is carried out on the test scores (pretest) of the learning results of logic electronics on logic gate material, which is before students get learning using IT-based logic gate learning media and test scores (posttest), ie after students get learning using logic gate learning media IT-based. The normality test is used to determine the data obtained from the sample that taken from a population is normally distributed or not. In this study researchers using Liliefors for its normality test, with a significant level $\alpha = 0.05$. Area the criticism of this test is $DK = \{L_{1L} > L_{0.05;16}\}$. From the results of the normality test analysis with the test criteria are H_0 accepted/ H_1 rejected if $L_{obs} < L_{table}$ and H_0 rejected/ H_1 accepted if $L_{obs} > L_{table}$. From the analysis of the normality test before treatment (pretest) can be known the value $L_{obs} 0.126 < L_{table} 0.206$ then H_0 is accepted. While after treatment (posttest) is known L_{obs} value $0.179 < L_{table} 0.206$ then H_0 is accepted, so the data obtained pretest test and Posttest tests come from a normally distributed population.

Table 3. Normality Test Analysis Results

Test	$L_{calculate}$	L_{table}	Test results	Conclusion
<i>Pretest</i>	0,126	$L(0,05;16) = 0,206$	H_0 rejected	Normal Distributed
<i>Posttest</i>	0,179	$L(0,05;16) = 0,206$	H_0 accepted	Normal Distributed

The homogeneity test is used with the aim of determining whether or not variance is the same of a number of populations. Researchers test homogeneity before treatment (Pretest) and after treatment (Posttest) using the F test formula with significance levels 5%. The results of the homogeneity test data analysis from student learning outcome value data are presented in the following table:

Table 4. Results of Homogeneity Test Analysis

$F_{calculate}$	F_{table}	Criterion	Test Decisions
1,638	$F_{0,05(16,16)} = 2,33$	$F_{calculate} \leq F_{table}$	H_0 accepted

Hypothesis testing is used to determine if there is an increase in media application IT-based logic gate learning to increase student motivation in the electronics logic course. Test this hypothesis using the mean against the questionnaire scores filled out by students. The test criteria is if the questionnaire value is filled greater than the mean, the student is included in the motivated criteria vice versa if the questionnaire value filled out by students is smaller than the mean then the student is included in the criteria of not being motivated. From the results of the analysis, there were 12 motivated students and 5 students who unmotivated. So, it can be concluded that there is an influence of media application IT-based Logic Gate learning to increase student motivation in the electronics logic course.

Hypothesis testing is used to determine if there is an increase in media application IT-based logic gate learning to improve student learning outcomes. Test this hypothesis using the t-test on the value of learning outcomes before treatment (pretest) and after treatment (posttest) by using a t-test with a significant level of 5%. The test criteria are as follows This H_0 is

accepted/ H_1 is rejected if $t_{count} < t_{table}$ and H_0 is rejected/ H_1 is accepted if t_{count} is $> t_{table}$. From The results of the hypothesis test analysis are obtained:

Table 5. Hypothesis Test Analysis

$T_{calculate}$	T_{table}	Criterion	Test Decisions
12,33	$T_{0,05(16,16)} = 1,746$	$T_{calculate} > T_{table}$	H_0 rejected

Based on the table above, the result obtained is H_0 rejected. So, it can be concluded that there is an increase in the application of IT-based logic gate learning media for improve student learning outcomes in the logic electronics course. The next step is the provision of treatment, which is in the form of learning media IT-based logic gateways for posttest groups and conventional learning for pretest group. Each group will be given 2 treatments and carried out Test at the 2nd meeting. After the test results from the pretest group and the posttest group obtained then continued by combining the two values so that obtained Intact learning outcomes. Based on observations, it is known that the application of gate learning media IT-based logic makes students concentrate more on understanding the material that given because the application of IT-based logic gate learning media helps lecturers in clarifying the material provided at the time of learning.

CONCLUSION

Based on the results of the analysis that has been put forward is this hypothesis carried out with Using t-tests on learning outcome values before treatment (pretest) and after treatment (posttest) using t-test with a significant level of 5%. Test criteria are as follows: H_0 is accepted/ H_1 is rejected if $t_{count} < t_{table}$ and H_0 is rejected/ H_1 is accepted if t_{count} is $> t_{table}$. From the results of the hypothesis test analysis, $t_{count} = 12.33$ and $t_{table} = 1.746$ Because $t_{count} > t_{table}$. Based on the hypothesis test obtained $t_{count} (12.33) > t_{table} (1.746)$ then H_0 is rejected.

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