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The effectiveness of learning media on the outcome of computer and basic network of vocational students

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Abstract—Learning media is a tool that can help the teaching and learning process so that the meaning of the message conveyed becomes clearer and the goals of education or learning can be achieved effectively and efficiently. The results given to students in the form of an assessment after following the learning process with the value of knowledge, attitudes, skills in students with changes in behavior can also be called student learning outcomes. One source of student learning to obtain messages and information provided by the teacher so that learning materials can be further improved and form knowledge for students is using Learning Media. In this study, researchers used research and development (R&D) methods, and the ADDIE development model. This interactive learning media is designed using the Lectora application. The results of this study are the effectiveness of the media using time series results of student learning mastery increased by 20% effectively to improve student learning outcomes through tests. A score of 0.52 was obtained in the medium category.

Keyword: *Interactive Learning Media, Basic Computer and Network, Effectiveness, R&D, ADDIE*

I. INTRODUCTION

The success of the learning process in schools is influenced by many factors, including teachers, students, curriculum, learning environment, learning resources and others. Teachers and students are the two most important factors in the learning process. The importance of the teacher factor to help students learn according to their needs and interests (Mardiah, 2018). Interactive learning media is very necessary during the learning process because not all of this subject matter can be understood by just reading but requires media in displaying something abstract that is difficult for students to understand as described (Devega, 2018).

According to Rusman et al. (2011: 60), the media is a tool that has the function of conveying messages. Meanwhile, according to Djamarah (2010: 120) in Arabic, media is dalah wasail or wasilah which means intermediary or delivery of messages from the sender to the recipient of the message. Media can provide an integral experience from the concrete to the abstract. Learning media plays an important role in the learning process that is carried out. Its use will greatly help the effectiveness of the learning process and the delivery of messages and learning content, in accordance with the demands of the curriculum (Devega, 2019; Riyanda, 2019).

Along with the development of technology, many are conducting research and development on interactive learning media. The research that has been valid regarding learning media can increase student learning outcomes is what Mardiah (2018) conducted research on the Effectiveness of Learning Media on Chemistry Learning Outcomes of SMA Negeri 16 Banda Aceh students. From the results of the research that has been carried out, it can be concluded that the average learning outcomes of students who are taught using the Crossword Puzzle (TTS) media are higher than the average learning outcomes of students who are taught using domino card media. The effectiveness of using card media and TTS media can be seen from the enthusiasm and enthusiasm of students looking for answers in playing domino card

media and TTS media. Domino card media and TTS card media are both effective media that can be used in the learning process to improve student learning outcomes. Besides Mardiah, there is also research conducted by Fahreza Azhar (2020) with his research entitled The Effectiveness of Using Interactive Learning Media in Plumbing Theory and Practice Courses. This research was conducted using the pre-test-post-test group discussion method by dividing into two study groups, namely the experimental group and the control group. The results showed that the experimental class had higher learning outcomes than the control class. In theoretical learning, the results of the pre-test and post-test in the control class get an average value of 42 and 69, which means that there is an increase in the value of 27 while the experimental class gets a higher score than the control class, which is 46 at the pre-test and 80 at the post-test. the increase is much greater than the experimental class of 34. Based on this, the use of interactive multimedia is more effective than learning with powerpoint and video. In terms of interest, seen from the questionnaires, suggestions and responses that were disseminated have increased students' interest in participating in learning.

II. METHODS

This research was conducted on 30 students of class X Computer Network Engineering at SMK N 1 Lahat, on Basic Computer and Network Subjects. This research is research and development. Development research is research that is used to produce certain products and test the effectiveness of these products" (Sugiyono, 2013; Pakpahan et al, 2020). The research and development method is research that is intentionally, systematically, aimed at finding findings, formulating, improving, developing, producing, testing the effectiveness of products, models, methods/strategies/methods, services, certain procedures that are superior, stone, effective, efficient, productive, and meaningful (Putra, 2012; Adhan, 2021).

The development procedure in this study uses the ADDIE model development method which consists of Analysis, Design, Development or Production, Implementation or Delivery and Evaluations.

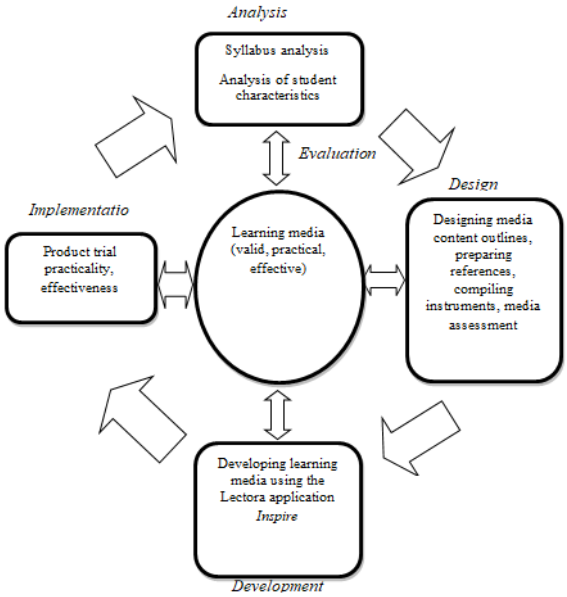

Figure 1. Learning Media Development Procedure

A. Data collection instruments

The research instrument developed to collect data on effectiveness is an effectiveness sheet. Effectiveness was seen from the results of the pretest and after being given treatment for four meetings. Learning outcomes are obtained by giving tests to local students who have been given learning treatment using interactive media that are valid and practical. The effectiveness test was carried out by comparing the learning outcomes before and after treatment with learning media developed using Time Series.

The instrument used is an instrument in the form of a pretest (test before being given treatment) in the form of a multiple choices test (objective). The test questions were first tested in other classes with a number of respondents as many as 30 students to determine the validity, reliability, difficulty level of the questions, and the differentiating power of the questions in the form of multiple choice. The test questions are arranged based on the subject matter and the objectives to be achieved in learning based on the curriculum. In this test, the measurement used is if the question can be answered correctly, the score is 1 and if the question is answered incorrectly, the score is 0.

B. Effectiveness analysis

1. Time series

Effectiveness analysis using time series design. In this design, the groups used for the study cannot be chosen randomly. Before being given treatment, the group was given a pretest up to four times, with the

aim of knowing the stability and clarity of the group's condition before being given treatment. If the result of the pretest for four times turns out to be worth it. different, meaning that the group is unstable, uncertain, and inconsistent. After the stability of the group condition can be known and clear, then the treatment is given. This research design only uses one group, so it does not require a control group.

$$O_1\ O_2\ O_3\ O_4\ x\ O_5 O_6\ O_7\ O_8$$

Possible research results from this design are shown in Figure 2 below. From Figure 2 it can be seen that, there are various possible results of research using a time series design.

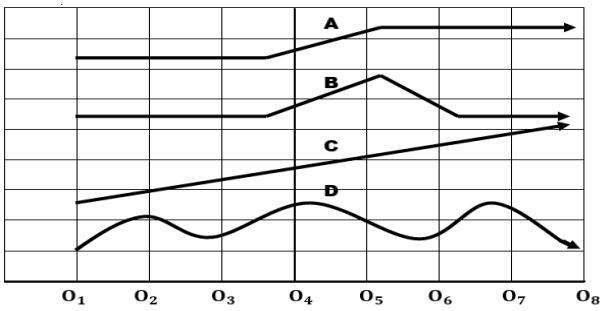

Figure 2. Various possible results of research using Time Series design

2. Gain score test

After doing research and doing calculations to see the increase in student learning outcomes using the gain score formula. The developed interactive learning media can be said to be effective if the gain score is > 0.30 or at least in the medium category.

Effectiveness analysis is used to measure the level of student learning completeness obtained from multiple choice tests. Learning is said to be effective if the number of students who achieve completeness is greater than or equal to 85%. Apart from being seen from the percentage of students' learning mastery classically, to see the effectiveness of the developed media, it is necessary to calculate the increase in student learning outcomes using a gain score (Hake, 1999), which can be seen in the formula:

$$g = \frac{S\ post - S\ pre}{100 - S\ pre}\ \%$$

Description :

g = gain score
Spost = posttest score
Spre = pretest score

The gain score category can be seen in Table 1.

Table 1. Gain Score Category

No.	*Gain Score*	Category
1	g > 0,70	Height
2	0,30 ≤ g ≤ 0,69	Medium
3	g < 0,29	Low

The developed interactive learning media can be said to be effective if the gain score is > 0.30 or at least in the medium category.

III. RESULTS

A. Effectiveness Test

The effectiveness of using interactive learning media in computer assembly subjects is reviewed in two ways, namely by looking at the classical KKM achievement along with the diagrams presented using time series calculations and by calculating pretest and treatment data using gain score analysis analysis.

1. Effectiveness in terms of classical completeness with time series method

Classical completeness with the Time series method is seen from the average value of students for 4 meetings before using the media compared to student scores for 4 meetings after being given interactive learning media. The reference for determining student completeness is to compare the student's score against the achievement of the minimum criteria for completeness that have been set. The value used is the value of the test results for each meeting where the learning process has been carried out 4 times before using the media and after using interactive learning media in Computer and Basic Network subjects. The student's test results are then given a score with predetermined conditions, the value is compared with the minimum completeness criteria for Computer and Basic Networking subjects that have been set, which is 75.

The basis for determining the effectiveness of interactive learning media is if the pretest result diagram shows a stable and consistent group condition (Q1 = Q2 = Q3 = Q4) as shown in the figure below:

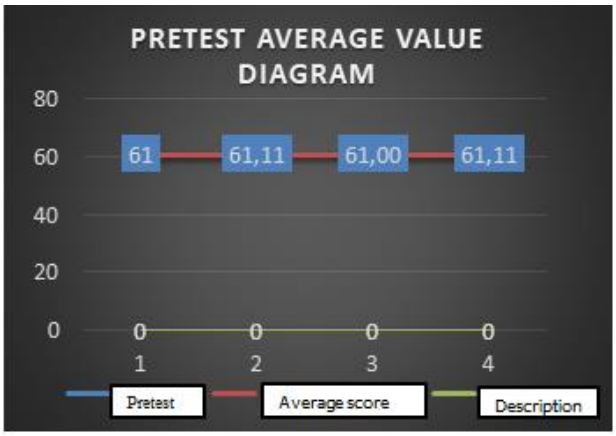

Figure 3. Diagram of the Pretest Results

After being given treatment, the condition improved consistently (Q5= Q6 = Q7 = Q8) which is presented in Figure 4.

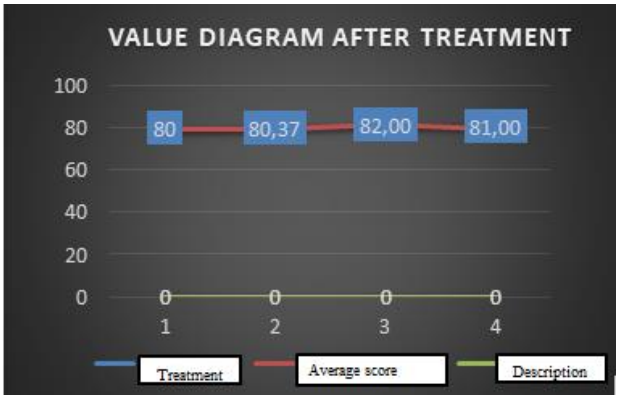

Figure 4. Display of Treatment Results Diagram

The comparison diagram of the overall student score with the Time series calculation is presented in Figure 5.

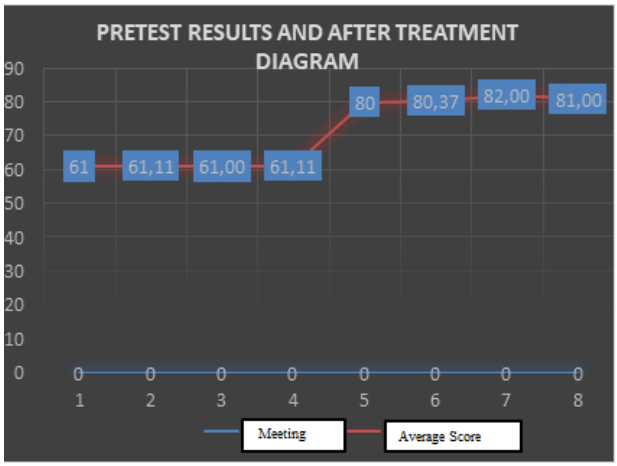

Figure 5. Time Series Result Diagram Display

The results of the pretest were good, namely Q1= Q2 = Q3 = Q4 and the results of good treatment were Q5 = Q6 = Q7 = Q8. The magnitude of the treatment effect is = (Q5 + Q6 + Q7 + Q8) – (Q1 + Q2 + Q3 + Q4) so that the percentage increase in student learning mastery is 20%.

Table 1. Table of data processing results using Time Series

No	Treatment	Average score	Treatment	Average score	Value of Treatment Effect	Percentage
1	Q5	80	Q1	61	0,19	19%
2	Q6	80,37	Q2	61,11	0,19	19%
3	Q7	82,00	Q3	61,00	0,21	21%
4	Q8	81,00	Q4	61,11	0,20	20%
				Average	0,20	20%

2. Effectiveness in terms of differences in pretest results and after being given treatment

a. Pretest result data and after being given treatment

Table 2. Pretest data analyst results

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest	30	43,33	83,33	60,11	10,67
Post-test	30	73,33	93,33	81	5,55

Based on data analysis using the Excel program, the following results were obtained, namely: a) the average value was: 60.11 b) the highest score was 83.33; c) the lowest score is 43.33; d) standard deviation is 10.67; Pretest data is the initial test data of students before being given treatment in the form of a learning process using interactive learning media on Computer and Basic Network subjects in the learning process in the classroom, this test was followed by 30 students. Based on data analysis using the Excel program, the following results were obtained, namely: a) the average value was: 81 b) the highest score was 93.33; c) the lowest value is 73.33 ; d) the standard deviation is 5.55. Treatment data is student test data after being given treatment in the form of a learning process using interactive learning media on Computer and Basic Network subjects in the learning process in class, this test was followed by 30 students.

b. Gain score test results

The gain score test is used to see the increase in student learning outcomes from the pretest and treatment scores. The following are the results of the gain score test.

Table 3. Gain Score Test Results

Respondent	Pretest		Posttest		gain score	Category
	True	Value	True	Value		
Amount		1803	Amount	2430		
Average		60,1	Average	81	0,52	Medium

Based on Table 3. it can be concluded that the use of interactive learning media has been effective, according to the results of the gain score on the average of 0.52 in the medium category.

IV. DISCUSSION

The effectiveness of the learning media in this study was seen from the ability of the media to activate students in learning and make it easier to understand the learning material. The use of teaching materials will greatly help the effectiveness of the learning process and the delivery of messages at that time (Arsyad, 2013). In addition to increasing learning media activities, it can also help students improve understanding. In this assessment, the effectiveness of the learning media is reviewed in terms of student learning outcomes. Learning outcomes test is used to determine the effectiveness of the learning process. Learning outcomes are abilities that students have after they go through the learning experience process. The learning experience is in the form of effective learning activities and can realize the goals of good learning outcomes. The purpose of the assessment of learning outcomes is to measure the level of success of the teaching and learning process that has been implemented.

From the description, it shows that the use of interactive learning media that was developed makes it easier for students to understand the material, so that student learning outcomes are better. Based on the learning outcomes for basic computer and network learning, it shows that of the 30 class X students of the TKJ Department of SMK Negeri 1 Lahat who took the test before they used interactive learning media, the average learning outcome was 60.11 with a fairly effective category, the minimum score was 43, 33 and a maximum value of 83.33.

Based on the learning outcomes data from 30 students who took the test after they used Interactive learning media, the average learning outcomes were 81. This was included in the effective category with a minimum score of 73.33 and a maximum score of 93.33. This shows that there is an increase in student learning outcomes before using the media and after using interactive learning media. This is also proven through the gain score test where the value is 0.52 in the medium category. So, it can be concluded that learning by using media can be said to be effective in improving student learning outcomes, it is clearly seen from the results of the increase in the value of students who do have abilities below the Minimum Completeness Criteria, it is very clear that the increase in value is 30% while students with abilities have reached the Minimum Completeness Criteria of the initial meeting only increased by 10%.

The results showed that the interactive learning media developed were valid, practical and effective learning media used in the Basic Computer and Network learning process for class X Computer and Network Engineering Department and succeeded in increasing the value of student learning outcomes so as to make students who were previously lazy and tend to only accept The explanation from the teacher alone in this subject has tended to spur students' creativity in learning because this media is equipped with video tutorials along with learning simulations where according to Edgar Dale's cone diagram it is explained that 90% of memory occurs when doing role playing, doing simulations and doing real things (Handhika, 2012; The results of this study are supported by theories and previous research that has been carried out by other researchers as previously discussed. Thus this interactive learning media can be used as an alternative choice of learning media to be used. used in the learning process of Basic Computers and Networks.

V. CONCLUSION

The results of the study include the effectiveness test. Student learning outcomes have increased by 20% where the average pretest is 60.11 with a minimum score of 43.33 and a maximum value of 83.33. After being given treatment, the average score of students was 81 with a minimum score of 73.33 and a maximum of 93.33. From the results of this calculation, the gain score test value is also 0.52 in the medium category. The process of using this interactive learning media that is easy for both teachers and students can increase effectiveness in the learning process so that learning will be easy to implement, interesting and fun for students.

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