Tutorial Learning Outcomes in Basic Lessons in Computer Network Engineering and Telecommunications

Zulkifli(✉) and Sudarwan Danim

Universitas Bengkulu, Bengkulu, Indonesia
hzul1724@gmail.com

Abstract. The aims of this study were to: (1) determine student learning outcomes in Basic Computer Network Engineering and Telecommunications at X TKJ SMK Negeri 3 Oku, (2) determine the effect of using video media on student learning outcomes in Basic Computer Network Engineering subjects and Telecommunications in class X TKJ SMK Negeri 3 Oku. The method used in this study is a quasi-experimental method with pre-test and post-test designs. This research was conducted at SMK Negeri 3 Oku. The sampling technique used was saturated sampling. In this study, class X TKJ 1 as an experimental class was taught using video media and class X TKJ 2 as a control class was taught not to use video media. The data collection technique used is the test. The data analysis technique used t-test. (1) The learning results obtained indicate that the use of video media on learning outcomes makes learning outcomes in the experimental class better than the control class. This is indicated by the average value of students in class X TKJ 1 as the experimental class to be 80.67. (2) The results of the calculation of the hypothesis test using the t-test on the post-test data, it is obtained that the value of T-count = 3.836 and the value of T table = 2.00 with a significant value of 0.000. Based on these results, it can be seen that T-count > T-table so that it can be said that H0 is rejected and H1 is accepted. So, it can be concluded that there is an effect of using video media on student learning outcomes in the Basic subjects of Computer and Telecommunication Network Engineering.

Keywords: Basic Computer Networking Techniques · Learning Outcomes · Video Media

1 Introduction

The problem of education and learning is a fairly complex problem where many factors influence it. One of these factors is the teacher. The teacher is an important and main component in learning, because the success of learning is largely determined by the teacher factor (Ethel Silva De Oliveira 2017). The teacher's task is to convey subject matter to students through communication interactions in the learning they do. The success of the teacher in delivering the material is very dependent on the smooth interaction of communication between the teacher and his students The main tasks in learning are:

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planning, implementing learning, and providing feedback [2]. The task of planning is the task of designing and preparing everything related to what will be done in learning. This task includes determining the goals to be achieved, preparing the material to be taught, and preparing evaluation tools to see the success of the learning carried out [3]. The task of carrying out learning is the implication and application of what has been previously planned by the teacher. While the task of providing feedback is a task to assist students in maintaining their interest and enthusiasm in carrying out learning tasks.

The success of a learning there are various components that determine, among others: objectives, materials, methods, teachers, infrastructure and so on [4]. Media is one component in learning. Learning media is a tool to achieve learning objectives [5]. In learning there is a process of internalization and ownership of knowledge by students because students can absorb and understand well what is conveyed by the teacher.

The success of a lesson can also be measured by the ability of students to understand the learning material [6]. The criteria for learning success are measured by the extent to which students master the learning material presented by the teacher [7]. Learning can be said to be successful if most students understand the lesson well. One of the factors that can affect the success of student learning is the teacher.

Teachers play a major role in developing interesting and fun learning strategies so that students are motivated to excel and can understand the lesson well [8]. The high and low learning outcomes of students in learning cannot be separated from the selection and use of learning methods [9]. With the use of appropriate learning methods, it can improve student outcomes and participation in the learning process. Students will be more active in the learning process so that learning can take place effectively in achieving a competency. With the achievement of competence, it will result in an increase in student achievement in the learning process. Based on the results of pre-research observations on March 21, 2022 at SMK Negeri 3 Oku, especially in class X TKJ in learning the Basics of Computer and Telecommunication Network Engineering (TJKT) for the 2021–2022 academic year found several problems in the learning process Basics Computer and Telecommunication Network Engineering. The learning process in class X TKJ tends to use the lecture method and read books with the material to be studied, without providing material through other media. This causes students to be less motivated to learn. The activeness of students is also not visible in the learning. Learners tend to be passive and only listen to what is taught by the teacher who is still dominant in classroom learning (teacher centered) so that learning in the classroom is more likely to run in one direction only [10].

The world of education today is inseparable from modern technology [11]. The use of modern tools should have been a necessity applied in the world of education, it is not time for teachers to teach in class using only blackboards and markers [12]. With the development of technology at this time, a teacher must be able to use technological tools as learning media [13]. One of the learning media that can be used in learning the Basics of Computer Networking and Telecommunication Engineering is to use video media, which is a very effective learning system if done well. This media also trains students to socialize well. The media is expected to increase the active role of students in learning so as to improve student learning outcomes and the quality of vocational graduates, especially from the TKJ major [14].

Based on the description above, teachers need to use video-based learning media so that students can better understand the basic learning materials of computer and telecommunications network techniques, so that student learning outcomes are expected to increase [15].

2 Methods

The research carried out is included in quantitative research. According to [16] quantitative data is a research method based on positivistic (concrete data), research data in the form of numbers that will be measured using statistics as a calculation test tool, related to the problem being studied to produce a conclusion.

The method used in this study is a Quasi experimental design method. According to [17] this form of experimental design is a development of true experimental design, which is difficult to implement. This design has a control group, but does not fully function to control external variables that affect the implementation of the experiment. In this study to find the effect of the use of video-based learning media (X) on learning outcomes (Y), in this study, the researchers provided [18].

Learning treatment in two classes with different treatments, namely the use of video media in the experimental class and not using video media in the control class. Then a test will be conducted to determine student learning outcomes [19].

According to [20], research variables are attributes or properties or values of people, objects or activities that have certain variations that are determined by researchers to be studied and then drawn conclusions [21]. The variables in this study consisted of one independent variable and one dependent variable. The independent variable consists of the effect of using video-based learning media (X) for the dependent variable is learning outcomes (Y).

In this study, the entire population consisting of two classes, namely class X TKJ 1 which consists of 30 students and class X TKJ 2 which also consists of 30 students will be sampled which based on interviews by subject teachers explains that the distribution of students between the two classes is the same. Average or in other words between the two classes there is no superior class.

The sampling technique in this study used a saturated sampling technique. The definition of saturated sampling put forward by [22] is “a sampling technique when all members of the population are used as samples”.

3 Results and Discussion

Data analysis is a problem solving process so that the research objectives can be achieved and the hypothesis can be answered [23]. For this reason, in the process of data analysis, an approach that is adapted to the object under study is needed. The learning outcomes of students in class X TKJ SMK Negeri 3 Oku after participating in learning using video-based learning media in basic subjects of Computer and Telecommunication Network Engineering (TJKT) Basic Networking material. To solve these problems, in this chapter the researcher will present the results obtained from the research, data analysis and discussion.

The data collected by the researchers based on the results of research conducted at SMK Negeri 3 Seluma in the form of learning outcomes data after being given multiple choice test instruments in each class, where class X TKJ 1 as the experimental class was given treatment using video-based learning media. Meanwhile, class X TKJ 2 as a control class was given treatment using a learning model commonly used by subject teachers, namely the conventional learning model. The data is then analyzed and presented by researchers to solve research problems.

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The following are the results of descriptive analysis with the help of the SPSS 26 application for student learning outcomes both in the experimental class and after being given pre-test and post-test as follows:

Based on Table 1, it is explained that the minimum value is the lowest value obtained in the experimental class both before and after being given treatment using video-based or conventional learning media. The maximum value is the highest learning achievement test score obtained in the experimental class before and after being given treatment using video-based and conventional learning media. The average (mean) is the sum of the total scores of students divided by the number of students. Standard deviation which is a measure that describes the level of spread of the average value.

In the table of experimental pre-test values, the maximum value is 50, the minimum value is 10, the average is 30.83, the standard deviation is 9.833. Meanwhile, for the experimental post-test, the maximum value was 95, the minimum value was 60, the average was 80.67, and the standard deviation was 9.072. This shows that the learning

Table 1. Descriptive Statistical Data of the Experimental Class

	N	Min	Max	Mean	Std. Dev
Pre-Test Experiment	30	10	50	30.83	9.833
Post-Test Experiment	30	60	95	80.67	9.072
Valid N	30				

outcomes of students in the experimental class after being given treatment (posttest) have a more even distribution than before (pretest) the use of video-based learning media is applied. Full results can be seen in the attachment.

The results obtained are the basis for determining the category of learning outcomes in the experimental class. The value interval for categorizing learning outcomes is based on the value set by the Ministry of National Education and adjusted to the K13 curriculum. The results of the categorization of learning outcomes can be shown in the following table:

The distribution of the learning outcomes of the experimental class students before and after the application of video-based learning media based on the frequency distribution category. In the class it can be seen that before giving the treatment (pretest) there were 6 students in the sufficient category with a percentage of 20% and 24 people in the less category with a percentage of 80%, while for the posttest score categorization, there were 7 students in the very good category. With a percentage of 23.33%, 22 students in the good category with a percentage of 73.33%, and there is 1 student who gets a sufficient score with a percentage of 3.33%.

The results of the descriptive analysis of the learning outcomes of students in the control class (class X TKJ 2 SMK Negeri 3 Oku) before and after being given treatment using the conventional learning model.

This research was conducted by giving an initial test called Pre-test with a total of 20 multiple choice questions, then teaching students using conventional learning models. After that, the researcher gave a final test (Post-test) with the same number of questions, namely 20 multiple choice numbers.

In the table of pre-test values for the control class, the maximum value is 45, the minimum value is 15, the average is 33.00, the standard deviation is 7.497. Meanwhile, for the post-test score for the control class, the maximum score was 85, the minimum score was 55, the average was 72.17, and the standard deviation was 8.060. This shows that the learning outcomes of students in the control class after being given treatment (posttest) have a more even distribution than before (pretest) the conventional learning model is applied. Full results can be seen in the attachment.

The results obtained are the basis for determining the category of learning outcomes in the control class. The value interval for categorizing learning outcomes is based on the value set by the Ministry of National Education and adjusted to the K13 curriculum.

The tests used in this inferential analysis include testing for normality and testing for homogeneity. Tests were carried out on student learning outcomes through learning outcomes tests in the experimental class using video-based learning media and in the control, class using conventional learning models. Before testing the hypothesis, a prerequisite test for data analysis is carried out, namely normality and homogeneity tests.

The normality test was carried out to determine whether or not the data from the test results of students' learning outcomes in the experimental class and control class, where the normality test can be seen in the analysis using the SPSS version 26 program (Table 2).

Table 2. Test for Normality of Learning Outcomes

Class Students		Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Achievement	Pre-test Experiment	.131	30	.200*	.973	30	.623
	Post-test Experiment	.150	30	.082	.958	30	.274
	Pres-test Control	.189	30	.008	.936	30	.072
	Post-Test Control	.139	30	.142	.949	30	.162

* This is a lower bound of the true significance
a. Lilliefors significance Correction

The normality test used in this study is the Kolmogorov Smirnov and Sharpiro-Wilk tests at a significant level = 0.05, while the results of the calculations in this study are as follows:

Based on table, the significant value in the Shapiro-wilk column for the experimental class pre-test was 0.623 and for the post-test experimental class 0.274. The significant value obtained is greater than 0.05 (sig. > 0.05). Also obtained a significant value in the Shapiro-wilk column for the pre-test class for the control class of 0.072 and for the post-test of the control class of 0.162. The significant value is greater than 0.05 (sig. > 0.05). so, it can be concluded that the scores of students' learning outcomes for the experimental class and the control class for the pre-test and post-test were normally distributed.

Homogeneity test was conducted to find out that the two samples being compared were groups that had the same or homogeneous variance. The homogeneity test used in this research is using the SPSS Statistics version 26 application program with a significant level (sig > 0.05). The results can be seen in the following table:

Based on Table 3 the Levene Statistic test using SPSS Statistic version 26 obtained a significant value (sig) based on the mean of 0.553 so that the data can be said to be

Table 3. The Results of the Homogeneity Test of the Experimental Class and the Control Class

		Levene Statistic	df1	df2	sig
Student Achievement	Based on Mean	.356	1	58	.553
	Based on Median	.391	1	58	.534
	Based on Median and with adjusted df	.391	1	57.979	.534
	Based on trimmed mean	.366	1	58	.548

Table 4. The Results of the Paired Sample T-Test

Paired Differences 95%Confindence Interval of the Difference									
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig(2-tailed)
Pair 1	Pre-test Experiment-Post-test Experiment	–49.83	11.024	2.013	–53.950	–45.717	–24.76	29	
Pair 2	Pre-test Control-Post-test Control	–39.17	11.071	2.021	–43.300	–35.033	–19.38	29	

homogeneous because 0.553 is greater than 0.05. This can happen because of an increase in student learning outcomes.

After testing for normality and homogeneity, the analysis continued with hypothesis testing. Hypothesis testing aims to prove the truth (answer the hypothesis) presented in this study. The hypothesis test used in this study is the paired sample t-test and the independent sample t-test.

a. Paired sample t-test.

This test is used to determine whether there is a difference in the average of two paired samples. The paired sample t-test was also carried out to answer the problem formulation in this study, namely "Is there any effect of using video-based learning media on student learning outcomes in the Basics of Computer Networking and Telecommunications Engineering subjects? To answer the problem formulation, the paired sample t-test was carried out on the experimental class pre-test data with the experimental class post-test. Then the control class pre-test data with the control class post-test data (Table 4). These results can be seen in the following table:

Based on the test results using the SPSS 26 application on the output pair 1, the value of T-count = 24.76 and T-table = 2.048 with a significant value (2-tailed) 0.000. So, it can be said that H0 is rejected and H1 is accepted, that is, there is a significant effect between the experimental pre-test value and the experimental post-test value. So, it can be concluded that there is a difference in the average student learning outcomes for the pre-test experimental class and post-test experimental class. Meanwhile, based on the output of pair 2, the value of T-count = 19.38 and T-table = 2.048 with a significant value (2-tailed) of 0.000 is obtained. So it can be said that H0 is rejected and H1 is accepted, that is, there is a significant effect between the control pre-test scores and the control post-test scores.

4 Conclusion

Based on the test results using the SPSS 26 application on the output pair 1, the value of T-count = 24.76 and T-table = 2.048 with a significant value (2-tailed) 0.000. So, it can be said that H0 is rejected and H1 is accepted, that is, there is a significant effect between the experimental pre-test value and the experimental post-test value. So, it can

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