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The Effect of Computer Assisted Learning and Learning Motivation on the Outcomes of Studying Physics at SMA Negeri 5 Palu

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Abstract-This study was conducted to test the significance of research on student learning outcomes using computer-assisted learning with conventional learning, to test research on learning outcomes of students who have high learning motivation with low learning motivation and the interaction between computer assisted learning and learning motivation towards physics learning outcomes. The research method used was quasi-experimental. The research design used was a 2 x 2 factorial design. Sampling was determined by purposive sampling technique. The research sample was class XI IPA 3 which was planned by 26 students as an experimental class and XI IPA 4 which could be carried out by 26 students as a control class. The research variables consisted of independent variables, namely computer assisted learning, the dependent variable on learning outcomes and the moderator variable, namely learning motivation. Retrieval of data through learning outcomes test and physics learning motivation questionnaire. The data of this study were analyzed using the two-way ANOVA technique using the SPSS version 21 program. The results showed that: (1) there were differences in student learning outcomes between those using computer assisted learning and conventional learning, (2) there were differences in student learning outcomes between those who had high learning motivation with low learning motivation, and (3) there is an interaction between computer assisted learning and learning motivation towards student learning outcomes, which means that students who have high learning motivation will have better learning outcomes than students who have low learning motivation Especially in classes that use computer assisted learning.

Keywords: Computer Assisted Learning, motivation, learning outcomes.

I. INTRODUCTION

Along with the advancement of the world of education today, information and communication technology which is increasingly developing has brought big changes in the use of the learning media used today. One of the technological developments in the world of education is the use of computers in learning in the world of education. The learning process is no longer teacher-centered but involves more students in learning activities. One of the innovations that has a major contribution to changes in the learning process is computer-assisted learning. According to Soenarto [1], the visualization of teaching materials in a more dynamic and interactive form is expected to motivate students to be more active and involved in the teaching and learning process.

SMA Negeri 5 Palu still applies conventional learning. The delivery of material in learning delivered by the teacher still uses standard learning media which is still conventional learning. Based on the results of observations, class XI students at SMA Negeri 5 Palu are still in the low range of motivation to learn physics, which affects student learning outcomes. Based on this, it is possible that the learning used is still inaccurate so that it affects student learning motivation and learning outcomes.

This study examines the existing computer-assisted learning in SMA Negeri 5 Palu for physics as an optimal learning resource to improve student learning outcomes, so that the role of the teacher as a facilitator can be implemented. In addition, student activeness is more emphasized when using computer-assisted learning because coherent learning steps have been given so that the learning culture created here requires students to be independent in the hope of being able to increase students' understanding of the subject matter which is ultimately able to be in line with the increase in student learning outcomes.

The problem that will be discussed in this study is to examine differences in learning outcomes of physics in students who are taught using computer-assisted learning media with students who are taught using conventional learning, to find out differences in learning outcomes of students who have high learning motivation with students who have low learning motivation. and to determine the interaction between computer assisted learning and

student learning motivation towards the physics learning outcomes of class XI SMA Negeri 5 Palu.

This study aims to analyze and describe the differences in learning outcomes of physics in students who are taught using computer assisted learning with students who are taught using conventional learning, to analyze and describe differences in learning outcomes of students who have high learning motivation with students who have low learning motivation, and to analyze and describe the interaction between computer assisted learning and student learning motivation towards the physics learning outcomes of class XI students of SMA Negeri 5 Palu.

II. METHODOLOGY

The research conducted was a quasi-experimental research. The data were obtained by dividing the class into two groups, namely the experimental class group using computer assisted learning and the control class group using conventional learning. The research design used was a 2 x 2 factorial design.

The research was conducted at SMA Negeri 5 Palu, in the even semester from January to April 2020. The population in this study were all students of class XI SMA Negeri 5 Palu. Class XI IPA 3 as a sample of the experimental class totaling 26 students and class XI IPA 4 as a sample control class totaling 26 students. Sampling in this study using simple random sampling technique.

Types of data to be collected are qualitative data and quantitative data. Quantitative data is a test of learning outcomes and qualitative data in the form of a questionnaire. The technique of collecting and collecting data in this study is to use: Questionnaires and Tests.

Students are given a questionnaire to find out the motivation to learn, the report is in accordance with the weighted score applied to the Likert scale. A good test must fulfill four characteristics: validity, reliability, level of difficulty and differentiation of each item in question. Test these four characteristics using Microsoft Excel and SPSS 21 programs.

In analyzing the data, this study used quantitative descriptive analysis techniques. The data obtained are in the form of data from the pretest and posttest learning motivation and learning outcomes. The results of a descriptive questionnaire about motivation to determine student responses, implementation of learning and student activities in learning. To determine normality, homogeneity variance, learning motivation and learning outcomes obtained from the pretest and posttest scores to determine the level of learning motivation and student learning outcomes, statistical tests were carried out. The statistical test used was processed using the SPSS 21 program.

Processing and data analysis using statistical tests with the stages of normality test using Kolmogorov Smirno; homogeneity test using the Levene Test; the test for the difference between the two means with the test criteria is: accept H_0 if $-t_{1-1/2\alpha} < t < t_{1-1/2\alpha}$, where $t_{1-1/2\alpha}$ is obtained from the t distribution list with dk = (n_1+n_2-2) and odds $(1-1/2\ \alpha)$; and ANOVA for hypothesis testing as listed in the following table:

TABLE 1 TWO-WAY ANOVA SUMMARY

Source Of Diversity	DK	JK	Varians	F_{HITUNG}	Sig
Between Lines	R – 1	JKB JKK	$(S_1)^2$ $(S_2)^2$	$(S_1)^2/(S_3)^2$ $(S_2)^2/(S_3)^2$	
Between Columns	K – 1	JKS	$(S_3)^2$		
Rows X Column Interactions	(R – 1) (K – 1)				
	RK – 1	JKT			

(Source:[2])

Hypothesis testing criteria: if the significance > 0.05, then H_0 is accepted and if the significance <0.05 then Ho is rejected.

III. RESULTS AND DISCUSSIONS

A. Findings

1. Description of Learning Outcomes

The data description presented from the results of this study is to provide a general description of the data obtained from the field. The data presented is raw data which will be processed using descriptive statistics. The results of the physics pretest and posttest are presented in Table 2.

TABLE 2 DESCRIPTION OF THE RESULTS OF THE PHYSICS PRETEST EXPERIMENT CLASS AND THE CONTROL CLASS

Description	*Pretest* Experiment Class	*Pretest* Control Class	Posttest Experiment Class	Posttest Control Class
Sample	26	26	26	26
Lowest Score	12	24	52	44
Highest Score	52	56	88	80
Average Score	34.15	40.35	70.62	61.00
Ideal Score	100	100	100	100
Standard Deviation	10.758	8.635	10.241	9.209

Based on the average pretest data acquisition in the experimental class and the control class are in the failing category. While the average posttest data acquisition in the experimental class and control class is in the graduated category.

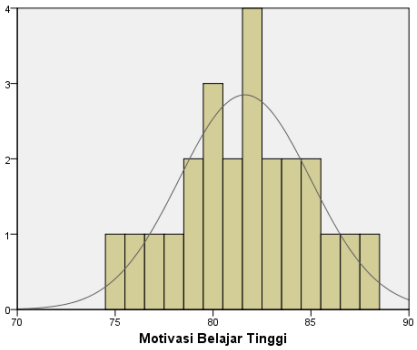
2. Description of Learning Motivation

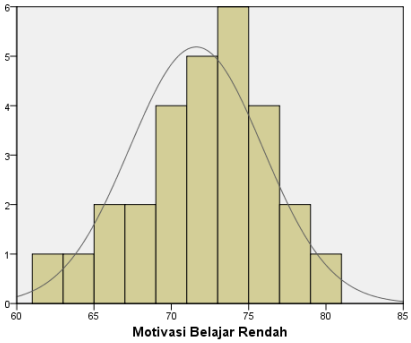
The data description presented from the results of this study is to provide a general description of the data obtained from the field. The data presented is raw data which will be processed using descriptive statistics. Descriptions of the results of the pretest and posttest based on learning motivation are presented in Table 3.

TABLE 3 DESCRIPTION OF PRETEST RESULTS BASED ON LEARNING MOTIVATION

Description	High Learning Motivation	Low Learning Motivation	*Posttest* High Learning Motivation	*Posttest* Low Learning Motivation
Sample	24	28	38	14
Lowest Score	75	62	77	62
Highest Score	88	79	98	88
Average Score	81.63	71.61	87.55	76.64
Ideal Score	100	100	100	100
Standard Deviation	3.360	4.306	5.451	7.281

The data description of the pretest results on high learning motivation and low learning motivation in the form of a frequency diagram is presented in Figure 1.





Pic. 1 Frequency diagram of the pretest results of high learning motivation and low learning motivation

Based on Picture 1, it is obtained an overview of the data distribution of the pretest results in terms of high learning motivation and low learning motivation with a comparison of the normal curve. This shows that the pretest score with the highest frequency is greater than the average pretest score on high learning motivation and low learning motivation.

3. Hypothesis

The research hypothesis which consists of three formulas is used to see the effect of the computer assisted learning model, the effect of learning motivation and the effect of their interaction on student learning outcomes. The level of significance used in this study (α = 0.05) is a reference for decision making on the research hypothesis obtained from the comparison of the probability value (p-value) of the source of variance. The two-way ANOVA test results were obtained from data processing using the SPSS version 21 program which is presented in Table 4.

TABLE 4 TWO-WAY ANOVA TEST RESULTS: TESTS OF BETWEEN-SUBJECTS EFFECTS (DEPENDENT VARIABLE: LEARNING OUTCOMES)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2195.640[a]	3	731.880	8.780	.000
Intercept	159461.080	1	159461.080	1912.965	.000
Class	457.988	1	457.988	5.494	.023
Motivation	367.852	1	367.852	4.413	.041
Class * Motivation	409.309	1	409.309	4.910	.031
Error	4001.187	48	83.358		
Total	235755.000	52			
Corrected Total	6196.827	51			

a. R Squared = .354 (Adjusted R Squared = .314)

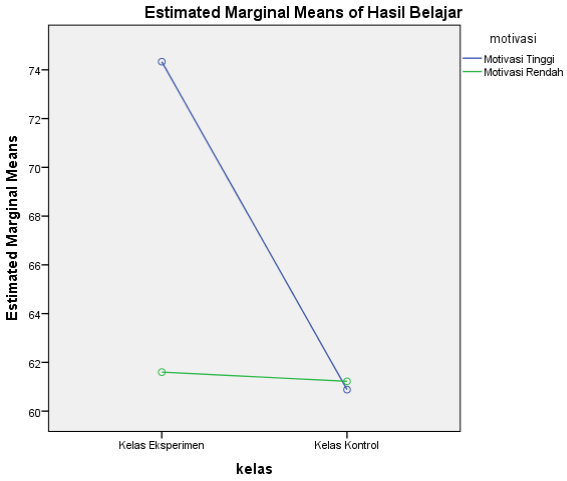
Based on Table 4, the results of testing the research hypothesis can be described as follows:

1) The research hypothesis about the effect of treatment states that there are differences

in learning outcomes between students who carry out computer assisted learning and students who carry out conventional learning in physics subjects. Decision making on the research hypothesis is done by comparing the level of significance with α. Source class variant has sig. (0.023) <α (0.05), so that Ho is rejected. From the test results it can be concluded that there are differences in learning outcomes for students who carry out computer assisted learning with students who carry out conventional learning.

2) The research hypothesis about the effect of learning motivation states that there are differences in learning outcomes for students who have high learning motivation with students who have low learning motivation. This research hypothesis is acceptable because the significance of the source of the variance of learning motivation is 0.041 <α (0.05) fulfilling the criteria Ho is rejected. From the test results it can be concluded that there are differences in the learning outcomes of students who have high learning motivation with students who have low learning motivation.
3) The research hypothesis about the effect of interaction states that there is an interaction between computer assisted learning and student learning motivation on student learning outcomes. The significance of the source of the variance of class interaction and learning motivation (0.031)> α (0.05), so that Ho is rejected. From the test results it can be concluded that there is an interaction between computer assisted learning and student learning motivation towards learning outcomes of physics.

The effect of the interaction between the two variables on learning outcomes can also be described through the plot of the marginal mean posttest results on the two independent research variables presented in Picture 2.



Pic. 2 Estimated Graph of Learning and Motivation Interaction

Based on Picture 2, an illustration shows that the two curves intersect, so this also indicates the influence of the interaction between computer assisted learning variables and learning motivation on physics learning outcomes of SMA Negeri 5 Palu.

B. Discussion

1. The Effect of Computer Assisted Learning on Physics Learning Outcomes

The mean posttest result in the experimental class is 70.62 with a standard deviation of the experimental class of 10.241. Based on the average posttest data acquisition, the experimental class is in the pass category. While the mean posttest score in the control class was 73.37 with a standard deviation of the experimental class of 8.94. Based on the average posttest data acquisition, the control class is in the pass category. From the data above, it can show that the experimental class average is higher than the control class average.

According to Dimyati and Mudjiono [3] who suggest that at the end of each lesson a test will be given that produces a value or score called learning outcomes. Based on this, from the results of observations to the data processing carried out, it was found that there were differences in learning outcomes between computer assisted learning and conventional learning. It can be said that the learning outcomes of computer assisted learning are better than conventional learning. The data taken in this study used statistical tests with the SPSS version 21 program where the significance value obtained was 0.023, which means the sig value (0.023) <α (0.05) where Ho was rejected, meaning that the two classes

that had different learning models also had learning outcomes. different physics.

From the results of the application of the two different learning models applied by researchers, it can be seen that there are differences in learning outcomes. Where a class that uses computer assisted learning has a good change in the value of each student when compared to a class that uses conventional learning, this is due to the different learning motivation of the students.

Computer-based learning is a teaching process that is carried out directly involving computers to present teaching materials in an interactive learning model in the form of using the internet to provide and control the learning environment individually for each student. The meaning of computer-assisted learning as individual learning, because computers provide services as a tutor for a student rather than as an instructor for a group of students [4].

Conventional learning as learning is more teacher-centered, communication is more one-way from teachers to students, learning methods are more on mastery of concepts not competencies. Although there are many shortcomings, this conventional learning is still needed, considering that this model is quite effective in providing understanding to students at the beginning of learning activities. However, if it is applied for too long, students will feel bored.

2. The Effect of Learning Motivation on Physics Learning Outcomes

Students are given a questionnaire by the researcher as many as 27 questions about student responses to learning which are used to determine the level of student motivation. Apart from being seen from the learning outcomes and the existence of motivation from students, this is also due to self-confidence, especially for students with low abilities that can be helped from their high-ability friends. From the learning outcomes it is also seen that with computer assisted learning the results are better than conventional learning, this is because student motivation in the computer assisted learning model increases [5].

From the results of observations and statistical test results showed different learning outcomes between students in the experimental class and control class students. Likewise, the value of learning motivation between the experimental class and the control class where the statistical test using the SPSS version 21 program shows that the significance value obtained is 0.000, which means that the value of sig (0.000)> α (0.05) so it can be said that Ho is rejected, which means the value of the result. learning students who have high high motivation with low low motivation is different. From the results of the statistical test, it can be seen that the learning used affects student learning outcomes and learning motivation.

Student learning motivation can arise due to the attractiveness of learning used to teach subject matter and activities carried out during learning so as to encourage students to want to study the material provided. One of the attractions that can be done is the use of appropriate learning. The use of the chosen learning should be adjusted to the media and learning resources that are considered relevant in conveying information, besides that optimal student involvement is needed so that students can gain learning experiences to develop their abilities, both cognitive, affective, and psychomotor abilities [6].

3. The Interaction Between Computer Assisted Learning and Motivation on Student Learning Outcomes

Statistical tests using the SPSS version 21 program obtained two-way ANOVA test results that allowed researchers to see the main effect and the interaction effect in this study. The main effect that can be seen in this study is the influence of computer assisted learning variables and learning motivation on learning outcomes that have been discussed in the previous section. According to Soenarto [1], the effect of the interaction between the two variables in this study can be seen in the indication of the marginal average plot and the probability value of the source of variance in the interaction of computer assisted learning and student learning motivation in physics subjects.

Based on the plot of the marginal mean of the independent variables, it is found that the profiles of the two variables intersect, indicating that the two variables have an interaction effect on student learning outcomes. The interaction effect between the two variables is also supported by the fulfillment of the H0 acceptance criteria, so that the research hypothesis is accepted. The amount of p-value source of class variance and motivation sig (0.031) <α (0.05), so Ho is rejected, which means there is an interaction between computer assisted learning and student learning motivation.

The results of this study which state that there is an influence of the interaction between computer assisted learning and motivation on student learning outcomes, can be explained that the characteristics of differences in learning outcomes between students with high learning motivation and low learning motivation are different. These characteristics are of course the same as the marginal characteristics of differences in student motivation. If it is seen that the average learning outcomes of students with high learning motivation (87.55) are better than those of students with low learning motivation (76.64). Because there is interaction, then in the experimental class, the average learning outcomes of students with high learning motivation are higher than the average learning outcomes of students with low learning motivation. Likewise, if you pay attention to the control class, the average learning outcomes of students with high learning motivation are higher than the average learning outcomes of students with low learning motivation.

Based on the results of the research above, computer assisted learning can increase student learning motivation so that it can improve student learning outcomes. Computer assisted learning makes students more active and less bored with conventional learning where teachers are more active than students.

IV. CONCLUSION

Based on the results of research data analysis, the following conclusions can be drawn:

1) Based on the results of statistical tests, a significant value of 0.023 was obtained. This significant value means that Ho is rejected so that there are differences in student learning outcomes using computer assisted learning with conventional learning in physics subjects in class XI SMA Negeri 5 Palu.
2) Based on the results of statistical tests, a significant value of 0.041 was obtained. With this significant value, Ho is rejected so that there are differences in the learning outcomes of students who have high learning motivation with students who have low motivation to learn physics in class XI students of SMA Negeri 5 Palu.
3) Based on the results of statistical tests, a significant value was obtained of 0.031. This significant value means that Ho is rejected so that there is an interaction between computer-assisted learning and motivation towards the physics learning outcomes of class XI students of SMA Negeri 5 Palu.

This research can still be developed and expanded by paying attention to the variables that have a direct effect on learning so that learning can run optimally. It is necessary to consider the use of computer assisted learning in learning in schools in order to increase student motivation and learning outcomes of physics. And it is necessary to vary the use of learning methods according to the situation and conditions of the class / school so that students' motivation to learn physics increases so that physics lessons do not feel difficult and boring.

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