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The Influence of the Project Based Learning Model on Science Learning Outcomes in Class V Students at MIS Al Huda Langkat

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ABSTRACT

This research aims to determine the science learning outcomes of students by applying the project based learning model in class V MIS AL Huda, Langkat. This type of research is quasi-experimental with a pretest and posttest control group design. The population of this study was all students in class V of MIS AL Huda, Langkat, totaling 30 students. The sampling technique used was probability sampling with a stage random sampling technique, namely 30 students were sampled as part of the population. The instrument used is a test sheet to measure student learning outcomes. The data analysis technique used is descriptive statistical analysis and inferential statistical analysis with the independent sample test. Based on the results of the descriptive analysis, the average obtained for the two groups, in the control class before and after implementing the project based learning model, was a pretest score of 54.33 and a posttest score of 76.33. In the experimental class by applying the project based learning model, the pretest average was 43.33 and the posttest average was 71.33. Based on the results of the independent sample-test, it shows that the t test value with a sig value < a = 0.05 (0.000 < 0.05) indicates that H1 is accepted. The results of the research show that there is a significant difference between the experimental class (VA) applying the project based learning model and the control class (VB) on science learning outcomes for MIS AL Huda, Langkat students.

Kata Kunci *Project Based Learning, Learning Model, IPA*

INTRODUCTION

Education is carried out through conscious and planned efforts to create a learning atmosphere and learning process that encourages students to actively develop their potential (Nurhadiyati et al., 2020). Education today requires teachers to work harder to improve student learning outcomes through interesting learning for students. Teachers can deliver material by utilizing various models, approaches and strategies that can be used in designing learning (Anggraini & Wulandari, 2020).

The current state of education is still faced with the problem of the difficulty of changing the teacher's mindset from teacher centered to student centered. Teachers should also give equal portions to affective and psychomotor aspects (Johannes, 2021). A teacher is required to continue to

increase knowledge and broaden his horizons. Apart from that, teachers are required to be more interesting in the process of delivering material with Creativity and Innovation which can produce new discoveries.

Science learning in elementary schools refers to the curriculum which emphasizes that learning must emphasize mastery of competencies obtained through a series of scientific processes. Science learning is not limited to memorizing material, but also emphasizes understanding concepts which then lead to applications in real life (Fitrianingrum, 2020).

However, in reality the science learning process in Indonesia still tends to run conventionally or traditionally (learning is still centered on the teacher) where students just sit, listen, take notes and memorize (Taupik & Fitria, 2021). Where science lessons are one of the subjects in elementary school that provide opportunities for children to think critically and objectively. This subject has educational values, that is, it has the potential to shape the child's overall personality.

Science learning in elementary schools is carried out with simple investigations and not memorizing a collection of concepts. The materials in this lesson concern natural phenomena and require more reasoning by students. However, it cannot be denied that this subject is still considered a difficult and boring subject. This condition results in this subject being disliked, ignored and even ignored at the elementary school level (Hizqiyah et al., 2023).

This of course creates problems where there is a fairly large gap between what is expected from science learning and what happens in the field. On the one hand, science lessons have an important role in everyday life, training children to think critically and objectively, and can shape children's personalities (Faurisiawati et al., 2022). On the other hand, many students do not like this subject. This condition has an impact on student learning outcomes.

To overcome this, a learning model and method is needed that can attract students' interest in wanting to study science and make students understand the concept. These models and methods must also be adapted to the learning objectives and subject matter being taught. Where science is a subject related to how to find out about nature systematically, so that it is not just mastery of a collection of knowledge in the form of facts, concepts or principles but is also a process of discovery (Triastuti et al., 2023).

One way to overcome the problems above is by implementing a project based learning model. The Project Based Learning or PjBL model is an innovative learning model that is student centered and places the teacher as a motivator and facilitator where students are given the opportunity to create a project based on what they have learned according to each student's creativity.

The application of the Project Based Learning model has the potential to meet learning demands (Rahayu et al., 2023).

This learning model can explore environmental problems around us, for example students can develop creative ideas in an effort to overcome environmental pollution and apply them directly to everyday life (Hutapea & Simanjuntak, 2019). Project based learning model with an innovative learning approach that encourages students to carry out investigations, work collaboratively in research and create projects that apply their knowledge from discovering new things, are proficient in using technology and are able to solve problems.

The learning process through the Project Based Learning Model allows long-term activities that involve students in designing, creating and displaying products to solve real world problems. Learning using the Project Based Learning model referred to in this research consists of 6 stages, namely (1) determining the project; (2) designing steps for project completion; (3) preparation of a project completion schedule; (4) implementation stage; (5) preparation of reports and presentations; (6) and evaluation stage (Nuraini et al., 2023).

Project-based learning has a significant role in improving student learning outcomes. This is supported by the results of research who used the PjBL learning model to look at students' creative abilities and learning outcomes. The results of this research show that there are significant differences in science learning outcomes between groups of students taught using Project Based Learning (PjBL) learning model and groups of students who are taught using conventional models. Apart from that, research (Fahrurrozi et al., 2022) shows that the Project Based Learning learning model can develop students' critical thinking abilities, improve complex problem solving abilities, by involving students in making observations, discussions and creating works that can clarify the material. .

Learning should attempt to describe the values contained in the curriculum and relate them to the reality of students. However, in reality the use of science learning models by teachers has not been optimal according to what was expected. This is due to the limitations of the learning model taught by the teacher. With the limitations of this learning model, the learning process makes students less interested, so this affects the science learning outcomes that students get (Husein et al., 2023).

This problem is also faced by fifth grade students at MIS AL Huda, Langkat, where students are less interested in science subjects. The results of observations in class V science learning activities for the 2022/2023 academic

year found problems in the learning process, namely that students were still less enthusiastic about following lessons, students did not experience the learning material themselves, students were less creative in producing products in the form of work to support ongoing learning.

Learning activities are not yet optimal and have an impact on the low completion of student learning outcomes, this can be seen from initial observations made on the results of the daily tests, there are 20 students who take the daily tests and there are 2 students who complete, while there are 16 students who have not achieved KKM or have not reached the completion limit set by the school. Where the student will receive remedial treatment because the school has determined that the criteria for completion is 75.

Problems in class V of MIS AL Huda, Langkat, caused the teaching and learning process to be less than optimal. Therefore, to gain in-depth knowledge about the material taught by the teacher, students need an interesting learning model. In this case, science learning requires choosing the right learning model to improve student learning outcomes.

Based on the description above regarding learning phenomena related to the problem of less effective learning methods and the need for science learning, researchers offer the use of the Project Based Learning method in an effort to improve science learning outcomes. This makes researchers interested and important to conduct research with the title "Application of Project Based Learning Methods in Improving Science Learning Outcomes in Class V Students of MIS AL Huda, Langkat TA. 2022/2023".

RESEARCH METHODE

The approach used in the research is a quantitative approach. Meanwhile, the type of research used in this research is experimental research. Experimental research is a way to look for cause-and-effect relationships (causal relationships) between factors that are deliberately caused by researchers by eliminating or reducing other disturbing factors (Suharsimi Arikunto, 2006:4). The location of the research was MIS AL Huda, Langkat. The population in this study were all class V students of MIS AL Huda, Langkat, consisting of 2 study groups totaling 30 students. According to Sugiono (2012: 80), if the population is less than 100, then the sample is taken from the entire existing population so it is called population research. In this research, the entire population was the research sample.

This research uses a quasi-experimental method to measure improvements in learning outcomes. In a quasi-experiment (Quasi Experimental) testing of the independent variable and dependent variable is

carried out on samples from the experimental group and control group. The subjects studied in the two groups were taken randomly. The research used a pre-test, post-test design. The research design used in this research is pretest-posttest Control Group Design. This research compares two classes, one of which is given treatment and one of which is used as a comparison/control. Class V A implements the Project Based Learning learning model and class V B is the control class. Data collection techniques were carried out using observation and test techniques. The data obtained from this research was then analyzed by carrying out calculations and statistical tests.

RESULT AND DISCUSSION

Inferential Statistics Results

In this section, inferential statistical analysis is carried out with the aim of finding out whether there is a significant average difference in the application of the project based learning model and the control class in class V students at MIS AL Huda, Langkat or not. The researcher carried out the analysis by looking at data from the results of the posttest learning test obtained from the experimental class and control class.

Normality test

Normality testing aims to state whether the learning outcome scores of students in the project based learning model and control class in science subjects for each experimental class (VA) and control class (VB) from the population are normally distributed. The criteria for testing normality are if the sign > a then it can be normally distributed and if the sign < a then the data is not normally distributed, with a significance level of a = 0.05.

Table 1.
Normality test values

	Model *Project Based Learning*	**Kelas Kontrol**
Statistik	0,157	0,134
Df	15	15
Sig	0,200	0,200

Based on the results of the one-sample Kolmogorov Smirnov test data analysis for the experimental class (VA) which was taught by applying the project based learning model, a significant value = 0.200 was obtained for a = 0.05 or 0.200> 0.05, this shows a sign. This means that the science learning outcome score data for the experimental class (VA) which is taught using the project based learning model is normally distributed. Meanwhile, the results of data analysis for the control class obtained a significant value = 0.344 for a =

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0.05, this would indicate sign > a. This means that the science learning outcome score data for the control class is also normally distributed, so that both data in this study pass the data normality test, in other words the data is normally distributed. The following are the results of the Kolmogrov-Smirnov normality test using SPSS.26:

Table 2.
Kolmogrov-Smirnov Test Results

Tests of Normality							
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Learning Methods	Statistic	df	Sig.	Statistic	df	Sig.
Student Learning Outcomes	Prject Based Learning	.157	15	.200*	.931	15	.287
	Lecture	.134	15	.200*	.921	15	.199
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

Homogeneity Test

Before conducting hypothesis testing, a homogeneity test is first carried out, because this is a requirement for testing in inferential analysis. The homogeneity test aims to see whether the data in the two groups have the same variance (homogeneous) or not. The hypothesis for the homogeneity test is as follows:

Ho = homogeneous population, if the calculated F value < F table with a = (0.05)

H1 = the population is not homogeneous, if the calculated F value > F table with a = (0.05)

To carry out calculations for the homogeneity test, the F test is used with the following formula:

$$F_{\text{hitung}} = \frac{Varian\ Terbesar}{Varian\ Terkecil}$$

The calculations to determine the largest variance and smallest variance are as follows:

a) Class eksperimen (VA)

$S_I^2 = \frac{\sum(Xi-X)2}{ni-1}$

$S_I^2 = \frac{724,65}{15-1}$

$S_I^2 = \frac{724,65}{14}$

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$S_I^2 = 51,76$

$S_I = \sqrt{51,76}$

$S_I = 7,194$

b) Class Kontrol (VB)

$S_I^2 = \frac{\sum(Xi-X)2}{ni-1}$

$S_I^2 = \frac{1042.25}{15-1}$

$S_I^2 = \frac{1042,25}{14}$

$S_I^2 = 74,44$

$S_I = \sqrt{74,44}$

$S_I = 8,627$

Based on the results of calculating the variance of the data above, the following data were obtained:

1) The experimental class variance value for VA SI2 = 51.76 while for SI = 7.194.
2) The variance value for the control class VB SI2 = 74.44 while for SI = 8,627.

So that the F test value can be obtained is:

$F_{hitung} = \frac{Varian\ Terbesar}{Varian\ Terkecil}$

$F_{hitung} = \frac{51,76}{74,44}$

$F_{hitung} = 0,695$

Based on calculations, the Fcount value = 0.695. This value is then compared with the Ftable value with dk in the numerator (k–1=2–1=1) and dk in the denominator (n-k = 15-2 = 13) at a significance level of a = 0.05, namely 4.20. Because the test criteria value exists if calculated F < F table, namely 0.695 < 4.20, then Ho is accepted, so the two sample values are homogeneous.

Furthermore, based on the results of data processing using SPSS.26, a significance value of 0.526 or a value of 0.526 > 0.05 was obtained. The homogeneity test requirement is that if the significance value is > 0.05 then the data distribution is homogeneous. This research data passed the homogeneity test so that it could be continued for parametric analysis. The following are the results of the homogeneity test with the help of SPSS.26:

Tabel 3.
Test Homogenitas

Test of Homogeneity of Variance					
		Levene Statistic	**df1**	**df2**	**Sig.**
Hasil Belajar	Based on Mean	.412	1	28	.526

Siswa	Based on Median	.457	1	28	.505
	Based on Median and with adjusted df	.457	1	27.796	.505
	Based on trimmed mean	.467	1	28	.500

Hypothesis Testing

Hypothesis testing was carried out to determine whether the science learning outcomes of students in the experimental class using the project based learning model were significantly different from the science learning outcomes of students in the control class.

Hypothesis testing is used to determine temporary allegations formulated in the research hypothesis using a two-party test.

$$H_o : \mu_1 = \mu_2 \text{ lawan } H_1 : \mu_1 \neq \mu_2$$

H0 = There is no difference between the application of the project based learning model and the control class on the science learning outcomes of class V students at MIS AL Huda, Langkat

H1 = There is a difference between the application of the project based learning model and the control class on the science learning outcomes of class V students at MIS AL Huda, Langkat

μ1 = Average learning outcomes of students taught using the Project Based Learning model

μ2 = Average learning outcomes of students taught the lecture method strategy

The μ1 value is (66.7 post test - 46.7 pretest) = 20, while the μ2 value is (73.3 post test - 56.7 pretest) = 16.6 so the value of H1: μ1 ≠ μ2 is accepted which means There is a difference between the application of the project based learning model and the control class on the science learning outcomes of class V students at MIS AL Huda, Langkat.

Based on the test criteria, if tcount > ttable or significance level < a (sign value < 0.05) then Ho is rejected and H1 is accepted. This shows that there is a significant difference between applying the project based learning model and the control class. Meanwhile, if tcount < ttable or significance level > a (sign value > 0.05) then Ho is accepted and H1 is rejected. This means that there is no difference in applying the project based learning model and the control class for class V students at MIS AL Huda, Langkat.

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Tabel 4.
Hipotesis *Independen sampel t-test*

Asumsion	F	Sig	T	Df	Average Difference	Standard Error Difference
Same variance		,000	-1,331	27,960	-5,66667	5,00793

The table above shows that the t test value is sig < a = 0.05 (0.000 < 0.05) which indicates that H1 is accepted. This means that there is a significant difference between the experimental class (VA) which applies the project based learning model and the control class (VB). The following are the results of the independent sample test with the help of SPSS.26:

Tabel 5.
Independent Sample Test Menggunakan SPSS.26

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Hasil Belajar Siswa	Equal variances assumed	.412	.026	-1.395	28	.0174	-5.000	3.583	-12.340	2.340
	Equal variances not assumed			-1.395	27.761	.174	-5.000	3.583	-12.343	2.343

Discussion

Students' Science Learning Results before Applying the Project Based Learning Model in the VA MIS AL Huda Experimental Class Langkat

Based on data analysis, it shows that the average value of science learning outcomes for MIS AL Huda, Langkat students before being taught using the

project based learning model was 46.7 on the pretest score. The students' scores after giving the pretest were in the low category with a percentage of 13.33%. The science learning outcomes of students who were taught before implementing the project based learning model got a score in the medium category of 26.67%, and students who got a high score was 33.33%. This is because the learning model used does not emphasize student activity in learning activities. So students get bored easily and are not trained to learn independently.

Students' Science Learning Results after Implementing the Project Based Learning Model in Experimental Class VA MIS AL Huda Langkat

Based on data analysis, it shows that the average value of science learning outcomes for MIS AL Huda, Langkat students after being taught using the project based learning model is 66.7 on the posttest score. The students' scores after giving the posttest were in the medium category with a percentage of 60.00%. The science learning outcomes of students after implementing the project based learning model were 13.33% in the low category, and students who got high scores were 26.67%.

This is because the learning model used is a project based learning model which can involve students in learning activities. In the project based learning model, learning activities are dominated by students so they do not easily feel bored, are very initiative, and can be trained to learn independently. The project based learning model is a type of learning where students build their own knowledge by conducting an experiment and discovering a principle from the results of the experiment. This can be proven from the test results of students in science subjects before and after the project based learning model was implemented, namely in the medium category.

This happens because, in the experimental class, it is taught by applying the project based learning model. This model results in a pleasant learning process where in learning activities students can carry out experiments in the form of projects. The activeness and cooperation of students can be seen from the cohesiveness of students formed in groups, where in a group there is a group leader who gets the task from the teacher to convey orders to his group members to prepare a problem that has been chosen by each group, with work. The group can complete it quickly and precisely. This is what makes students comfortable in learning, because they can understand problems based on experience in carrying out projects. Based on this experience, students know what they don't know. So that learning can run actively and ultimately improve student learning outcomes in science subjects.

Students' Science Learning Results Before Applying the Lecture Model in the VB MIS AL Huda Control Class Langkat

Based on data analysis, it shows that the average value of science learning outcomes for class V students at MIS AL Huda, Langkat who were taught before implementing the lecture model was 56.7 on the pretest score. The students' scores after giving the pretest were in the medium category with a percentage of 13.33%. The science learning outcomes of students who were taught before implementing the lecture received a score in the low category of 6.67%, and students who got a high score was 33.33%. This happens because learning is not fun where in learning activities students do not do activities other than listening to the material being presented.

Students' Science Learning Results after Applying the Lecture Model in the VB MIS AL Huda Control Class Langkat

Based on data analysis, it shows that the average value of science learning outcomes for class V students at MIS AL Huda, Langkat who were taught after implementing the lecture model was 73.3 on the posttest score. The students' scores after giving the posttest were in the medium category with a percentage of 73.3%. The science learning outcomes of students who were taught after applying the lecture received a score in the low category of 26.7%, and students who got a high score was 0%.

Differences in Science Learning Outcomes of Students in the Experimental Class of VA MIS AL Huda, Langkat by Applying the Project Based Learning Model with the Control Class using the Lecture Model

Based on the ANOVA test for equality of variances, the value Fcount = 0.695 for Ftable = 1.671, which shows Fcount < Ftable (0.695 < 1.671). This means that the learning outcome data for both treatment groups come from a homogeneous population. The next step is to test the hypothesis that there is a significant difference between the experimental class (VA) using project based learning and the control class (VB) using lectures. This is indicated by a sig value < α = 0.05 (0.000 < 0.05), which indicates that H1 is accepted and Ho is rejected, meaning that there is a significant difference between the experimental class (VA) applying project based learning and the control class (VB) by implementing lectures

The results of calculating the average student learning outcomes between the two groups show that the science learning outcomes of students using the project based learning model are higher than the science learning outcomes using the lecture learning model. The average science learning outcome score for students in the control class was 66.67 and the average science learning

outcome score for students in the control class was 73.3 after the posttest was given.

1) Students who are categorized as having learning outcome scores in the "high" category are the experimental class at 26.67% and the control class at 0%.
2) Students who are categorized as having learning outcome scores in the "medium" category, namely the Control class 73.3% and the experimental class 60.00%.
3) Students who are categorized as having learning outcomes in the "low" category, namely the experimental class is 13.33% and the control class is 26.7%.
4) It can be concluded that there is an influence of the application of the project based planning model on the science learning outcomes of class V MIS AL Huda, Langkat.

CONCLUSION

Based on the results of the analysis and descriptive description of this research data, it can be concluded that there is an influence of the application of the project based learning model on the science learning outcomes of class V students at MIS AL Huda, Langkat. The science learning results before implementing the project based learning model for class V students at MIS AL Huda, Langkat, in the control class, the average learning result was 46.7. Meanwhile, the science learning outcomes after implementing the project based learning model for class V students at MIS AL Huda, Langkat in the control class average learning outcomes of 66.7.

In the control class, science learning outcomes were obtained for class V students at MIS AL Huda, Langkat with an average learning outcome of 56.7. Meanwhile, the science learning results after applying the lecture model to class V students at MIS AL Huda, Langkat were in the control class with an average learning outcome of 73.3.

The application of the project based planning model in science subjects influences student learning outcomes. This can be proven based on the results of hypothesis testing, the sig value < a = 0.05 (0.000 < 0.05). then it can be concluded that Ho is accepted and H1 is rejected. Furthermore, the application of the project based learning model can improve learning outcomes in science subjects. This can be seen from the increase in the average learning outcomes of students after implementing the project based learning model by 29.98%.

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