

The Effect of Using Learning Models *Project Based Learning (PjBL)* on Science Learning Outcomes

Azizah^{a*}, Nurul Annisa^b, Zulfuraini^c, Sisriawan Lapasere^d

Undergraduate of Primary School Teacher Education, Faculty of Teacher Training and Education
Tadulako University, Indonesia

Corresponding Author*: azizaathalib@gmail.com

Abstract

This research aims to determine the influence of the Project Learning (PjBL) learning model on the Science Learning Outcomes of Class V Students at SDN Inpres 1 Birobuli. The subjects in this research were 49 class V students of SDN Inpres 1 Birobuli. This type of research is quantitative research. The sample in this study was class Va as the experimental class and Vb as the control class. The instrument used is a multiple choice test which has been tested for validity and reliability. Data analysis used prerequisite tests, namely the normality test and homogeneity test as well as hypothesis testing using paired sample t-test which was analyzed using IBM SPSS Statistics 25. Based on the research results, it showed a significance value (2-tailed) of $0.000 < \alpha$ value of 0.05 . Because of the sig value. $0.000 < 0.05$ then accepts the H_a hypothesis and rejects H_o . So it can be concluded that there is an influence of the Project Based Learning (PjBL) learning model in improving the science learning outcomes of class V students at SDN Inpres 1 Birobuli.

Keywords: Learning Model; Project Based Learning; Learning Outcomes; Science Learning

1. INTRODUCTION

Education is defined as a means of improving the quality of human resources to ensure the sustainability and development of the nation. According to Dharsana (2017), "Education is a guidance effort that is centered on students who in their development are always connected to and influenced by their environment." Efforts to optimize the learning process in schools are one of the important aspects that must be considered in efforts to improve the quality of education because the success or failure of an educational goal lies in the learning process obtained by students while at school.

The Minister of Education and Culture, Research and Technology of the Republic of Indonesia explained that the aim of independent learning is, among other things, to provide wider opportunities for students to explore their individual interests and talents, so that they can choose the appropriate educational path. This will foster enthusiasm for learning encourage the nation's progress improve the quality of education and develop students' potential in the long term. This is in accordance with the decision of the Head of the Educational Standards, Curriculum and Assessment Agency of the Ministry of Education, Culture, Research and Technology Number 008/H/ KR/2023 and the Mandate of Law Number 20 of 2003 concerning the National Education System Chapter 1 Article 1 which reads: Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by oneself, the nation's community and the country.

From this understanding, it can be concluded that learning itself means a conscious effort by the teacher to make students learn, namely changes in their behavior when studying, where these changes are obtained by students with new abilities that are valid over a relatively long period of time. The indicator of the desired learning outcomes in learning is whether students can learn what they should learn and accept.

According to Jagantara et al., (2014), The task of education is to support students in self-development, namely in developing all possible skills and personal qualities in a positive direction, both

with themselves and with the environment. Education is not just about providing knowledge or values to practice skills. The task of education is to develop what students potentially and actually have.

According to Rifai et al., (2019) one of the lessons in elementary school is science which is a way to find out about nature systematically to master a collection of knowledge in the form of facts, concepts, principles, innovation processes, and have a scientific character. Several aspects of a scientific attitude in science learning that can be developed are curiosity, perseverance, optimism, cooperation, determination, openness, responsibility, free-thinking and self-discipline. Warda Rasidah et al., (2022) argue that science is also a collection of information, reflection, and research. To be effective and efficient, one of these tactics or approaches is applied training activities. This will have implications for science learning activities. Science is not just scientific knowledge but contains scientific content, process skills, and measurements that focus on behavioral characteristics and scientific character. Science is not only scientific knowledge but has scientific content.

Science learning is a science learning concept with more natural and real-world situations for students and encourages students to make science experiments and connect the knowledge that students have with everyday life. Science learning is learning that is closely related to student experience. This is reinforced by previous research by Permadi & Saini, (2017) which stated that science learning is one of the subjects that requires teaching aids and practice in learning. Therefore, in the science learning process, you need teaching aids. Apart from using teaching aids, teachers also use learning models that will involve students.

Learning outcomes are changes that occur after experiencing a learning process. According to Suprijono in Thobroni (2016) who states that learning outcomes are patterns of behavior, values, understanding, attitudes, appreciation, and skills. Students' learning outcomes achieved through education enable them to compete in various activities of community life. Learning outcomes are the peak of a student's learning success in relation to the specified learning objectives. Student learning outcomes can include cognitive (knowledge), affective (attitude), and psychomotor (behavior) aspects. Meanwhile, according to Azizah (2018), science learning outcomes are the abilities that students have after the teaching and learning process is carried out and are expressed in scores, grades, test results, and standard values expected after using teaching models in learning. Thus, the science learning outcomes in this research are the scores obtained by students after implementing the inquiry learning model.

From this understanding, we can conclude that learning outcomes are the final results obtained or achieved by students after experiencing a learning process. This is marked with a grade scale in the form of letters, symbols, or numbers, and is usually used as a measure of whether a student has learned successfully. Based on the results of interviews and observations conducted by researchers on August 14, 2023, class V students at SDN Inpres 1 Birobuli show that there are still problems that are obstacles in the learning process. These problems include the fact that in the science learning process, students are still unable to relate what they have learned to how the knowledge they have learned will be used or exploited. This is because the learning process used by the teacher still uses the lecture method of delivering the material without being accompanied by the use of learning media so that the material seems abstract to students. The learning process will only be centered on the teacher (Teacher Center Learning), resulting in students having low motivation in learning and lacking self-confidence when appearing in front of the class. man.

One way to overcome the problems above is to use the Project Based Learning (PjBL) learning model. According to Chaerul Abas and Deni Darmawan (2017), the Project Based Learning (PjBL) learning model is a learning method where teachers have the opportunity to manage a learning system by creating a product during the learning process in class. Through this project assignment, the teacher asks questions or basic problems that guide the products and work that will be created. Next, students are required to create a product planning design and prepare an appropriate product manufacturing process schedule. To observe the development of projects for products made by students, teachers must also monitor the development of the product and then ask students to check their work on the product. Anggreni et al., (2019) The average value of critical thinking and communication skills for students taught using the Project Based Learning (PjBL) model is higher than conventional learning. This is supported by several theories that reveal several advantages of the Project Based Learning (PjBL) model compared to other models. The Project Based Learning (PjBL) model provides opportunities for

students to build knowledge and develop their skills and can help students provide solutions to problems in everyday life because they have been trained to discover concepts directly through the practicum. Based on the description above, the researcher is interested in conducting research with the title "The Effect of Using the Project Based Learning (PjBL) Model on the Science Learning Outcomes of Class V Students at SDN Inpres 1 Birobuli".

2. RESEARCH METHODS

This research was conducted through experimental research. This type of research is quantitative, where experimental research is carried out in two groups, namely the experimental group and the control group. Where the VA class was chosen as the Experimental class by applying the Project Based Learning (PjBL) learning model and the VB class as the control class by applying the conventional method (lecture). The experimental research design used in this research is an experimental design in the form of a control group pre-test and post-test design. Data collection techniques use multiple choice tests, and data analysis techniques use normality tests, homogeneity tests, and hypothesis tests.

This research was carried out at SDN Inpres 1 Birobuli because the learning process used by the teacher still used the lecture method of delivering material without the use of learning media so that the material seemed abstract to students. This research was conducted in the even semester of 2023-2024 in March 2024. There were 25 students in the VA class at SDN Inpres 1 Birobuli, while the VB class had 24 students. There are 14 male students in the VA class and 11 female students, while the VB class has 24 students. There were 12 male students in the VA class and 12 female students who were the subjects of this research.

3. DISCUSSION RESULT

Research conducted at SDN Inpres 1 Birobuli tested the effect of using the Project Learning (PjBL) learning model on the science learning outcomes of class V students at SDN Inpres 1 Birobuli, especially on the material Properties of Light. Class Va students as the control class and class Vb students as the control class. experiment. Student learning outcomes were obtained using the test instrument which consisted of 20 numbers in multiple-choice form. The results of descriptive analysis using the IMB SPSS statistics 25 application aim to determine the data that has been collected from the experimental class and control class. The results of this analysis pay attention to various results consisting of average (mean), minimum value, maximum value, and standard deviation.

1. Pre-Test Data

The pre-test is an initial test to determine students' ability to understand the material on the properties of light. Before being tested in the experimental and control classes, the questions given to students were tested using validity and reliability tests. The experimental class data is in Appendix 15 page 109 and the control class data is in Appendix 16 page 110. The results of the pretest data for the experimental class and control class with calculations using the IMB SPSS statistics 25 program can be seen in Table 1.

Table 1. Pretest Analysis Results

Statistics	<i>Pretest Data</i>	
	Experimental Class	Control Class
Mean	67.32	67.46
Std. Deviation	7,576	7,077
Minimum Score	55	55
Maximum Score	81	80

2. Post-Test Data

The posttest is a final test that aims to measure or determine students' ability to understand the material on the properties of light and find out the results of the learning process that has been carried out. More details can be seen in the experimental class learning results in appendices 15 and 16, pages 109-110. The results of the statistical analysis of post-test data for the experimental class and control class can be seen in Table 2.

Table 2 Posttest Analysis Results

Statistics	Posttest Data	
	Experimental Class	Control Class
Mean	84.92	78.67
S t d. Deviation	5,090	4,517
Minimum Score	7 7	72
Maximum Score	93	8 8

Based on the results of the analysis above, it can be concluded that the use of the *Project Learning (PjBL) learning model* can influence the science learning outcomes of class V students at SDN Inpres 1 Birobuli. The difference in the average *post-test scores* in the two classes shows that the use of the *Project Learning (PjBL) learning model* can improve the science learning outcomes of class V students at SDN Inpres 1 Birobuli.

3. Normality Test

The normality test in this research uses the help of the IBM SPSS *Statistics 25 program*. The test criteria used to measure normality in this research are if the Sig value is > 0.05 then the data is normally distributed and if the Sig value is < 0.05 , the data is not normally distributed. Data normality test results using Lilliefors (Shapiro-Wilk) with the help of the IBM SPSS *Statistics 25 program*. The following is a description of the normality test results for the control class and experimental class which can be seen in table 3.

Table 2. Normality Test of Pretest and Posttest Data

Results	Class	Shapiro-Wilk		
		Statistics	Df	Sig.
	Pre-Test Experiment	.939	25	.137
	Post-Test Experiment	.925	25	.066
	Pre-Test Control	.963	24	.511
	Post-Test Control	.917	24	.051

4. Homogeneity Test

The homogeneity test is a statistical test procedure to show that two or more groups of sample data come from populations that have the same variations. The homogeneity test was carried out using the Levene Test with the help of the IBM SPSS *Statistics 25 program*. The test criteria carried out to determine population homogeneity in this study were if the sig value obtained was \geq the specified α

level, namely 5% (0.05), then It can be said that the data group comes from a population that has the same variance (homogeneous), which can be seen in Table 4.

Table 4 Homogeneity of the Experimental Class and Control Class

	Levence Statistics	df1	df2	Sig
Results Based on mean	,340	1	47	,562

5. Hypothesis Testing

Hypothesis testing was carried out at a significance level of 5% (0.05). The decision-making criteria for accepting or rejecting Ho in this test are if the significant value is > 0.05 then Ha is rejected and Ho is accepted, conversely, if the significant value is < 0.05 then Ha is accepted and Ho is rejected. The results of the Paired Sample T Test analysis with calculations assisted by the IBM SPSS Statistics 25 program can be seen in Table 5.

Paired Sample T-Test Results

Paired samples t-test		
Paired Differences		
		Pair 1 pretest_eks - posttest_eks
Mean		-17,640
Std. Deviation		8,062
Std. Error Mean		1,612
95% Confidence Interval of the Difference	Lower	-20.968
	Upper	-14.312
T		-10.941
df		24
Sig. (2-tailed)		.000

The Paired Sample T Test output results above show a significant Paired Sample T Test value of 0.000. Because the significant value of the T-test < 0.05 (0.000 < 0.05) then Ha is accepted and Ho is rejected. So it can be concluded that there is an influence of the Project-based Learning (PjBL) learning model on the science learning outcomes of class V students at SDN Inpres 1 Birobuli. Teachers play an important role as facilitators so that students are more enthusiastic about teaching so that student learning outcomes increase. The aim of this research is to determine whether there is an influence of the Project-based Learning (PjBL) learning model on the science learning outcomes of fifth-grade students at SDN Inpres 1 Birobuli.

Based on the results of the data analysis explained above, show that the average value of science learning outcomes for students in the pre-test or before being given treatment in the experimental class was 67.32, while for students in the control class, it was 67.46. Between the experimental class and the control class, it can be seen that both have almost the same low initial abilities. This occurs due to students' lack of understanding of the material presented by the teacher.

The treatment that researchers used in the experimental class was the Project Based Learning (PjBL) learning model which can help teachers in carrying out learning and students can directly observe the properties of light. Using the Project Based Learning (PjBL) learning model can provide more meaningful learning because it can improve students' science learning outcomes, especially regarding the properties of light in everyday life and while observing the properties of light around them.

Meanwhile, the treatment used in the control class was using thematic books used by the class teacher as well as lecture and assignment methods.

The researcher gave treatment to the experimental class and control class twice. Before that, the researcher gave a multiple choice test as a post-test for the science learning outcome scores in the experimental class, which obtained an average of 84.92, while the post-test for the science learning outcome scores in the control class obtained an average score of 78.67. There were significant changes to student learning outcomes in the experimental class which used the Project-based Learning (PjBL) learning model compared to the control class without treatment. The use of the Project-based Learning (PjBL) learning model is influential when used in experimental classes because the class situation at that time is more lively because there is an active interaction between the teacher and students on material that uses the Project-based Learning (PjBL) learning model so that it is easy for students to understand and able to encourage students to think about the problems they face regarding the properties of light.

This is in accordance with the advantages of the Project-based Learning (PjBL) learning model obtained from Sani as quoted by Murfiah (2017), namely a) Involving students in complex real-world problems, which allows students to define issues or problems that are meaningful to them. b) Requires a process of inquiry, research, planning skills, critical thinking, and problem-solving skills in an effort to create a project. c) Involve students in learning to apply knowledge and skills in varied contexts when working on projects. d) Provide opportunities for students to learn and practice interpersonal skills when working together in groups and with adults. e) Provide opportunities for students to practice the skills needed for life and work (allocating time, being responsible, learning through experience, and so on). f) Includes reflection activities that direct students to think critically about experiences and relate these experiences to learning standards.

This is in accordance with Mas-mulyono's (2018) research which states that implementing the Project Based Learning (PjBL) learning model can improve the learning outcomes of grade 4 students at Jatisari Elementary School on science learning material about the nature of light.

Learning in the control class with the application of conventional methods and the use of video media also experienced a significant increase in learning outcomes because the provision of material was very limited, such as the Project-based Learning (PjBL) learning model which was given treatment regarding the properties of light. Only a few examples are provided for one material regarding the properties of light. So students do not have a benchmark for comparison in observing the four material points of the properties of light

Based on the results of calculations using the Paired sample T-Test, a significant value of $0.000 < 0.05$ was obtained, thus accepting the alternative hypothesis (H_a), namely, the Project-based Learning (PjBL) learning model on the science learning outcomes of class V students at SDN Inpres 1 Birobuli.

This research was also previously conducted by Izhur Fahrezi in 2020 with the title "Meta-Analysis of the Impact of the Project-Based Learning (PjBL) Learning Model on Students' Learning Achievement in Elementary School Science Subjects." The research results show that Project Based Learning (PjBL) learning can improve student learning outcomes whose average score before learning with the Project Based Learning (PjBL) learning model is 63.29 and can increase from 16.85 to 80.15.

4. CONCLUSION

Based on the results of the data analysis, it can be concluded that the t-test analysis obtained a significant value of 0.000. Because the significance value of the t-test $< \alpha$ ($0.000 < 0.05$), H_a is accepted and H_o is rejected, so it can be concluded that there is an influence of the Project-based Learning (PjBL) learning model on the science learning outcomes of class V students at SDN Inpres 1 Birobuli. There are changes in the level of student learning outcomes in experimental classes that use the Project-based Learning (PjBL) learning model. The Project-based Learning (PjBL) learning model can improve student learning outcomes because it can help students to be more active, learning is more meaningful because

it can make it easier for students to study independently or in groups so that it can increase their understanding of science lessons and help students master the learning material effectively. fast.

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