

THE EFFECT OF PROJECT-BASED LEARNING ON FIFTH-GRADE STUDENTS' IPAS LEARNING OUTCOMES: A QUASI-EXPERIMENTAL STUDY

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ARTICLE INFO

Article history:

Received : Mar 05, 2025

Revised : Aug 18, 2025

Accepted : Dec 17, 2025

Available online : Dec 31, 2025

Keywords:

Project Based Learning, Student Learning Outcomes, Social Studies Lessons.

ABSTRAK

The learning model greatly determines the effectiveness of learning. One of the learning models that can be applied to overcome problems is to use the *Project Based Learning* learning model which provides opportunities for students to learn actively. The purpose of this study is to determine the Effect of the Use of *Project Based Learning* on the Learning Outcomes of Grade V Students of SD Inpres Bumi Sagu. This study is an experimental research conducted on two groups, namely the experimental group and the control group. The research design used in this study is *Quasi Experimental Design* using a *Non-equivalent Control Group Design*. The population in this study is grade V students of SD Inpres Bumi Sagu, which totals 30 students. The samples in this study were class VB as the control class and class VA as the experimental class. The research instruments are in the form of *pretest* and *posttest*. Data were analyzed using the SPSS 30.0-assisted *Independent Sample t-Test*. The results of the analysis showed a significance value (*p-value*) of $0.001 < 0.05$ which means that there is a significant difference between the two groups. These findings show that *Project Based Learning* is effective in improving student learning outcomes. Theoretically, this research strengthens the theory of constructivism in learning, while it can practically be an alternative to innovative learning models in elementary schools.

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INTRODUCTION

Education is a very important factor in producing young people who are competent and ready to face future challenges. Education is an effort to improve (HR) which is one of the important factors for the development of a nation, in line with Education is one way to improve the quality of human resources with the aim of preparing the younger generation as the successor of the nation who is able to face the development of science

and technology. Law No. 20 of 2003 concerning the National Education System article 1 paragraph (1) states that 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 morals, and skills needed by themselves, society, nation and state. Education does not only form people who are different from other Pictures who can eat and drink, dress and have a house to live in, this is called the term humanizing humans. So that learning is one of the factors that greatly supports the quality of education, with good learning, of course, it will create good quality education as well. (Fitriani and al. , 2021) (Alya and al. , 2021) (Pristiwanti et al., 2022)

According to the learning process, the existence of teachers is very urgent, because the teacher determines whether the learning goals are achieved or not, the results of the study state that although there is an encouraging improvement in the quality of education, the learning and understanding of students at the elementary level, including Madrasah Ibtidaiyah in some subject matter, shows unsatisfactory results. Learning at the elementary school level or Madrasah Ibtidaiyah tends to (Mirdad, 2020) *be textbook oriented* and less related to students' daily lives. In line with Arif Firmansyah, the main task of teachers is to teach, that is, convey or transfer knowledge to their students, therefore an elementary school teacher is required to master all fields of study. Teachers need to have professional standards by mastering the material and learning strategies and can encourage their students to study hard to be able to get good results in a series of educational and learning activities. A teacher's professional competence is a teacher's ability to master learning which includes: planning, implementing and evaluating learning in accordance with their field of expertise. (Roringi & Zulfuraini, 2021) (Nasrullah and al. , 2022)

Wardani said that teachers as educational leaders are not only to students as they are, but are required to provide professional, creative, and fun services so that it is easier for students to learn. This is in line with the opinion that learning aims to achieve maximum learning outcomes through various approaches that are in accordance with the goals to be achieved. To achieve this goal, an in-depth study of the various components of learning is needed. (Mubarak, 2022) (Sari and al. , 2023)

However, there are still many teachers who use learning models that have not varied and the learning methods are still conventional. So far, the learning method provided by teachers still uses conventional methods with lecture methods. This method

results in the learning process and mastery of the material taught to be less than optimal and students are also less able to think critically and can affect student learning outcomes (Budiman 2014).

One of the factors that can improve the quality of education is the implementation of a learning model that increases the creativity and activeness of students. Thus, in choosing a learning model is one of the important factors in realizing the success of education. According to Joice & Weil in the Learning Model, a pattern or plan that has been planned in such a way and is used to develop the curriculum, organize the subject matter, and give instructions to the teacher in his class. (Talib & Maulinda , 2021)

Based on the results of initial observations made by researchers in schools with grade V teachers of SD Inpres Bumi Sagu, it was obtained that the minimum completeness score that must be achieved by students is 70, from the results of the report card scores there are 5 students who do not achieve the minimum completeness score. Based on the explanation of the homeroom teacher of grade V of SD Inpres Bumi Sagu, data was obtained that in the learning process using *the Direct Instruction* learning model, it can be seen that learning runs monotony. Teachers give more lectures in front of the class, while students sit and listen with little interaction. Some students seemed confused, but hesitant to ask questions because the classroom atmosphere was too rigid and the teacher dominated the communication. During the learning activities, students only follow the instructions to record and answer questions. As a result, some students look bored and lose focus. This overly teacher-centered learning makes students with kinesthetic and visual learning styles seem to have difficulty understanding the material, because they do not get a varied learning experience. Students' critical thinking skills and creativity are also lacking because there are no activities that encourage them to actively participate or solve problems independently. Learning in the 21st century leads students to have 21st century skills consisting of critical *thinking*, creative, *collaboration* and communication skills which are better known as 4C skills. One of the learnings that improves these skills is social studies learning. IPAS is a science that studies the interaction of inanimate objects and living things in the universe and how they as individuals socialize and interact with their environment. So that the learning model greatly determines the effectiveness of learning. This observation shows that the (Rosnaeni, 2021; Suharyat and al., 2022) ('Adilah & Haryanti, 2023) (Susilowati, 2023) *Direct Instruction* model has weaknesses in actively involving students and providing

space for the development of deeper social and cognitive skills, resulting in low student learning outcomes.

One of the learning models that can be applied to overcome problems is to use *the Project Based Learning* (PjBL) learning model which provides opportunities for students to learn actively, according to Afriana et al. in . PjBL is a learning model that provides meaningful experiences and produces a project in the learning process. (Nababan and al. , 2023) *Project based learning* provides opportunities for a student-centered, more collaborative learning system, where students are actively involved in completing projects independently and working together in a team and integrating real and practical problems. The goals to be achieved for students are very diverse, for example thinking skills, social skills, psychomotor skills, and process skills. In line with Nababan according to the advantages of (Nurhamidah & Nurachadijat, 2023)*the Project Based Learning* learning model , which includes being able to increase students' motivation to learn, make students more active and successfully solve complex problems, increase student collaboration, and provide learning and practice experience to students in organizing projects.

Based on the above background, the researcher is interested in proving whether *the Project Based Learning* model can really have an influence on student learning outcomes. Therefore, the main purpose of the study is to find out whether there is an effect of the use of *Project Based Learning* on the learning outcomes of grade V students of SD Inpres Bumi Sagu.

RESEARCH METHODS

The type of research conducted by researchers is quantitative research. The research method used in this study is a *Quasi Experimental Design* type experimental research using a *Non-equivalent Control Group Design*, which is a *quasi* experimental design that uses a *pretest* before being given treatment, and a *posttest* after treatment which can be described as follows: (Squirrelly & Masniladevi , 2020)

Table 1. Research Design Design

Groups	Pre-Test	Independent Variables	Post-Test
KE (Experimental Class)	O1	X1	O2
KK (Control Class)	O3	X2	O4

In this study, the population is divided into 2 classes, namely the experimental class and the control class. After that, each class is given a *pretest* (O1,O3) to find out the

students' initial knowledge before treatment using *Project Based Learning* (X1) and *Direct Instruction* (X2), In the learning process, students will also carry out projects, namely simple technology projects. At the end of the learning process, students will be given a *posttest* (O2,O4) to see the students' abilities after receiving the treatment provided by the researcher through the learning models and media that have been provided by the researcher. From the results obtained, data processing and hypothesis test data analysis were carried out.

Based on the above research method, the hypotheses of this research include:

It has: Usage *Project Based Learning* (PjBL) affects the learning outcomes of grade V students of SD Inpres Bumi Sagu.

With: Usage *Project Based Learning* (PjBL) has no effect on the learning outcomes of grade V students of SD Inpres Bumi Sagu.

RESULTS AND DISCUSSION

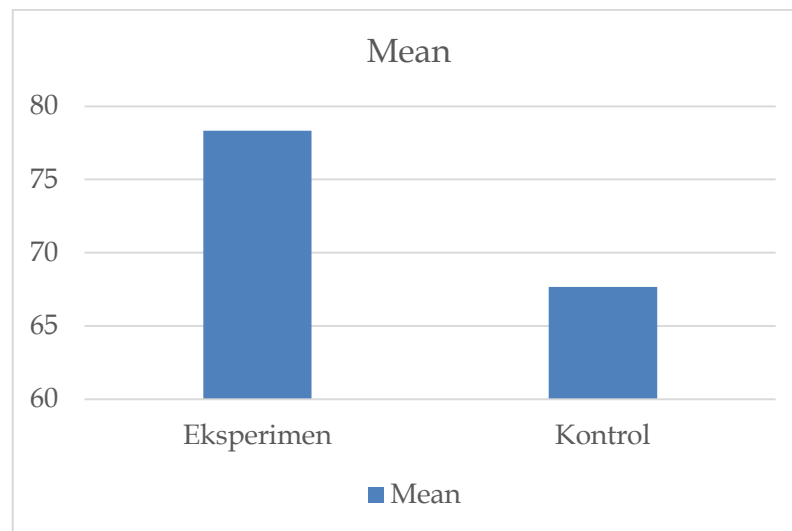
The data of this study consists of *Pretest* and *Posttest data*. The following is the *Pretset* and *Posttest score data*:

Table 2. Pretest and Posttest scores of control class and experiment class

Test Type	Highest Score	Lowest Score	Average
Experimental Class Pretsets	85	20	49,00
Control Class Pretest	80	15	44,00
Experiment Class Posttest	100	55	78,33
Control Class Posttest	95	40	67,67

Based on the table above, it can be seen that the difference between the *pretest* score in the experimental class 20 and the control class for the lowest score is 15 and the highest score in the experimental class is 85 while the control class is 80 with an average of 44.00 and 49.00 for the experimental class, respectively. As for the *posttest* score, the highest score was in the experimental class of 100 and the control class of 95 with the average *posttest score* of 78.33 and the control class of 67.67, respectively. In the experimental class, there were only 3 students who had not completed the KKM, this is because during the group discussion learning process, the student relied more on his smart friends so that it affected the work on individual student problems.

The comparison between the experimental class and the control class was quite different, with the *pretest* score conducted before learning with the *posttest* score obtained at the end of the learning and after being treated with the *Project Based Learning* model. As seen in the table, the highest *posttest* score is 100, and the lowest is 55, with an average score of 78.33, and there are only 3 students who do not meet the Minimum Completeness Criteria (KKM). This shows that there is an increase from *pretest* scores that were treated before being treated with *posttest* scores that have been treated with the *Project Based Learning* model. As for the control class, the highest *posttest* score is 95 and the lowest is 40 with an average score of 67.67 which is still below the KKM. The increase in student learning outcomes was marked by a higher average *posttest* score in the experimental class than the *posttest* score in the control class, which was $78.33 > 67.67$.



Picture 1. Comparison of Experimental Class and Control Class Posttest Average

Based on Picture 1, it can be seen that the average *posttest* score of the experimental class (78.33) is higher than that of the control class (67.67). This difference shows that the application of the *Project Based Learning* model provides a better improvement in learning outcomes than the *Direct Instruction* model.

Initial Data Analysis (*Pretest*). The Normality Test, according to Ghazali, is a test that aims to find out whether independent and dependent variables have a normal distribution or not. The normality test is carried out on the data obtained from (Birowo & Fuadati, 2021) *pretest* scores. The calculation of the normality of *Pretest* scores can be seen in the following table:

Table 3. Normality Test

Classes	Kolmogorov-Smirnov		
	Statistics	Df	Sig
Eksperimen	0,133	15	0,200
Control	0,133	15	0,200

Based on the table above, the significant value in the experimental class was $0.200 > 0.05$ and in the control class $0.200 > 0.05$. It can be concluded that the *experimental* class and control class pretest data are normally distributed because they get a significant level > 0.05 . To test the normality of the *experimental* and control class pretest scores, they can be analyzed using the *kolmogorov-smirnov* formula with the help of calculations using the *SPSS for Mac 30.0* program.

Homogeneity test. The calculation of the posttest value homogeneity test can be seen in the following table:

Table 4. Homogeneity Test

		Levene Stasistic	df1	df2	Say.
Student Learning Outcomes	Based on Mean	1.086	1	28	.306
	Based on Median	.915	1	28	.347
	Based on Median and with adjusted df	.915	1	27.958	.347
	Based on trimmed mean	1.091	1	28	.305

Based on the table above, that $df2$ or the number of samples ($N-2$) and sig. are significant values, the magnitude of the significant value in the experimental class and the control class is 0.305 greater than the α level set which is 0.05 which means that the value of $0.305 > 0.05$ then the data meets the homogeneity assumption. This means that the population being studied is similar or homogeneous. The homogeneity test was performed using the *SPSS for Mac 30.0* program.

After the normality test and homogeneity test were carried out, it was known that the learning outcomes of the experimental class and the control class were normally distributed and had a sample with homogeneous variants, so a hypothesis test could be carried out. In this study, the *Paired Sample t Test* was used. This hypothesis test was carried out with the *Paired Sample t Test* to see whether or not there is a significant influence of the use of *Project Based Learning* on the learning outcomes of grade V students of SD Inpres Bumi Sagu for the 2024/2025 school year.

The results of the *Paired Sample t Test* data *Pretest* and *Posttest* of the experimental class can be seen in the following table:

Table 5. Hypothesis Test Results

<i>Paired Differences</i>								
<i>95% Confidence Interval of the Difference</i>								
	Mean	Hours of deviation	Std. Error Mean	Lower	Upper	T	df	Sig/(2-tailed)
Pair 1	-29.333	14.125	3.647	-37.155	-21.511	-8.043	14	<,001

Based on the results of the *Paired Sample t Test output* in the table above, the significance value of the *Paired Sample t test* is $0.001 < 0.05$. Because the significant value (2-tailed) $< \alpha$ is $0.001 < 0.05$, H_a is accepted and H_o is rejected. Based on this data, it was concluded that the hypothesis test stated that *Project Based Learning* had an effect on the learning outcomes of Class V students of SD Inpres Bumi Sagu. The *Paired Sample T Test* was performed using the *SPSS for Mac 30.0 program*.

In addition to the significance test, the *effect size* was also calculated using *Cohen's formula d* to determine the magnitude of the influence of the use of *Project Based Learning* on student learning outcomes. Based on calculations, *Cohen's d* value of 2.07 was obtained which was included in the *very large effect* category. This shows that the application of the *Project Based Learning* model is not only statistically significant, but also has a very strong influence on improving the learning outcomes of grade V students of SD Inpres Bumi Sagu.

Discussion

Based on the results of hypothesis testing which states that *Project Based Learning* has an effect on the learning outcomes of grade V students of SD Inpres Bumi Sagu. *Project Based Learning* has an effect on the learning outcomes of grade V students of SD Inpres Bumi Sagu, shown by the *Sig t-test* in the table of test analysis results – t. In the column, it can be seen that the value of the *sig t-test* is less than α ($0.001 < 0.05$), then H_o is rejected and H_a is accepted, which means that the use of *Project Based Learning* affects the learning outcomes of grade V students of SD Inpres Bumi Sagu.

The use of *Project Based Learning* is said to affect the learning outcomes of grade V students of SD Inpres Bumi Sagu. This is shown by the difference in the average score of student learning outcomes in the *experimental class posttest* which in science learning uses *Project Based Learning* and the control class uses *Direct Instruction*. This is in line with the definition of learning outcomes according to what is meant by learning outcomes are the results that have been achieved by students after they participate in learning activities. (Sunarti, 2021)

The results of this study are consistent with previous findings that show that the implementation of *Project Based Learning* significantly improves learning outcomes and other aspects of science learning in elementary school students. Like international research conducted by (Pangestu and al., 2024) *Project Based Learning* has a significant impact on student learning outcomes, motivation, and creativity in science education. The implementation of *Project Based Learning* in the classroom positively affects student achievement rates, as they show a higher level of understanding and retention of scientific concepts compared to traditional teaching. Through descriptive analysis, the experimental group achieved an average learning outcome of 83, a motivation score of 76, and a creativity score of 85. In contrast, the control group obtained lower scores, with an average learning outcome of 74, a motivation score of 65, and a creativity score of 71.

This is also in accordance with research conducted by those who stated that there is a significant influence of the (Muzria & Indrawati, 2020) *Project Based Learning* learning model on student learning outcomes. This is because in learning that applies the *Project Based Learning* model, students are required to actively carry out learning activities by understanding material concepts and being able to create a project. The results of this study are relevant to the research conducted by the (Nurhadiyati and al., 2021) *Project Based Learning (PjBL) model* on student learning outcomes, based on the results of hypothesis testing, a t stat value of t stat (26.605) > t table (1.729) was obtained, which means that H_0 was rejected and H_1 was accepted at the level of 5%. Based on this, it can be concluded that there is an influence of the PjBL Model learning on learning outcomes in grade IV, in line with the research conducted by the influence of Project Based Learning (PjBL) (Danny and al., 2021) on mathematics learning outcomes in elementary schools, based on the results of the research obtained the lowest score in the *pretest* class which is 40, while the highest score is 83.3. Based on the calculations that have been made, the average score of the *pretest* class is 70. The lowest score in the *posttest* class is 60, while the highest score is 100. Based on the calculations that have been made, the average score of the *posttest* class is 83.3. The *Project Based Learning* learning model has a positive effect on mathematics learning outcomes. The implication of this research is that by applying this PjBL model, student learning outcomes will increase, and students will more easily understand mathematical concepts in the learning process. Thus using project-based learning can provide students with experience in organizing projects, allocating time, and managing resources such as equipment and materials to complete tasks.

According to Andita, the (Noviati, 2021) *Learning Model Project Based Learning* (PjBL) is an innovative learning that is student-centered (*Student Centered*) and places teachers as motivators and facilitators, where in this case students are given the opportunity to work autonomously to construct their learning. PjBL also allows learners to reflect on their own ideas and opinions, and make decisions that affect the outcome of the project and the learning process in general, and present the final product results. (Lailatunnahar, 2021)

The research was carried out on grade V students of SD Inpres Bumi Sagu, in the learning process using the *Project Based Learning* learning model. During the learning process, the researcher found several conveniences obtained in using the *Project Based Learning* model in understanding the material, including (1) making students think critically in solving problems so that they can improve students' abilities, (2) encouraging students to practice communication skills so that good collaboration is formed for fellow students, (3) improving students' skills in managing resources into a products that indirectly students understand well about the material being taught. Apart from some of the conveniences above, researchers found several drawbacks or weaknesses in using the *Project Based Learning model*: (1) there are some students who are anxious (anti-social), find it difficult to interact with their group mates and tend to be silent and engrossed in themselves, (2) it takes a lot of time to solve problems and produce products. To overcome these shortcomings, what teachers can do is encourage students to work together with his friends and make a planning schedule so that the time used is more effective.

Theoretically, the effectiveness of the implementation of *Project Based Learning* can be understood through the concept of constructivism pioneered by Piaget and Vygotsky. In a constructivist view, the learning process will be more optimal when students are actively involved in building their own understanding through direct experience and problem-solving activities, rather than simply receiving one-way explanations from the teacher. Through *Project Based Learning*, students are assigned to work on projects that encourage them to investigate, collaborate, and reflect on the science concepts studied. This process makes learning more meaningful because it is related to real situations. The intellectual and emotional engagement formed during project activities ultimately contributes to the overall improvement of student learning outcomes.

Theoretically and practically, the findings of this study make complementary contributions. From the theoretical side, the results of the study broaden the understanding of the application of *Project Based Learning* in science learning in

elementary schools by presenting empirical evidence that the model is effective in increasing learning participation, high-level thinking skills, and academic achievement of students, in line with the foundation of constructivism which emphasizes the active role of students in building knowledge. Meanwhile, from a practical perspective, this finding provides recommendations for teachers and education policy makers to consider *Project Based Learning* as an alternative learning strategy that is relevant and effective in improving the quality of science learning. The application of this model also has the potential to encourage the development of 21st century competencies, such as creativity, collaboration, and problem-solving skills, which are urgently needed by students to face the learning challenges at the next level of education.

CONCLUSIONS AND SUGGESTIONS

Conclusion

Based on the analysis of the results and the discussions that have been carried out, it can be concluded that the use of *Project Based Learning* has an effect on the learning outcomes of grade V students of SD Inpres Bumi Sagu. This can be seen from the final score or *posttest* score of the experimental class which in learning using *Project Based Learning* obtained an average score of 78.33. In the control class that used the *Direct Instruction model*, the *posttest score* was 67.66 on average. Second, the final results of the *posttest from the experimental class and the control class were carried out with the Paired Sample T Test with a significance value of $0.001 < 0.05$, so that it can be concluded that the use of Project Based Learning has an effect on the learning outcomes of grade V students of SD Inpres Bumi Sagu.*

Suggestions

This research has limitations in its use because this study was only carried out on technology materials and has not studied other materials in science learning. So it is recommended that the next researcher conduct research that discusses using other materials in science lessons.

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