

The Effect of Project-Based Learning on IPAS Learning Outcomes Fifth-Grade Students at MIN 6 Boyolali

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ABSTRACT

Project-Based Learning (PjBL) is a learning model centered on project-based activities designed to enhance student engagement and learning outcomes. This study aims to analyze the effect of Project-Based Learning on the IPAS learning outcomes of fifth-grade students at MIN 6 Boyolali for the 2025/2026 academic year. The study employed a quantitative approach with a correlational design. All 83 fifth-grade students were selected as the sample using total sampling. Data on the implementation of Project-Based Learning were collected using a Likert-scale questionnaire covering aspects such as trigger questions, project planning, project implementation, teacher guidance, final products, and reflection and evaluation, while learning outcome data were obtained through documentation of daily test scores on ecosystem material. The research instruments met validity criteria based on Aiken's V index and reliability criteria based on Cronbach's Alpha coefficient. Data analysis was conducted descriptively, followed by a Kolmogorov-Smirnov normality test, a linearity test, and simple linear regression using SPSS version 31. The results showed that the implementation of Project-Based Learning fell into the moderate category (47.0%), while IPAS learning outcomes were also predominantly in the moderate category (49.4%) with an average score of 84.18. The regression analysis results indicate that Project-Based Learning has a positive and significant effect on IPAS learning outcomes ($\beta = 0.286$; $t = 2.681$; $p = 0.009$). The coefficient of determination (R^2) of 0.082 indicates that Project-Based Learning contributes 8.2% to the variation in student learning outcomes, while 91.8% is influenced by other factors outside the scope of this study. Thus, Project-Based Learning can be used as an alternative instructional model to improve IPAS learning outcomes in elementary schools.

Keywords

Project-Based Learning, Learning Outcomes, IPAS.

Introduction

Learning is one of the key factors in developing high-quality human resources capable of facing the challenges of the 21st century. In its implementation, the learning process is no longer solely focused on mastering subject matter but is also directed toward developing critical thinking skills, creativity, collaboration, and communication. At the elementary school level, the Natural and Social Sciences (IPAS) subject plays a strategic role in building students' integrated understanding of natural and social phenomena. Through IPAS instruction, students are expected not only to understand basic concepts but also to analyze problems and apply the knowledge they have gained in their daily lives. Thus, the success of IPAS instruction is measured not only by mastery of subject matter but also by students' ability to think critically and solve problems in a contextual manner (Komariah et al., 2023).

However, the reality of learning in schools still reveals various obstacles that hinder the achievement of these goals. Current teaching practices tend to be dominated by lectures and individual assignments, resulting in students acting as passive recipients of information. This situation leads to low student engagement in the learning process and limits opportunities to develop higher-order thinking skills (HOTS). According to Fahrezi et al. (2020), a teacher-centered learning approach is ineffective in optimizing student participation. Similarly, Nurhadiyati et al. (2020) state that the lack of exploratory activities and hands-on practice results in students focusing solely on memorizing information without being able to conduct in-depth analysis of the material being studied.

The gap between curriculum requirements that emphasize active learning and teaching practices that remain conventional highlights the need for innovative learning models. From an Islamic educational perspective, the importance of thinking, observing, and reflecting on natural phenomena is also emphasized in Quranic Surah Ali 'Imran, verse 191, which encourages humanity to reflect on the creation of the heavens and the earth. This value aligns with IPAS learning, which requires students to actively observe, investigate, and solve problems. Therefore, a learning model is needed that can facilitate students' direct involvement in the process of knowledge construction.

One learning model considered suitable for these needs is Project-Based Learning (PjBL). This model provides students with the opportunity to learn through the planning, implementation, and evaluation of projects related to real-world problems. PjBL also encourages students to work collaboratively, conduct investigations, and produce outcomes as a form of applying the concepts they have learned (Taupik & Fitria, 2021). Various previous studies have shown that the implementation of PjBL can enhance learning motivation, student engagement, and learning outcomes in the cognitive, affective, and psychomotor domains (Anwar & Syah, 2020; Juaini & Rokhmat, 2023; Puspitasari & Dewi, 2025). However, most of these studies have focused on testing the effectiveness of PjBL through experimental or quasi-experimental designs in science subjects in general or at different educational levels.

Research specifically examining the relationship between the level of Project-Based Learning implementation and science learning outcomes on ecosystem material in Madrasah Ibtidaiyah using a correlational approach remains very limited. Furthermore, there have been few studies that measure the application of PjBL across all stages of its implementation—from the triggering question, project planning, project execution, teacher guidance, final product, to reflection and evaluation—and then relate these to students' learning outcomes. Therefore, this study offers a novel contribution by analyzing the effect of the level of Project-Based Learning (PjBL) implementation on IPAS learning outcomes in the ecosystem unit among fifth-grade students at MIN 6 Boyolali using a quantitative correlational research design. The results of this study are expected to provide empirical evidence regarding the contribution of PjBL implementation in improving IPAS learning outcomes in elementary madrasahs while enriching the literature on PjBL implementation in IPAS instruction at the elementary school level.

Based on the results of preliminary observations in the fifth-grade class at MIN 6 Boyolali, it was found that the school actually possesses adequate learning resources, such as textbooks, learning modules, LCD projectors, and other supporting media. However, the utilization of these facilities has not been matched by the application of innovative learning models. Instruction is still dominated by lectures and individual assignments, causing students to tend to be passive and unenthusiastic, and resulting in suboptimal learning outcomes in IPAS (). This situation represents both a *research* gap and the basis for the novelty of this study, which is to examine the effect of implementing Project-Based Learning in IPAS instruction on the topic of ecosystems in the fifth-grade class at MIN 6 Boyolali as an effort to improve student learning outcomes. Therefore, this study aims to determine the level of Project-Based



Learning implementation, assess students' IPAS learning outcomes, and analyze the extent of the impact of *Project-Based Learning* on the IPAS learning outcomes of fifth-grade students at MIN 6 Boyolali.

Literature Review

Project-Based Learning (PjBL)

Project-Based Learning (PjBL) is a learning model that places students at the center of the learning process through contextual project activities focused on solving real-world problems. This model is grounded in social constructivism, which emphasizes that knowledge is actively constructed through experience, social interaction, and reflection on the learning process (Alimuddin & Nurdin, 2022:101–110). In its implementation, PjBL involves the stages of formulating a trigger question, planning the project, conducting an investigation, developing a product, presenting the results, and reflecting on and evaluating the process (Thomas, 2020:7–10; Sufyadi et al., 2021:22–38). Various studies indicate that PjBL can enhance student participation, learning motivation, critical thinking skills, creativity, communication, and collaboration because students are directly involved in the process of inquiry and problem-solving (Markula & Aksela, 2022:512–530; Listiana et al., 2022:134–135; Yu et al., 2024:455–470). In addition to enhancing 21st-century skills, PjBL has also proven effective in deepening conceptual understanding and improving learning outcomes because students gain more meaningful learning experiences compared to conventional teacher-centered instruction (Zhang et al., 2023:2095–2112). Therefore, PjBL is viewed as one of the innovative learning models relevant for implementation in IPAS instruction in elementary schools to create an active, collaborative, and contextual learning process.

Learning Outcomes

Learning outcomes are changes in behavior, knowledge, skills, and attitudes acquired by students after participating in the learning process and serve as indicators of the success of an educational activity (Lindgren, 2017:1–25). Conceptually, learning outcomes encompass three main domains—cognitive, affective, and psychomotor—which are interrelated in shaping students' holistic competencies (Bloom, 2021:1–15). In educational research, learning outcomes are generally measured through formal assessment instruments, such as tests, to determine the level of conceptual mastery, understanding, and skills achieved by students after participating in instruction (Erickson, 2022:1–15; Ramadhan et al., 2017:1–10). The level of learning outcomes is influenced by various internal factors, such as physical condition, intelligence, motivation, readiness, and learning fatigue, as well as external factors that include the family, school, and community environments, and the quality of the learning process students receive (Manopo, 2021:54–61; Basri et al., 2022:291–301; Vasheka et al., 2023:1279–1284). Furthermore, the use of innovative learning models that provide students with opportunities to actively explore knowledge has also been shown to contribute to improved learning outcomes because they enhance student engagement, conceptual understanding, and motivation to learn (Trisnawati, 2020:112–120). Thus, learning outcomes not only reflect the level of mastery of the material but also serve as an indicator of the effectiveness of the learning strategies implemented in the educational process.

Methods

This study employed a quantitative approach with a correlational design to analyze the effect of Project-Based Learning (PjBL) on the IPAS learning outcomes of fifth-grade students at MIN 6 Boyolali. e-ISSN 3125-0386 | DOI: <https://doi.org/10.54090/rimie.1201>

The study was conducted during the 2025/2026 academic year, involving the entire population of 83 students, thus utilizing total sampling. Data on the Project-Based Learning (PjBL) variables were collected through a Likert-scale questionnaire covering the aspects of trigger questions, project planning, project implementation, teacher guidance, final products, as well as reflection and evaluation, while IPAS learning outcome data were obtained through documentation of daily test scores on ecosystem material. The validity of the research instruments was first tested using Aiken's V index through expert judgment, and their reliability was tested using Cronbach's Alpha coefficient. Data analysis was conducted using descriptive statistics to describe the conditions of each variable, followed by prerequisite tests, namely the Kolmogorov-Smirnov normality test and the linearity test. Hypothesis testing was performed using simple linear regression with the aid of SPSS version 31 to determine the extent of the influence of Project-Based Learning (PjBL) on students' IPAS learning outcomes.

Results

Data Description of the Project-Based Learning (PjBL) Variable

Table 1. Frequency Distribution of Variable X

Class No.	Interval	Frequency	Cumulative Frequency	Percentage
1	47–51	4	4	5%
2	52–56	2	6	2%
3	57–61	15	21	18%
4	62–66	34	55	41%
5	67–71	21	76	25%
6	72–76	5	81	6%
7	77–81	2	83	2%
Total	-	83	-	100%

Based on the frequency distribution table for variable X above, it is evident that the majority of scores for variable X are concentrated in the 62–66 range, with an accumulated percentage of 41% (34 out of 83 students).

Table 2. Descriptive Statistics for Variable X

	N	Min	Max	Mean	Standard Deviation
PjBL	83	47	77	64.30	5.864
Valid N (listwise)	83				

Table 3. Categorization of Variable X

		Frequency	Percent	Valid Percent	Cumulative Percent
<i>Valid</i>	<i>Very Low</i>	5	6.0	6.0	6.0
	<i>Low</i>	16	19.3	19.3	25.3
	<i>Medium</i>	39	47.0	47.0	72.3
	<i>High</i>	20	24.1	24.1	96.4
	<i>Very High</i>	3	3.6	3.6	100.0
	<i>Total</i>	83	100.0	100.0	

Based on the categorization table above, it is evident that the majority of respondents fall into the moderate category, with 39 students, or 47.0%.

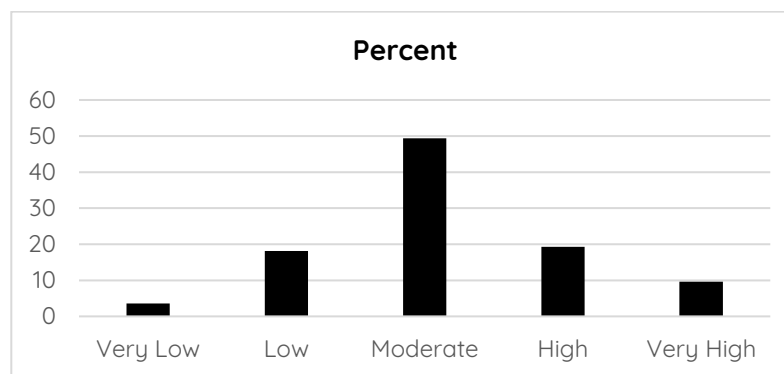


Figure 1. Categorization of Variable X Data

Description of Learning Outcome (Y) Variable Data

Table 4. Frequency Distribution of Variable Y

Class No.	Interval	Frequency	Cumulative Frequency	Percentage
<i>1</i>	50–57	2	2	2%
<i>2</i>	58–65	0	2	0%
<i>3</i>	66–73	1	3	1%
<i>4</i>	74–81	30	33	36%
<i>5</i>	82–89	26	59	31%
<i>6</i>	90–97	15	74	18%
<i>7</i>	98–100	9	83	11%
<i>Total</i>		83		100%

Based on the frequency distribution table for variable X above, it is evident that the majority of scores for variable Y are concentrated in the 74–81 range, with an accumulated percentage of 36% (30 out of 83 students).

Table 5. Descriptive Statistics for Variable X

	N	Min	Max	Mean	Standard Deviation
<i>Learning Outcomes</i>	83	50	100	84.18	9.069
<i>Valid N (listwise)</i>	83				

Table 6. Categorization of Variable Y

	Frequency	Percent	Valid Percent	Cumulative Percent
<i>Valid Very Low</i>	3	3.6	3.6	3.6
<i>Low</i>	15	18.1	18.1	21.7
<i>Moderate</i>	41	49.4	49.4	71.1
<i>High</i>	16	19.3	19.3	90.4
<i>Very High</i>	8	9.6	9.6	100.0
<i>Total</i>	83	100.0	100.0	

Based on the categorization table above, it is evident that the majority of students fall into the moderate category, totaling 41 students or 49.4%.

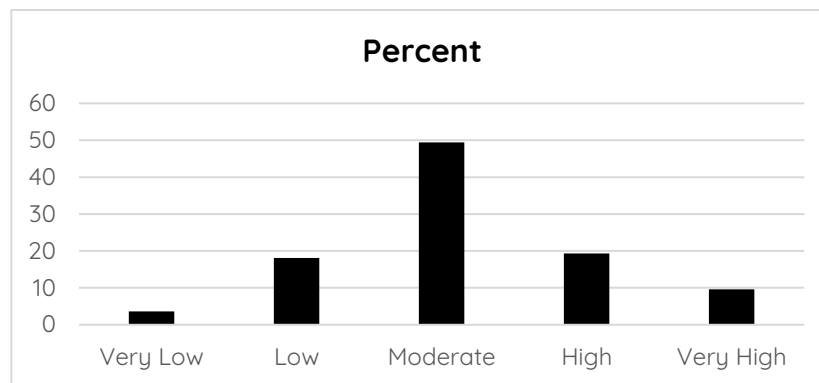


Figure 1. Categorization of Variable Y Data

Prerequisite Tests for Analysis

Normality Test

Table 7. Results of the Normality Test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		83
Normal Parameters ^{a, b}	Mean	,0000000
	Standard Deviation	8.96788108
Most Extreme Differences	Absolute	,089
	Positive	,061
	Negative	–0.089
Test Statistic		0.089

Asymptotic Significance (2-tailed) ^c			,156
Monte Carlo Sig. (2-tailed) ^d	Sig.		,107
	99% Confidence Interval	Lower Bound	0.099
		Upper Bound	0.114
a. The test distribution is normal.			

Based on the results of the normality test, the significance value is $0.156 > 0.05$; therefore, it can be concluded that the data are normally distributed.

Linearity Test

Table 8. Results of the Linearity Test using *the Deviation from Linearity Test*

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Learning Outcomes IPAS * PjBL	Between Groups	(Combined)	1953.343	23	84,928	1,046	,429
		Linearity	149,612	1	149,612	1,842	,180
		Deviation from Linearity	1,803.731	22	81,988	1,010	,468
	Within Groups		4,790,946	59	81,202		
	Total		6,744,289	82			

Based on the results of the linearity test in the ANOVA table, the Sig. *Deviation from Linearity* value was 0.468. Since this value is greater than 0.05 ($0.468 > 0.05$), it can be concluded that the relationship between the *Project-Based Learning (PjBL)* variable and IPAS learning outcomes is linear. Thus, one of the requirements for conducting a regression analysis has been met.

Hypothesis Testing

Hypothesis testing was conducted to determine whether there is a significant effect of the independent variable (*Project-Based Learning*) on the dependent variable (IPAS Learning Outcomes). This analysis used simple linear regression and the coefficient of determination (R^2) with the aid of the SPSS statistical software, version 31.

Table 9. Results of the Simple Linear Regression Test

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	69.519	5,491		12,661	<.001
	PjBL	,228	,085	,286	2.681	,009
a. Dependent Variable: results						

Based on the results of the simple linear regression test in the *Coefficients* table, the constant (*Constant*) value is 69.519 and the regression coefficient for the *Project-Based Learning (PjBL)* variable is 0.228. From these results, the following regression equation is obtained: $Y = 69.519 + 0.228 X$

This regression equation indicates that when the *Project-Based Learning (PjBL)* value is zero, the IPAS learning outcome is 69.519. The regression coefficient of 0.228 means that every one-unit increase in the *Project-Based Learning (PjBL)* variable raises the IPAS learning outcome by 0.228 units.

Based on the *Coefficients* table, the beta value is 0.286, the t-value is 2.681, and the significance level is 0.009. Since the significance level is less than 0.05 ($0.009 < 0.05$), H_0 is rejected and H_1 is accepted. Thus, it can be concluded that *Project-Based Learning (PjBL)* has a significant positive effect on the IPAS learning outcomes of fifth-grade students at MIN 6 Boyolali.

Table 10. : Results of the Coefficient of Determination Test

Model Summary				
Model	R	R-Square	Adjusted R-Square	Standard Error of the Estimate
1	.286 ^a	.082	.070	4,516
a. Predictors: (Constant), PjBL				

Based on the results of the Coefficient of Determination Test in the Model Summary above, the correlation coefficient (R) is 0.286. From this output, the coefficient of determination (R-squared) is 0.082, which means that the independent variable (*PjBL*) explains 8.2% of the variation in the dependent variable (IPAS Learning Outcomes).

Discussions

The results of the descriptive analysis show that the implementation of Project-Based Learning (PjBL) in IPAS instruction in Grade 5 at MIN 6 Boyolali falls into the moderate category, with a percentage of 47.0% or 39 students. The average score for PjBL implementation was 64.30 with a standard deviation of 5.864, indicating that the implementation of the PjBL syntax has proceeded fairly well, although not all students have experienced optimal implementation. On the other hand, students' IPAS learning outcomes were also predominantly in the moderate category, at 49.4% or 41 students, with a mean score of 84.18 and a standard deviation of 9.069. These findings suggest that most students achieved good learning outcomes on ecosystem-related material, although there remains variation in ability among students. These conditions indicate that project-based learning has provided meaningful learning experiences through inquiry, collaboration, and project completion, thereby supporting students' achievement of competencies.

Before hypothesis testing, the data were first analyzed using prerequisite tests. The results of the normality test using the Kolmogorov-Smirnov test showed a significance value of 0.156 ($p > 0.05$), indicating that the data are normally distributed. Furthermore, the results of the linearity test yielded a Sig. Deviation from Linearity value of 0.468 ($p > 0.05$), indicating that the relationship between the Project-Based Learning variable and IPAS learning outcomes is linear. With both assumptions met, simple linear regression analysis is appropriate for testing the effect of PjBL on student learning outcomes.

The results of the hypothesis testing show that Project-Based Learning has a positive and significant effect on students' IPAS learning outcomes. This is evidenced by a regression coefficient of 0.228, a calculated t-value of 2.681, and a significance value of 0.009, which is smaller than the significance level of 0.05. The regression equation obtained, $Y = 69.519 + 0.228X$, indicates that for every one-unit increase in the Project-Based Learning implementation score, there is a 0.228-point increase in IPAS learning

outcomes. These findings suggest that the better the implementation of the Project-Based Learning stages in the learning process, the higher the learning outcomes achieved by students.

Nevertheless, the results of the coefficient of determination test show an R-squared value of 0.082, meaning that Project-Based Learning contributes only 8.2% to the variation in students' IPAS learning outcomes. Thus, approximately 91.8% of the variation in learning outcomes is influenced by other factors not examined in this study. These findings indicate that learning outcomes are a complex phenomenon influenced by various factors, both internal and external. Internal factors include students' physical condition, intellectual ability, motivation, interest, attention, talent, and readiness to learn (Basri et al., 2022; Vasheka et al., 2023). Meanwhile, external factors include family support, the school environment, teacher competence, learning resources, interactions with peers, and the community environment (Manopo, 2021). Therefore, the implementation of PjBL is not the sole factor determining learning success but is an important component in creating active and meaningful learning.

The results of this study align with constructivist theory, which forms the foundation of Project-Based Learning—namely, that knowledge is constructed through authentic, collaborative, and problem-solving-oriented learning experiences. In IPAS learning, students' involvement in designing, implementing, and evaluating projects enables them to develop a deeper conceptual understanding compared to teacher-centered learning. This process also fosters the development of critical thinking, communication, collaboration, and creativity—key competencies for 21st-century learning.

The findings of this study also reinforce the results of previous research. Sari (2021) reported that the implementation of Project-Based Learning (PBL) can improve elementary school students' science learning outcomes because it provides students with opportunities to learn through direct experience. Similarly, Lestari (2022) found that PjBL contributes to improving students' cognitive and critical thinking skills through contextual project activities. Furthermore, Rahmawati and Putra (2019) explained that the characteristics of PjBL, which emphasize solving real-world problems, can increase student engagement, thereby positively impacting academic achievement. This study differs from previous research in its use of a correlational design to measure the level of PjBL implementation in the classroom and to analyze its contribution to IPAS learning outcomes on ecosystem material in elementary madrasahs. Thus, this study not only demonstrates a significant relationship between the two variables but also provides insight into the extent of PjBL's contribution to student learning outcomes in the context of IPAS instruction at MIN 6 Boyolali.

Based on the overall research results, it can be concluded that the implementation of Project-Based Learning has a positive effect on IPAS learning outcomes, although its contribution is relatively small. This indicates that the implementation of PjBL needs to be supported by other factors, such as increased learning motivation, teacher competence in managing project-based learning, the availability of learning media, and a supportive learning environment. With the support of these factors, the implementation of Project-Based Learning has the potential to have a more optimal impact on improving the quality of learning and IPAS learning outcomes in elementary schools.

Conclusion

Based on the research results, it can be concluded that the implementation of the Project-Based Learning (PjBL) model in IPAS instruction on the topic of ecosystems in Grade 5 at MIN 6 Boyolali falls into the “ ” category, indicating that the project-based learning process was carried out fairly well. Students' IPAS learning outcomes also fell into the moderate category, with an average score of 84.18.

Regression analysis results show that Project-Based Learning (PjBL) has a positive and significant effect on students' IPAS learning outcomes; thus, the better the implementation of PjBL, the higher the learning outcomes achieved. The magnitude of PjBL's contribution to learning outcomes reached 8.2%, indicating that this learning model plays a role in improving students' learning outcomes, although there are still other factors outside the scope of this study that influence learning outcomes. Thus, Project-Based Learning (PjBL) can be used as an effective alternative learning model to improve the quality of learning and IPAS learning outcomes in elementary schools.

Limitations and Future Studies

This study has several limitations that must be considered when interpreting the results. First, the study focused only on the effect of Project-Based Learning (PjBL) on cognitive learning outcomes in IPAS regarding ecosystem material; thus, it did not account for various other factors that could also influence student learning outcomes, such as learning motivation, learning styles, prior knowledge, family support, and the school environment. This is reflected in the coefficient of determination of 8.2%, indicating that most of the variation in learning outcomes is influenced by variables outside the scope of this study. Second, data regarding the implementation of PjBL were obtained through self-administered questionnaires completed by the students, so there remains a possibility of subjective bias in the responses. Third, the study involved only 83 fifth-grade students at MIN 6 Boyolali during the 2025/2026 academic year; therefore, generalizing the research findings requires caution, as student characteristics, school conditions, and learning environments at other locations may differ. Consequently, future research is recommended to include a broader sample size and consider other variables that may influence student learning outcomes.

For Future Researchers: Given that the PjBL model contributed 8.2% to the findings of this study, it is recommended to conduct further research by examining other variables that influence learning outcomes, expanding the sample size across several different schools, or using mixed methods to obtain more in-depth data.

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