

**THE INFLUENCE OF PROJECT BASED LEARNING ON UNDERSTANDING
LEARNING EVALUATION AND THE ABILITY TO COMPOSE HOTS WRITTING
TEST**

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Abstract

Education is a vital foundation for shaping the future of individuals and advancing society. An effective learning process plays a crucial role in ensuring learners' understanding and mastery of educational content. This study aimed to examine the influence of Project-Based Learning (PjBL) on students' understanding of learning evaluation and their ability to develop Higher Order Thinking Skills (HOTS) written tests. A quantitative research approach was employed using a quasi-experimental 2 x 2 pretest-posttest nonequivalent control group design. The collected data were analyzed both descriptively and using 2 x 2 factorial MANOVA. Hypothesis testing was conducted at a 5% significance level with the assistance of SPSS 21.0 software. The findings indicated that Project-Based Learning significantly enhances students' comprehension of learning evaluation and their competence in constructing HOTS-based written tests. Students exposed to Project-Based Learning outperformed those in conventional learning settings in both understanding of evaluation concepts and the quality of HOTS test construction. These results suggest that Project-Based Learning can serve as an effective alternative for improving the quality of learning evaluation instruction.

Keywords: Project Based Learning, Understanding Learning Evaluation, Compose HOTS Writting.

INTRODUCTION

Education has a very vital position in preparing the future of individuals as well as influencing changes in society (Akour & Alenezi, 2022). An effective learning process plays an important role in ensuring that students can understand and master the learning material (Normatilova, 2016). A successful educational process not only imparts knowledge but also forms skills, attitudes and a deep understanding of the lessons provided (Yulianto & Darmawan, 2024). Good quality education encourages the development of quality individuals and contributes positively to the social, economic, and cultural development of a society (Tambak, 2017).

The importance of this learning needs to be improved, one of which can be pursued by implementing Project Based Learning (PjBL) (Diana & Sukma, 2021). Project Based Learning is a learning model that emphasizes student involvement in investigating and solving real-world problems through structured projects (Belwal et al. 2020). This model encourages students to actively explore, collaborate, and present the results of their investigations

(Haatainen & Aksela, 2021). In general, PjBL involves students working in small groups to complete projects that require critical thinking, problem-solving, communication, and creativity (Suradika et al. 2023).

Project Based Learning encourages students to work collaboratively with their peers, utilize various resources, and develop solutions to meaningful problems (Hussein, 2021). Students are empowered to be actively involved in determining the direction of the project, collecting relevant data, and producing real or concrete products as the result of learning (Sani, 2014). Through PjBL, students do not merely receive knowledge passively, but are guided to construct their own understanding through authentic experiences (Mitry, 2021). This approach is in line with 21st century skills which emphasize creativity, collaboration, communication, and critical thinking (Tohani & Aulia, 2022).

An effective learning process has a big role in ensuring the understanding and mastery of learning material by learners (Sudargini & Purwanto, 2020). Evaluation of learning and the ability to construct tests that measure higher-order thinking skills (HOTS) are important elements in effective learning (Shanti & Munadi, 2022). These elements help assess not only the students' knowledge retention but also their ability to analyze, evaluate, and create based on what they have learned (Wang, 2020). Therefore, the design of learning activities and assessments should align with the goals of fostering critical and creative thinking in students.

Previous research by (Astuti, 2022) examined the influence of the Group Investigation (GI) type cooperative learning model on the understanding of the concept of flat building material and cooperation of grade IV elementary school students in Magelang. The results showed that the GI type cooperative learning model had a positive effect on student cooperation. The data analysis proved that there was a difference in the average and percentage of pretest questionnaire results between the experimental class, categorized as "sufficient," and the control class, categorized as "less." The average posttest results showed that the experimental class improved to "good," while the control class was "sufficient."

Another study by (Wulandari, 2021) examined the effectiveness of Project Based Learning in improving students' learning outcomes in science subjects at SMP Negeri 1 Sleman. The results showed that the application of the Project Based Learning model significantly improved student learning outcomes. In addition, there was an increase in student engagement and motivation, as well as a positive response toward the learning process that allowed them to explore real-world problems through collaborative projects.

The novelty of this study lies in the absence of research examining the effect of Project Based Learning on the understanding of learning evaluation and the ability to construct HOTS-based written tests. The practical implication of this research is the opportunity to improve the quality of the learning process through meaningful, student-centered learning activities. Project Based Learning can serve as an effective alternative to deepen students' understanding of learning evaluation and strengthen their ability to develop higher-order thinking skills through written assessments. The purpose of this study is to analyze the effect of Project Based Learning on the understanding of learning evaluation and the ability to construct HOTS-based written tests.

RESEARCH METHODS

This study used quantitative research methods. Quantitative research according to (Sugiyono, 2019), is a research method based on the philosophy of positivism, as a scientific or scientific method because it has fulfilled scientific rules concretely or empirically, objectively, measurably, rationally, and systematically. The subject of this study is a student of the Islamic Education Study Program, Faculty of Tarbiyah and Education UIN Kiai Haji Achmad Siddiq Jember who programmed the Learning Evaluation course in the odd semester of 2022/2023. The total number of subjects was 80 people divided into 2 classes, each consisting of 40 students in the Project Based Learning (PjBL) class (class A2) and 40 students in the conventional class (class A3). Students were divided into two groups, namely the experimental group that received learning using the Project Based Learning model, and the control group that received conventional learning.

This study used a quasi-factorial version of the experimental design 2 x 2 pretest-posttest nonequivalent control group design. The instrument used was a learning outcomes test. For the collection of learning outcome data, there are two abilities being measured: (a) understanding learning evaluation material consisting of 10 essay questions, and (b) compiling a written test in the field of Islamic Education Studies (PAI), which was measured using performance assessments in the form of a test grid and a set of question cards. The collected data were analyzed using 2 x 2 factorial MANOVA statistics. Hypothesis testing was carried out at a significance level of 5% with the help of SPSS 21.0 for Windows.

RESULT

General Description of Research

The average score of standard intersection (SD), understanding of learning evaluation material and the ability to compile the HOTS written test before and after treatment is presented in table 1.

Table 1. General Description of Research Data

Group	Understanding Bell Evaluation Material		Compiling the HOTS Written Test					
	Pretes		Posts		Pretes		Posts	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Project Based Learning	16.95	3.439	39,250	2,250	8.25	1.624	25,075	1,384
Conventional	17.32	4.183	37,250	1,793	8.89	1.917	22.725	1.219

Source: Compilation by researchers, 2022

In Table 1, it can be described that after treatment, there are differences in learning outcomes, understanding of learning evaluation material, and the ability to compile HOTS written tests, both in the Project Based Learning (PjBL) and conventional learning models.

Hypothesis Testing

The results of testing data normality and homogeneity at the level of $\alpha=0.05$ showed that the distribution of data on understanding learning evaluation material and the ability to compile written tests in the PAI field of study was normally distributed and homogeneous data variants, so that the analysis continued with MANOVA factorial 2x2. The results of the analysis are presented in table 2.

Table 2. Data on Understanding Learning Evaluation Material and Ability to Compile PAI HOTS Written Test

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Understanding	80.000a	1	80.000	19.319	.000
	Preparation	110.450b	1	110.450	64.897	.000
Intercept	Understanding	117045.000	1	117045.000	28264.737	.000
	Preparation	45696.800	1	45696.800	26850.097	.000
Class	Understanding	80.000	1	80.000	19.319	.000
	Preparation	110.450	1	110.450	64.897	.000
Error	Understanding	323.000	78	4.141		
	Preparation	132.750	78	1.702		
Total	Understanding	117448.000	80			
	Preparation	45940.000	80			
Corrected Total	Understanding	403.000	79			
	Preparation	243.200	79			

a. R Squared = .199 (Adjusted R Squared = .188)

b. R Squared = .454 (Adjusted R Squared = .447)

c. Computed using alpha= .05

Source: Compilation by researchers, 2022

Table 3. Results of Simultaneous Analysis of Material Understanding Data Learning Evaluation and Ability to Compile HOTS Written Test

Multivariate Testsa						
Effect		Value	F	Hypothesis df	Error df	Say.
Intercept	Pillai's Trace	.999	26314.859b	2.000	77.000	.000
	Wilks' Lambda	.001	26314.859b	2.000	77.000	.000
	Hotelling's Trace	683.503	26314.859b	2.000	77.000	.000
	Roy's Largest Root	683.503	26314.859b	2.000	77.000	.000
Class	Pillai's Trace	.512	40.433b	2.000	77.000	.000
	Wilks' Lambda	.488	40.433b	2.000	77.000	.000
	Hotelling's Trace	1.050	40.433b	2.000	77.000	.000
	Roy's Largest Root	1.050	40.433b	2.000	77.000	.000

a. Design: Intercept + Kelas

b. Exact statistic

c. Computed using alpha= .05

Source: Compilation by researchers, 2022

Based on the results of the analysis presented in Table 2, the research findings can be explained as follows:

1. There is a significant difference in the influence of Project Based Learning (PjBL) and conventional learning models on the ability to understand evaluation material. This is evident from the significance value ($\text{sig.} = 0.000 < 0.05$), which means that H_0 is rejected. Therefore, it can be concluded: There is a significant difference in understanding learning evaluation material between students who follow Project Based Learning and those who follow conventional learning.
2. There is a significant difference in the influence of Project Based Learning (PjBL) and conventional learning models on the ability to compile PAI HOTS written tests. This is also supported by the significance value ($\text{sig.} = 0.000 < 0.05$). Hence, H_0 is rejected. Thus, it can be stated: There is a significant difference in the ability to compile PAI HOTS written tests between students who follow Project Based Learning and those who follow conventional learning.
3. Based on the results of the multivariate test in Table 3 using Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root, all procedures showed a significance value ($\text{sig.} = 0.000 < 0.05$). This means that H_0 is rejected. Therefore, it can be concluded: There are simultaneous differences in the understanding of learning evaluation material and the ability to

DISCUSSION

Ability to understand learning evaluation material and ability to compile HOTS written test

The results showed that there were significant differences in the ability to understand learning evaluation material and the ability to compile HOTS written tests between groups of students who were taught through Project-Based Learning (PjBL) and those taught through conventional cooperative learning. These findings align with previous studies showing the positive impact of PjBL on student outcomes. For instance, research by Simbolon & Koeswanti (2020) indicated that learning models involving active student participation, such as PjBL, have a more significant effect on learning outcomes than conventional learning methods.

This is further supported by Firdausih & Aslan (2024), who found that PjBL implementation in science subjects leads to better conceptual understanding due to its emphasis on real-world application and student autonomy. Similarly, Mohammed & Hamied (2019) observed statistically significant improvements in academic writing among students taught with experiential, task-driven learning approaches like PjBL, suggesting that learning grounded in project work enhances engagement and output.

Hakimah (2023) also observed improved learning achievements in writing among students involved in project-based environments compared to those in traditional learning settings. These results are echoed by Wiratman et al. (2023), who found higher post-test scores among students learning through integrated, task-oriented strategies such as PjBL. The process of planning, implementing, and presenting projects facilitates deeper comprehension and collaboration, especially in EFL classroom settings.

In practice, Project-Based Learning typically involves several core stages: (1) problem identification and goal setting, (2) in-depth inquiry and resource gathering, (3) project planning and team roles, (4) project execution, (5) reflection and evaluation, and (6) final presentation or product demonstration. When implemented correctly, this learning cycle ensures that students actively construct knowledge and develop higher-order thinking skills.

Further supporting the efficacy of PjBL, Maros et al. (2023) reported better learning outcomes in students engaged in projects than those taught through conventional means. Almulla (2020) demonstrated that students in a PjBL environment exhibited higher understanding levels due to the active discussion and collaboration required by the method. The PjBL framework promotes ownership of learning, critical thinking, and problem-solving—qualities necessary for mastering HOTS-based test construction.

Sarwi et al. (2021) noted that students taught using project-based approaches showed a significantly improved ability to identify and solve learning problems. This aligns with Tang (2023), who stated that the primary goal of student-centered methods like PjBL is to optimize individual and group learning achievement.

Additional evidence comes from Yunita et al. (2021) and Lazic et al. (2021), who found that PjBL positively influenced students' understanding of mathematical concepts. Similar improvements were noted in science learning (Ridwan, 2024; AlAli, 2024), as PjBL encourages exploration and contextualized understanding of subject matter.

Writing skills also appear to benefit from the method. Andargie et al. (2025), Faturahmah et al. (2023), and Sari et al. (2023) all reported better essay-writing performance in students taught using project-based or experiential learning approaches. Marwa et al. (2024), Rubino (2024), and Wisniewski (2021) confirmed this trend in descriptive and argumentative writing skills, attributing the improvement to the structured planning and group discussion inherent in PjBL. Sudadi et al. (2021) and Chadafi (2024) found that students' abilities to write argumentative texts and project proposals improved significantly when taught through PjBL. These improvements stem from the method's emphasis on inquiry, collaboration, and communication throughout the learning process.

Taken together, these studies demonstrate the strong pedagogical value of Project-Based Learning in fostering student engagement, deep understanding, and improved learning outcomes, particularly in higher-order thinking and complex skill development. This approach encourages students to take ownership of their learning through real-world problem-solving and collaboration. As a result, learners not only retain knowledge more effectively but also build transferable skills essential for academic and professional success.

Simultaneously the ability to understand learning evaluation materials and the ability to compile the HOTS written test

The results showed no interaction between cooperative learning strategies on the ability to understand learning evaluation materials and the ability to compile HOTS written tests. The results of this study showed that the significant number ($\text{sig} = 0.254$) is greater than 0.05 ($\text{sig} > 0.05$). This means that H_0 is accepted, so it can be concluded that there is no influence of the interaction of learning strategies (Project-Based Learning and conventional types) on the achievement of understanding of evaluation material and the ability to compile the HOTS written test. This means that the application of Project-Based Learning strategies does not significantly affect the improvement of students' ability to understand learning evaluation material or their ability to compile tests with higher-order thinking skills when viewed simultaneously.

This finding suggests that while Project-Based Learning may enhance certain individual competencies, it may not have a combined effect when both abilities are considered together. Further research is needed to explore contextual or instructional factors that might influence these outcomes.

CONCLUSION

Departing from the research findings and discussion, the results of this study can be concluded as follows, (1) There are significant differences in the ability to understand learning evaluation

material and the ability to compile a HOTS written test between groups of students who are taught through Project-Based Learning and conventional type cooperative learning strategies; (2) There are simultaneous differences in understanding learning evaluation materials and the ability to compile PAI HOTS questions between students who take part in Project-Based Learning and conventional learning.

The use and selection of cooperative learning strategies, including Project-Based Learning, need to pay attention to the learning objectives, characteristics, and implementation procedures of each strategy, as well as the type of learning material (facts, concepts, principles, and procedures). For further research, it is recommended that each cooperative learning strategy should be implemented by a single lecturer to ensure focused and consistent delivery of the experimental strategy. Since the subjects in this study were from the same academic community, it is suggested that future studies involve broader and more diverse participant groups to enhance the generalizability of the findings.

BIBLIOGRAPHY

1. Akour, M., & Alenezi, M. (2022). Higher education future in the era of digital transformation. *Education Sciences*, 12(11), 784.
2. AlAli, R. (2024). Enhancing 21st century skills through integrated STEM education using project-oriented problem-based learning. *Geo Journal of Tourism and Geosites*, 53(2), 421-430.
3. Almulla, M. A. (2020). The effectiveness of the project-based learning (PBL) approach as a way to engage students in learning. *Sage Open*, 10(3), 2158244020938702.
4. Andargie, A., Amogne, D., & Tefera, E. (2025). Effects of project-based learning on EFL learners' writing performance. *PloS one*, 20(1), e0317518.
5. Astuti, S. D. (2022). The influence of the Group Investigation (GI) type cooperative learning model on the understanding of the concept of flat building material and cooperation of grade IV elementary school students in Magelang (Doctoral Dissertation, Thesis, University of Muhammadiyah Magelang).
6. Belwal, R., Belwal, S., Sufian, A. B., & Al Badi, A. (2020). Project-based learning (PBL): outcomes of students' engagement in an external consultancy project in Oman. *Education+ Training*, 63(3), 336-359.
7. Chadafi, M. (2024). Project-Based Learning to Enhanced Student's Writing Narrative Text Ability. *JEET, Journal of English Education and Technology*, 5(01), 236-247.
8. Diana, N., & Sukma, Y. (2021, May). The effectiveness of implementing project-based learning (PjBL) model in STEM education: A literature review. In *Journal of Physics: Conference Series* (Vol. 1882, No. 1, p. 012146). IOP Publishing.
9. Faturohmah, N. A., Irianto, A., & Rachmadtullah, R. (2023). Project-based learning assisted with mind mapping on description essay writing skills: A study in elementary school. *Journal of Education and Teacher Training Innovation*, 1(1), 44-52.
10. Firdausih, F., & Aslan, A. (2024). Literature review: The effect of project-based learning on student motivation and achievement in science. *Indonesian Journal of Education (INJOE)*, 4(3), 1011-1022.

11. Haatainen, O., & Aksela, M. (2021). Project-based learning in integrated science education: Active teachers' perceptions and practices. *LUMAT: International Journal on Math, Science and Technology Education*, 9(1), 149-173.
12. Hakimah, N. (2023). Assessing the impact of project-based learning on students' writing skills: A pre-experimental study. *Acitya: Journal of Teaching and Education*, 5(2), 434-448.
13. Hussein, B. (2021). Addressing collaboration challenges in project-based learning: The student's perspective. *Education Sciences*, 11(8), 434.
14. Lazic, B., Knežević, J., & Maričić, S. (2021). The influence of project-based learning on student achievement in elementary mathematics education. *South African Journal of Education*, 41(3).
15. Maros, M., Korenkova, M., Fila, M., Levicky, M., & Schoberova, M. (2023). Project-based learning and its effectiveness: evidence from Slovakia. *Interactive Learning Environments*, 31(7), 4147-4155.
16. Marwa, M., Nurfaisal, N., Muliardi, M., Awal, R., Putri, A. Y., Irawan, H., ... & Ramli, F. (2024). Assessment of Students' 4C Skills in Research Article Writing Projects for Publication. In *E3S Web of Conferences* (Vol. 593, p. 04003). EDP Sciences.
17. Mitry, M. M. (2021). Translating constructivism into pedagogy from philosophy to practice: Active project-based learning. *The International Journal of Humanities Education*, 19(1), 39.
18. Normatillova, F. (2016). Profile of Student Cooperation Ability in Science Learning (Descriptive Study on Even Semester Students of SMP Negeri 22 Bandar Lampung Academic Year 2015/2016).
19. Ridwan, W. (2024). Implementation of Problem Based Learning and Project Based Learning Approaches in Fiqh Subjects at MTs Al Munawwaroh. *Jurnal Profesi Guru Indonesia*, 1(1), 136-148.
20. Rubino, S. (2024). *Project-Based Learning and Its Impact on Student Engagement, Well-Being, and Learning Outcomes: A Study of Teachers' Perspectives*. Arkansas State University.
21. Sarwi, S., Baihaqi, M. A., & Ellianawati, E. (2021, June). Implementation of project based learning based on STEM approach to improve students' problems solving abilities. In *Journal of Physics: Conference Series* (Vol. 1918, No. 5, p. 052049). IOP Publishing.
22. Simbolon, R., & Koeswanti, H. D. (2020). Comparison of Pbl (Project Based Learning) models with Pbl (Problem Based Learning) models to determine student learning outcomes and motivation. *International Journal of Elementary Education*, 4(4), 519-529.
23. Sari, D. M. M., Prasetyo, Y., & Riza, M. D. (2023). PROJECT-BASED LEARNING OF ELT STUDENTS ON ESSAY WRITING. *Premise: Journal of English Education and Applied Linguistics*, 12(2), 379-401.
24. Shanti, M. R. S., Istiyono, E., & Munadi, S. (2022). The Effectiveness of Learning to Improve Students' Higher-Order Thinking Skills. *Cypriot Journal of Educational Sciences*, 17(5), 1576-1587.

25. Slavin, Robert E. (2005). *Cooperative Learning, Theory, and Practice*. London: Allyn & Bacon.
26. Sudadi, S., Rahmadi, R., Ramli, A., Kasuma, J., Nivin-Vargas, L. R., & Angulo-Cabanillas, L. E. (2021). *Improving Essay Writing through Project-Based Learning*. *Review of International Geographical Education Online*, 11(5).
27. Sudargini, Y., & Purwanto, A. (2020). The effect of teachers pedagogic competency on the learning outcomes of students. *Journal of Industrial Engineering & Management Research*, 1(4), 1-8.
28. Sugiyono. (2019). *Quantitative and Qualitative Research Methodology and R&D*. Bandung: Alfabeta. E-Journal of Ganesha University of Education Graduate Program. Volume 3. 1-12.
29. Suradika, A., Dewi, H. I., & Nasution, M. I. (2023). Project-based learning and problem-based learning models in critical and creative students. *Jurnal Pendidikan IPA Indonesia*, 12(1), 153-167.
30. Tambak, S. (2017). Cooperative learning method in learning Islamic religious education. *Al-Hikmah: Journal of Religion and Science*, 14(1), 1-17.
31. Tang, K. H. D. (2023). Student-centered Approach in Teaching and Learning: What Does It Really Mean?. *Acta Pedagogica Asiana*, 2(2), 72-83.
32. Tohani, E., & Aulia, I. (2022). Effects of 21st century learning on the development of critical thinking, creativity, communication, and collaboration skills. *Journal of Nonformal Education*, 8(1), 46-53.
33. Wang, Y. H. (2020). Design-based research on integrating learning technology tools into higher education classes to achieve active learning. *Computers & Education*, 156, 103935.
34. Wiratman, A., Bungawati, B., & Rahmadani, E. (2023). Project-based learning integrated with science, technology, engineering, and mathematics (STEM) to the critical thinking skills of students in elementary school. *SITTAH: Journal of Primary Education*, 4(2), 167-180.
35. Wisniewski, P. A. (2021). *A Project-Based Learning Approach to Community-Based Learning: Action Research to Explore Transformative Change in 1st Year Occupational Therapy Students' Awareness About Contextual Barriers, Occupational Justice, and Advocating for Community Health and Wellness* (Doctoral dissertation, University of South Carolina).
36. Yulianto, A., & Darmawan, D. (2024). Effective implementation of teaching skills and religious activities to enhance the quality of learning in Islamic religious education at MTsN 2 Surabaya. *Educana: Jurnal Pendidikan Islam*, 8(1), 68-85.
37. Yunita, Y., Juandi, D., Kusumah, Y. S., & Suhendra, S. (2021, May). The effectiveness of the Project-Based Learning (PjBL) model in students' mathematical ability: A systematic literature review. In *Journal of Physics: Conference Series* (Vol. 1882, No. 1, p. 012080). IOP Publishing.