

Exploring the Impact of Project-Based Learning on University Students' Essay-Writing Ability

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ABSTRACT

Project-Based Learning (PjBL) offers an instructional approach that emphasizes student autonomy, collaboration, and real-world application, which may enhance essay-writing ability. This study aims to (1) examine the effect of PjBL on university students' essay-writing ability and (2) evaluate its effectiveness in improving writing performance. A quasi-experimental design with a sequential explanatory mixed-methods approach was employed. The participants were students in Class B of the English Education Study Program at Tadulako University, selected through purposive sampling. Quantitative data were gathered through pre- and post-tests and analyzed using a paired samples t-test and normalized gain (N-gain) scores. Qualitative data from learning logs and interviews were analyzed thematically to explain the quantitative findings. The t-test indicated a statistically significant improvement in students' writing scores after the PjBL intervention ($p = 0.000$). However, the N-gain score was 0.1978, placing the effectiveness in the "low" category. Qualitative findings showed that students positively perceived PjBL, noting enhanced critical thinking, creativity, and collaboration. Nevertheless, several challenges emerged, including uneven group participation, cognitive overload, and misalignment between assessment and learning activities. Despite statistical significance, the low effectiveness suggests limitations in task design, assessment alignment, and learner readiness. These factors may have constrained the impact of PjBL on measurable writing outcomes. PjBL significantly affected students' essay-writing ability, but its practical effectiveness was limited. Given the study's reliance on a single purposive sample, generalizability is restricted. Future research should include larger, diverse samples and refine instructional design to maximize PjBL's pedagogical benefits.

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1. INTRODUCTION

Writing is one of the important language skills that must be possessed and mastered by students. It is also a productive and expressive skill that requires students to deliver their thoughts in written form. As a productive and expressive skill, writing should not be underestimated because it needs the coordination of various aspects, including content, organization, vocabulary, language use, and mechanics. Among the four language skills, writing is considered challenging because it requires students to be able to deliver their ideas (Syarifah & Emiliasari, 2019). Furthermore, Jabali (2018) argued that writing is a very difficult aspect of language learning, especially in a foreign language. Writing needs many ideas, broad thoughts, and creativity to be transformed into good-quality writing. It involves not only the selection of vocabulary but also the variation of sentences, the selection of punctuations, cohesion, and coherence (Cheung, 2016).

In writing, students usually face and find some problems. Bulqiyah et al. (2021) found that most students are not intrinsically motivated to write, and they get little training on writing, especially in academic contexts. Problems in writing essays are also found in grammar, paragraph cohesion and coherence, and the selection of words or diction (Ariyanti & Fitriana, 2017; Ginting, 2019). It was confirmed by Rahmatunisa (2014) and Toba et al. (2019) in their observation and research. The research by Rahmatunisa (2014) showed that students face three categories of problems. The first one refers to linguistic issues, including grammar. The second problem is cognitive issues like paragraph organization. The third issue is psychological problems like emotion, laziness, and difficulties starting to write. Besides the writing aspect and the low writing motivation, other problems students face are limited available time, anxiety, negative perception of writing, and a writing learning model that is less supportive (Toba et al., 2019).

Some problems mentioned above were also faced by students of the English Education Study Program at Tadulako University, especially in Writing in Professional Context subject. The subject aims to train and guide students to write and develop coherent and united paragraphs into an essay. Coherence and unity are two aspects that should be considered in composing a paragraph. However, in the implementation, some students still find it difficult to deliver their ideas and develop them into coherent paragraphs to be built as an essay. Besides that, grammatical mistakes are also found in their writing. It ultimately needs a concern from the lecturer to facilitate students and solve their problems in essay writing. Lecturers are responsible for finding a solution that can help students train more effectively as much as possible to produce a good essay.

According to Setyowati et al. (2017), a writing plan is useful for improving students' performance in writing an essay. Thus, in writing, students should be given the freedom to choose a planning strategy that they are going to use. Being free to design and decide what they want to do will boost their performance in essay-writing. Based on the consideration, project-based learning (PjBL) is believed to be a proper learning model to be implemented in Writing in Professional Context. Project-based learning (PjBL) is a learning model utilizing a project or activity as the learning facility to achieve the target competencies, including attitude, knowledge, and skill (Fathurrohman, 2017). Many researchers have investigated PjBL (e.g., Asfihana et al., 2022; Habibi et al., 2022; Sari & Prasetyo, 2021; Almulla, 2020; Gunawan et al., 2017), and all of them confirmed the positive effects of PjBL. They stated that PjBL can improve creativity, critical thinking skills, active participation, and motivation.

In relation to writing instruction, PjBL is expected to significantly improve students' writing ability because it aligns well with several educational theories that emphasize active, process-oriented, and collaborative learning. From the constructivist perspective, as proposed by Vygotsky (1978) and Piaget (1970), learning is most effective when students actively construct their own understanding through experience and interaction. PjBL facilitates this by engaging students in meaningful, real-world tasks that require them to explore, reflect, and apply knowledge, thereby deepening their understanding of writing as a process. Furthermore, PjBL supports the process writing approach (Flower & Hayes, 1981), which views writing as a recursive, non-linear process involving planning, drafting, revising, and editing. Through projects, students are encouraged to engage authentically and iteratively in each stage of this process, often producing better-organized and more refined essays. Additionally, the

collaborative nature of PjBL resonates with Bruffee's (1984) theory of collaborative learning, which sees peer interaction as essential to knowledge construction. Working in groups enables students to exchange ideas, give and receive feedback, and develop a stronger sense of audience, all of which are crucial for improving writing quality. Therefore, PjBL fosters an optimal learning environment where writing ability can be nurtured through active engagement, process awareness, and social interaction.

Although numerous studies have explored Project-Based Learning (PjBL), the present research employs a distinct methodological approach by utilizing an explanatory research design to examine PjBL in greater depth. The primary focus of this study is to identify and assess both the effect and effectiveness of the PjBL model on students' essay-writing ability. Initially, the researchers investigated whether the PjBL model had a measurable impact on students' essay-writing performance. Subsequently, the study evaluated the effectiveness of the model in enhancing students' writing skills.

Assessing the effectiveness of a learning model is essential to determine its suitability for classroom implementation. Therefore, this study examined not only the effect of the PjBL model but also its effectiveness from multiple perspectives. In addition to evaluating students' writing performance through tests, the research also analyzed students' responses to the PjBL approach. These responses were collected through students' learning logs, which documented their experiences and reflections during project implementation, as well as through interviews. This multi-method data collection strategy sets the study apart from previous research, which typically relied on a single data source to examine the impact of PjBL.

Based on the research objectives and the rationale outlined above, this study aimed to: (1) identify the effect of the PjBL model on students' essay-writing ability, and (2) assess the overall effectiveness of the PjBL model in improving students' writing skills. It was hypothesized that the implementation of PjBL would significantly enhance students' essay-writing abilities.

The findings of this research hold both theoretical and pedagogical significance. Theoretically, the results contribute to the growing body of knowledge on PjBL by revealing not only its strengths but also potential limitations. Pedagogically, insights into the effect and effectiveness of the PjBL model offer valuable guidance for educators in selecting and adapting instructional strategies. Teachers and lecturers can use this information to design more effective PjBL activities that align with their instructional goals and enhance student outcomes.

Based on the background and problem of the research, the research questions of this research are as follows:

1. Does PjBL model has significant effect on students' essay-writing ability?
2. How effective is the PjBL model on students' writing ability?

2. METHODS

This research employed a quasi-experimental design with a sequential explanatory mixed-method approach. In this design, quantitative data were first collected and analyzed, followed by qualitative data to explain or elaborate on the quantitative findings. The quantitative phase examined whether the project-based learning (PjBL) model had a statistically significant effect on students' essay-writing ability, while the qualitative phase explored students' perceptions and experiences with PjBL through learning logs and interviews.

The research consisted of two variables: the independent variable was the implementation of the PjBL model, and the dependent variable was the students' essay-writing ability.

The population of this study included all students enrolled in the Writing in Professional Context course within the English Education Study Program at Tadulako University. The sample consisted of students from Class B, selected through purposive sampling. Class B was chosen based on specific criteria established by the researchers, including representativeness in terms of academic background, writing experience, and engagement level. Diagnostic assessments indicated that students in this class had diverse levels of writing proficiency (low, medium, and high), making it suitable for examining the effectiveness of the PjBL model across varying skill levels.

Three research instruments were used to collect data: a writing test, student learning logs, and interviews. The writing test was administered as a pre-test and post-test to determine the statistical effect of PjBL and to calculate its level of effectiveness. The learning log was a reflective journal in which students documented their thoughts, challenges, and responses during each stage of the PjBL implementation. In-depth interviews were also conducted to gain further insights into students' experiences and perceptions regarding the model.

Quantitative data from the pre- and post-tests were analyzed using SPSS software. A paired sample t-test was used to assess the statistical significance of the differences in writing scores. A significance level of $p < 0.05$ was used as the threshold to determine whether PjBL had a significant effect. To measure the level of effectiveness, the normalized gain (N-gain) was calculated based on the following criteria:

Table 1. N-gain Criteria

Gain Scores	Interpretation
$g > 0.7$	High
$0.3 < g \leq 0.7$	Medium
$g \leq 0.3$	Low

The qualitative data from the learning logs and interviews were analyzed using Miles and Huberman's three-step approach: data reduction, data display, and conclusion drawing/verification. Data excerpts were coded, categorized thematically, and interpreted to elaborate on the quantitative findings—particularly to understand how students responded to PjBL and to identify potential factors affecting its effectiveness.

This mixed-method approach allowed for a more nuanced understanding of both the measurable impact and the subjective experiences associated with the implementation of project-based learning in academic writing instruction.

3. FINDINGS AND DISCUSSION

3.1 Findings

The data were collected through a writing test, students' learning logs, and interviews. The writing test was employed to determine whether the PjBL model had a significant effect on students' essay-writing ability, as well as to assess the degree of its effectiveness. In addition, students' learning logs and interview responses served as supporting data, providing further insight into the effectiveness of the PjBL model in enhancing students' essay-writing skills.

3.1. The Effect of PjBL Model on Students' Essay-Writing Ability

To collect data on students' essay-writing ability, the researchers administered two tests: a pre-test and a post-test. The pre-test was conducted prior to the implementation of the PjBL model, while the post-test was administered following the completion of the intervention. This procedure aimed to determine whether the PjBL model had a significant effect on students' essay-writing performance. The results of these tests are presented in the following tables.

Table 2. Frequency Table (Pre-test)

	Frequencies	Percentages	Cumulative Percent
Valid	79	5	10.9
	80	10	21.7
	81	1	34.8
	83	4	43.5
	84	19	84.8
	85	7	100.0
Total	46	100.0	

Table 2 shows the score frequencies from the pre-test. It can be seen that in the pre-test, five students obtained a score of 79 (10.9%), ten students obtained 80 (21.7%), one student got 81 (2.2%), four students got 83 (8.7%), nineteen students got 84 (41.3%), and seven students got 85 (15.2 %).

Table 3. Frequency Table (Post-test)

	Frequencies	Percentages	Cumulative Percentages
Valid	81	2	4.3
	82	6	17.4
	83	1	19.6
	85	6	32.6
	86	3	39.1
	87	13	67.4
	88	15	100.0
Total	46	100.0	

In Table 3, the scoring frequency of the post-test. Two students (4.3%) got 81, six students (13.0%) got 82, a student (2.2%) got 83, six students (13.0%) got 85, three students (6.5%) got 86, thirteen students (28.3%) got 87, and fifteen students (32.6%) got 88.

Table 4. Statistic Table (Pre-test and Post-test)

	Pre-test	Post-test
N	Valid	46
	Missing	0
Mean		82.59
Std. Error of Mean		.321
Median		84.00
Mode		84
Std. Deviation		2.176
Range		6
Minimum		79
Maximum		85
Sum		3799

Table 4 presents the statistics of the pre-test and post-test. It can be seen that the number of students taking the pre-test and post-test was 46. The average score of the pre-test was 82.59, while the post-test was 86.00. The standard error of means was 0.321 (pre-test) and 0.336 (post-test). The pre-test median was 84.00, and the post-test median was 87.00. The pre-test mode was 84, while the post-test mode was

88. The standard deviation of the pre-test was 2.176, while the post-test was 2.280. The range between the maximum and minimum score in the pre-test was 6, while in the post-test was 7. In the pre-test, the minimum score was 79, and the maximum score was 85. While, in post-test, the minimum score was 81, and the maximum score was 88.

Then, to identify if the PjBL model has a significant effect on the students' essay-writing ability, a paired samples t-test was carried out. The result of the paired sample t-test is presented in the following table.

Table 5. Paired Samples T-test

	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-test	-3.413	1.024	.151	-3.717	-3.109	-22.614	45	0.000
Post-test								

Table 5 displays the result of the paired sample t-test. Data analysis using paired sample t-test shows that the p-value (sig.) is lower than the chosen alpha level, $0.000 < 0.05$. Thus, it can be concluded that PjBL model significantly influences students' essay-writing ability, or it has a significant effect on students' essay-writing ability.

3.2. The Effectiveness of the PjBL Model on Students' Essay-Writing Ability

The effectiveness of PjBL model on students' essay-writing ability was measured using the N-gain score, learning log, and interview. The N-gain score was used to measure the effectiveness level of PjBL on the writing test, while learning log and interview were used to measure the effectiveness of PjBL model based on students' responses.

3.2.1 The Effectiveness based on the N-gain Score

After identifying a significant effect of the PjBL model on students' essay-writing ability through paired samples t-test, a normalized gain test (N-gain) was used to measure its effectiveness. The results of the calculation can be seen in the following table.

Table 6. N-gain Score

	N	Min.	Max.	Mean	Std. Deviation
Gain	46	.10	.29	.1978	.05558
%	46	9.52	28.57	19.7817	5.55827

The result of the normalized gain test was 0.1978. According to the N-gain interpretation scale, this falls within the low effectiveness category. This finding suggests that while the project-based learning (PjBL) model had a statistically significant effect on students' essay-writing ability, as demonstrated by the paired samples t-test ($p < 0.05$), the actual degree of improvement in students' performance was limited.

This apparent contradiction—statistical significance paired with low effectiveness—calls for further analysis. It indicates that while students' writing scores improved, the magnitude of that improvement was modest. Therefore, any recommendation for broader implementation of PjBL should be made with caution and should consider this limitation.

Several moderating factors may have influenced the low effectiveness observed. For instance:

1. Group dynamics: Unequal participation within groups may have diluted the benefits of collaborative learning.
2. Time constraints: The time allocated for each stage of the project may have been insufficient for deep engagement with the writing process.

3. Assessment alignment: If the assessment rubric did not fully capture the learning outcomes targeted by PjBL, it could underestimate its effectiveness.
4. Learner preparedness: Some students may not have possessed adequate skills in collaboration, time management, or independent writing, which are essential for successful PjBL implementation.
5. Instructional scaffolding: The level of guidance provided by instructors during each PjBL phase may not have been sufficient to support all students equally.

These potential moderating variables were not directly controlled or measured in this study, and therefore should be investigated further in future research. Despite the low N-gain, the positive qualitative feedback from students—particularly regarding critical thinking, creativity, and collaboration—suggests that PjBL may still hold pedagogical value if implemented with stronger support mechanisms and attention to individual learner differences.

3.2.2 Students' Reflections and Critical Insights from Learning Logs and Interviews

The implementation of the Project-Based Learning (PjBL) model followed several stages: selecting a topic, outlining, drafting, revising, and rewriting. Students recorded their experiences in learning logs, and follow-up interviews were conducted to gain deeper insight into their perceptions of the model's influence on their writing ability.

In the topic selection stage, students faced difficulty identifying engaging and relevant topics. One student reflected, *"I was usually trapped in selecting a topic, so it was difficult to start writing"* (St2). Another expressed concern about topic suitability, stating, *"I was afraid the topic I chose wasn't interesting or easy to describe"* (St5). These responses suggest a need for more structured guidance, such as brainstorming techniques or sample topic frameworks.

During the outlining phase, confusion remained about organizing ideas. A student admitted, *"We were still confused about determining the outline"* (St7). Although group discussions provided some clarity, the lack of prior training in structuring essays contributed to their struggles. However, students also recognized the benefit of this stage. As one noted, *"A good outline helped us organize ideas and save time"* (St9).

In the drafting stage, students reported challenges in translating outlines into cohesive paragraphs. *"To develop an outline into a paragraph was a big challenge"* (St5). Still, the collaborative aspect of the task helped, with students stating that dividing paragraph responsibilities eased the process. *"Each paragraph was developed from our shared thoughts"*, one student explained (St15), highlighting the value of group creativity.

The revision process generated anxiety. Students were unsure whether their edits would meet expectations: *"We were worried that after the revision, there would still be paragraphs that needed to be changed"* (St17). Peer feedback, however, proved helpful. *"It was very helpful to find our mistakes and revise"* (St17).

Finally, the rewriting stage allowed students to polish their work. Though minor issues occurred, students acknowledged the value of this process: *"Rewriting made us write more carefully than before"* (St27). They also appreciated the sense of shared responsibility in groups: *"Togetherness reduced the burden"* (St22).

From the interviews, students expressed mixed but mostly positive perceptions of PjBL. One student stated, *"Doing a project in a group trained collaboration and how to accept others' opinions"* (St1), while another said, *"I prefer doing it independently because it's easier to focus and manage time"* (St4). These differing views suggest that learning preferences influenced student engagement.

When asked about PjBL's impact on their writing, responses were generally affirmative. For instance, *"We were trained to think critically, so in writing essays, we didn't find it difficult"* (St4), and *"Our project experience helped us write essays more easily"* (St6). Such feedback supports the quantitative finding that PjBL had a significant effect on writing scores.

However, despite the positive responses, the normalized gain score (N-gain = 0.1978) categorized the model's effectiveness as low. This contrast points to several possible contributing factors:

1. Task complexity: Students had to manage multiple processes at once, from content development to group coordination, which may have increased cognitive load.
2. Limited scaffolding: While students engaged with all PjBL phases, many lacked prior instruction in essential writing skills, which may have hindered learning.
3. Unequal participation: Some students were more active than others. One comment noted, "Sometimes a friend didn't participate much in the project", reducing its collaborative value (St3).
4. Instructional support: While peer learning was emphasized, the lack of sufficient teacher feedback during key stages may have limited progress for struggling students.

These insights indicate that while students gained valuable soft skills such as collaboration and critical thinking, measurable improvements in writing proficiency were modest. Future PjBL implementations should include better task scaffolding, structured peer roles, and enhanced teacher feedback to support diverse learner needs.

In summary, PjBL offered a meaningful learning experience, but its impact on essay-writing performance was limited by design and support challenges. Addressing these issues may improve future effectiveness and better align student engagement with writing outcomes.

Discussion

This study found that the Project-Based Learning (PjBL) model had a statistically significant effect on students' essay-writing ability, as evidenced by the paired sample t-test ($p = 0.000$). The post-test mean score (86.00) exceeded the pre-test mean (82.59), indicating improvement in students' writing performance after the PjBL intervention. However, despite this statistical significance, the normalized gain (N-gain) score was 0.1978, placing the effectiveness of the model in the "low" category. This contrast between significance and practical effectiveness warrants deeper exploration.

One likely explanation for the low effectiveness lies in the design of the learning tasks. PjBL requires a careful balance between autonomy and guidance. If the task design lacks sufficient scaffolding or structure, students—especially those who are still developing academic writing skills—may struggle to navigate complex processes like planning, drafting, revising, and collaborating effectively (Thomas, 2000). In this study, although students engaged in multiple stages of the writing process, the structure may not have been robust enough to ensure consistent progress for all participants.

Additionally, the cognitive load placed on students during the PjBL process may have been too high. Writing essays in a second language is already cognitively demanding, involving lexical choice, grammar accuracy, coherence, and content development (Flower & Hayes, 1981). When combined with the requirements of collaborative planning, decision-making, and project management, the extraneous cognitive load could overwhelm students' working memory, reducing the learning benefits (Sweller, 1988). The low N-gain may reflect students' difficulty balancing these simultaneous demands, which diluted the impact on measurable writing improvement.

The assessment methods used in this study may also have contributed to the low effectiveness rating. If the rubric used to evaluate the essays focused primarily on surface-level features (e.g., grammar or format) and did not fully capture higher-order skills such as idea development, argument structure, or audience awareness, the actual depth of learning may not have been accurately reflected in the scores. Andrade (2000) emphasized the importance of using multi-dimensional rubrics in writing assessment to capture nuanced improvements, especially in complex tasks such as essay writing.

Another factor to consider is group dynamics and participation equity. The qualitative data revealed that some students were less active in their groups or preferred to work independently, which may have limited their engagement with the project and, consequently, their learning gains. Group-based learning, while beneficial in promoting communication and collaboration, can also lead to unequal distribution of effort if not carefully managed (Bashan & Holsblat, 2012). This disparity may have caused some students to benefit more than others, resulting in an overall low gain when averaged across the class.

The study also has limitations in terms of sampling and generalizability. The use of purposive sampling from a single class (Class B) within one university inherently limits the extent to which the findings can be generalized to broader student populations. While Class B was selected for its representative variation in writing ability, it does not account for potential differences in institutional context, teaching style, or student demographics. As Gay, Mills, and Airasian (2006) argued, non-random sampling restricts external validity, and findings from such samples should be interpreted with caution. Therefore, it is important to acknowledge that the results of this study may not be applicable to other programs, universities, or cultural contexts.

Despite these limitations, the study offers important insights. The positive student responses in learning logs and interviews indicate that PjBL provided valuable experiences, especially in areas such as critical thinking, collaboration, and problem-solving. These benefits, however, may not be immediately captured through quantitative test scores. Vygotsky's (1978) sociocultural theory supports the idea that meaningful learning occurs through social interaction and scaffolded experiences—elements inherent in PjBL that may contribute more to long-term skill development than to immediate test score gains.

To improve the effectiveness of PjBL in future implementations, several strategies are recommended. First, task design should include clearer scaffolding, such as checkpoints, guided outlines, and templates. Second, student readiness for collaborative learning should be assessed beforehand, and role assignments should be structured to promote equal participation. Third, assessment tools should be refined to capture not only language accuracy but also the depth and organization of ideas. Lastly, future research should include larger and more diverse samples, potentially using random or stratified sampling, to enhance the generalizability of the findings and provide a more accurate representation of the PjBL model's impact across various learner populations.

In conclusion, while PjBL demonstrated a significant effect on students' essay-writing ability, the low effectiveness score suggests that implementation challenges, task complexity, cognitive demands, and limited assessment sensitivity may have constrained its full potential. These findings call for a more deliberate and adaptive approach to applying PjBL in writing instruction, ensuring that pedagogical strategies match students' readiness, context, and support needs.

4. CONCLUSION

In conclusion, this study found that the Project-Based Learning (PjBL) model had a statistically significant effect on students' essay-writing ability, as indicated by improved post-test scores; however, its effectiveness was categorized as low based on the N-gain score, suggesting limited practical impact. This discrepancy may be attributed to factors such as task design complexity, high cognitive demands, uneven group participation, and insufficient alignment between assessment methods and learning objectives. A key limitation of this research is the use of purposive sampling from a single class at one university, which restricts the generalizability of the findings to broader student populations. Therefore, future research should consider involving larger and more diverse samples using random or stratified sampling methods, as well as exploring alternative assessment strategies and differentiated task designs to better support individual learning needs and enhance the overall effectiveness of PjBL in writing instruction.

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