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The Effects of Project-Based Learning in Writing on Students' Autonomy, Students' Creativity, and Learning Engagement at SMAN 2 Lintau Buo

Delfita Yulianti[1*], Veni Roza[1], Absharini Kardena[1], Melyann Melani[1]
[1] Faculty of Education and Teaching Training, UIN Syech M Djamil Djambek, Bukittinggi, Indonesia
Corresponding author email: delfiyulianty@mail.com

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ABSTRACT

This study is investigated the effects of Project Based Learning (PjBL) on students' writing ability, autonomy, creativity and engagement at SMAN 2 Lintau Buo, West Sumatera, Indonesia. Writing as productive skills, causes challenges for students, particularly in producing structured and meaningful exposition text. The students also showed low levels of autonomy, creativity, and engagement under conventional instruction. Thus, innovative model like PjBL was implemented to enhance both writing skills and non-cognitive abilities. A quasi-experimental design was employed. The instruments included writing test scored with Jacobs' rubric, autonomy, creativity, and engagement questionnaires, each validated through Aiken's V and tested for reliability. The prerequisite of data analysis found that the data were not normally distributed (the sig score < 0.05) and not homogeneous (0.002 < 0.05). So, the data cannot be tested by using parametric test. Hence the Mann Whitney test was used to test the hypotheses.The results revealed that PjBL did not yield significant results in improving writing scores compared to the control group. The p-score 0.542 is greater than 0.05. However, PjBL significantly enhanced students' autonomy (sig. score 0.001 is smaller than the alpha 0.05), creativity (sig. score 0.001 is less than 0.05), and engagement (sig. score 0.000 is less than 0.05). These findings suggest that while PjBL is not sufficient to improve students' writing ability, it is effective in fostering non-cognitive skills necessarily for meaningful learning. Implication for teaching recommend combining PjBL with scaffolding to strengthen writing ability while maintaining high levels of autonomy, creativity, and engagement.

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INTRODUCTION

Writing is an essential ability in school, promoting both academic achievement and personal expression. It is more than just the mechanical act of writing sentences. It is a cognitive process that includes concept structuring, meaning-making, and effective communication. Writing allows students to explore their ideas, construct arguments, and reflect on their learning. However, conventional strategies frequently restrict writing to a conventional activity, ignoring

its more significant role in forming critical thinking and identity. Students rarely participate in significant discourse with their peers while writing (Deveci, 2018).

In senior high school, writing instruction is genre-based, with exposition text being one of the main genres taught. Exposition writing is essential for helping students communicate their thoughts clearly and coherently. It demands students to plan, compose sentences, and revise. The skills that Hayes & Flower (1986) characterize as essential to the writing process. Writing exposition texts also encourage an endless cycle of discovery and improvement, in which students actively create meaning rather than passively imitate content.

Besides structure and logic, exposition writing fosters crucial learning skills such as critical thinking, evaluation, and synthesis of concepts. Grabe & Kaplan (2014) define writing as a communicative action that takes into account audience and goal, whereas Hyland (2013) defines writing as a method of producing knowledge and negotiating meaning. As a result, learning to create exposition texts prepares students for real-world academic interactions while simultaneously improving their language proficiency. Furthermore, exposition texts are highlighted in the English learning achievement for Phase F (grades XI and XII), where students are expected to write a variety of organized writings utilizing a wide range of language and expressions appropriate for different audiences and goals.

This study also focused on three critical non-cognitive dimensions: autonomy, creativity, and engagement that support life long learning. These were chosen because they are essential components of effective writing and are expressly stated in the goals of the current SMA English curriculum (Phase F). The Kurikulum Merdeka promotes student-centered learning, in which students actively participate in creating meaning, making decisions, and expressing ideas. Students are required to investigate a variety of texts and create written and visual texts that demonstrate growing autonomy, originality, and understanding of context and audience. These expectations are strongly related to autonomy (self-directed learning and decision-making), creativity (originality and idea generation), and engagement (active participation and motivation). Together, these non-cognitive abilities promote deeper learning and are consistent with the curriculum's overarching goal of fostering critical, independent, and reflective learners.

To produce such writing, students must develop these three non-cognitive skills. Writing requires decision-making, idea generation, and regular self-assessment. All of these are directly related to autonomy. Writing, as stressed by Zimmerman and Risemberg in Graham & Harris (2023), increases self-regulation, which is essential for autonomous learning. Similarly, creativity is required to generate original ideas, organize arguments, and convey viewpoints in engaging ways. Engagement, on the other hand, encourages students to modify, develop, and improve their work through consistent effort and reflection.

However, the preliminary research at SMAN 2 Lintau Buo showed that students had difficulty demonstrating these abilities in writing class. Despite regular training, students generated uninspired and repetitious texts that lacked creativity and personal expression. Their writing frequently lacked depth, varied sentence forms, and a consistent progression of ideas. According to the observation, students considered writing projects boring and demanding. Many students depended largely on teacher directions and were afraid to take the initiative, indicating a lack of autonomy and engagement. Conventional techniques, which frequently concentrate grammar drills and standardized prompts, limited students' abilities to explore own interests or participate deeply in the writing process (Wale & Bogale, 2021).

To address these issues, teachers were starting to investigate alternate teaching models. Project-Based Learning or abbreviated as PjBL (Kemendikbudristek, 2023) is a promising model that meets the needs of writing training, particularly for exposition texts. PjBL is a student-centered model that involves students in real-world projects that necessitate collaboration, exploration, and problem solving (Nishat, 2024). It varies from conventional strategies in that it allows students to chose topics that are important to them, enhancing intrinsic motivation. This technique naturally promotes autonomy, creativity, and engagement as students take control of their learning process.

Patall et al. (2018); Han (2021) discovered that motivation and engagement are significantly related to student autonomy. PjBL allows students to make decisions, solve problems, and manage their projects individually, which promotes self-directed learning. The continuous drafting and revising process also increases engagement since students may see concrete improvements in their work. Furthermore, encouraging students to express ideas in innovative ways, arrange arguments differently, and experiment with presentation strengthens the creative component of writing (Barak & Yuan, 2021).

Despite increased interest in PjBL, most research focused on overall academic achievement or specific skills. Few studies have looked at the combined influence of PjBL on the three interconnected non-cognitive characteristics of autonomy, creativity, and engagement, particularly in the setting of writing exposition texts. This study aimed to close that gap by looking into the effects of Project-Based Learning in writing on students' autonomy, creativity, and learning engagement. Based the considerations above, the researcher was conducted the research on The Effects of Project-Based Learning in Writing on Students' Autonomy, Students' Creativity, and Learning Engagement at SMAN 2 Lintau Buo.

METHODS

This study employed a quasi-experimental design as defined by Creswell & Creswell (Costigliola, 2019), which tests causal hypotheses without random assignment. The design compared a control and an experimental group through pre-tests and post-tests to assess the effects of Project-Based Learning (PjBL) on students' writing skills, autonomy, creativity, and engagement.

Cluster random sampling was applied to select two groups, as this method ensures representative and homogeneity within clusters (Kazerooni, 2001). Levene's Test in SPSS confirmed variance homogeneity across classes, with XI F1 and XI F2 chosen for the study. XI F1 (32 students) served as the control group, while XI F2 (33 students) was assigned the experimental treatment using PjBL.

1. Instruments

   This study employed multiple instruments to measure the effects of Project-Based Learning (PjBL) on students' writing skills, autonomy, creativity, and engagement. The writing test was assessed using Jacobs' ESL Composition Profile (Haswell, 2007), covering five indicators—content, organization, vocabulary, language use, and mechanics. Each indicator had four performance levels with a total score range of 37–100. Learner autonomy was measured using the Learner Autonomy Questionnaire (LAQ) adapted from Zeki & Tanyeli (2016). Students' creativity was examined through the Students' Creativity Questionnaire (SCQ) based on Torrance's indicators—fluency, flexibility, originality, and elaboration. Learning engagement was assessed by the Task Engagement Questionnaire

(TEQ) adapted from Zare & Derakhshan (2024). All questionnaires (LAQ, SCQ, TEQ) were administered at both pre-test and post-test stages, provided in English and Bahasa Indonesia to ensure clarity for participants.

2. Validity and Reliability

This study employed both content and construct validity. Content validity for the writing test, LAQ, and SCQ was ensured through expert judgment, curricular alignment, and pilot testing. Aiken's V (Penfield & Giacobbi, 2004) was used to quantify expert agreement, with results showing high indices (V = 0.963–0.981), confirming strong representatives of items. The TEQ, adapted directly from Zare & Derakhshan (2024), was not revalidated, as its prior validation confirmed a five-factor structure (behavioral, emotional, cognitive, agentic, social). Construct validity was tested using Pearson correlations in SPSS. All items of LAQ (24), SCQ (16), and TEQ (25) showed significant correlations, confirming that each item appropriately measured the intended constructs.

Reliability was tested through inter-rater reliability for the writing test and Cronbach's Alpha for the questionnaires. Inter-rater reliability was calculated using Krippendorff's Alpha, yielding 0.694 for the control group and 0.772 for the experimental group, indicating moderate to acceptable agreement (Krippendorff, 2004). Questionnaire reliability was satisfactory to strong: LAQ (= 0.723), SCQ (= 0.836), and TEQ (= 0.915), all exceeding the recommended threshold of 0.70. These results demonstrate that the instruments were both valid and reliable for assessing writing ability, autonomy, creativity, and engagement in this study.

3. Data Collection

Data collection was carried out in two stages: pre-test and post-test. In the pre-test stage, both the experimental and control groups were given a baseline writing test to evaluate their initial writing skills. At the same time, they completed questionnaires measuring autonomy, creativity, and learning engagement, providing an overview of their starting levels before the intervention.

In the post-test stage, the same instruments were administered after the implementation of Project Based Learning in the experimental group. Students completed the autonomy, creativity, and engagement questionnaires again, along with a final writing test. The results were then compared to identify improvements in writing ability as well as changes in learner autonomy, creativity, and engagement between the experimental and control groups.

4. Data Analysis

The data were analyzed using SPSS statistical software to compare pre-test and post-test results (Connolly, 2007). Prior to hypothesis testing, normality and homogeneity tests were conducted to ensure the suitability of the statistical procedures. Normality was examined using the Kolmogorov-Smirnov and Shapiro-Wilk tests, with hypotheses set to determine whether the data were normally distributed. Homogeneity was then assessed using Levene's Test, testing whether the data variances were equal across groups. In both cases, the criteria for acceptance or rejection were based on a significance level of = 0.05.

To test the research hypotheses, the researcher initially used Sturges' formula to generate class intervals, enabling meaningful frequency distribution comparisons of writing, autonomy, creativity, and engagement scores between the experimental and control groups. However, since the results of the normality and homogeneity tests indicated that the data did

not meet parametric assumptions, the independent t-test was deemed inappropriate. Instead, the Mann-Whitney U Test, a non-parametric alternative, was employed to compare the two groups. This test was suitable because it does not assume normality and is appropriate for ordinal-level data frequently encountered in educational research (Field, 2018; Gravetter & Wallnau, 2017; Pallant, 2020).

RESULTS AND DISCUSSION

1. Pre-test Results

a. Pre-test Results of Writing Ability

The pre-test writing scores of students, grouped using Sturges' formula, are presented in Table 1. This method allowed the data to be organized into score intervals, ranging from 34–41 (lowest) to 90–97 (highest).

Table 1. Students' writing pre-test score distribution

Score Range	Pre-test	
	Control	Experiment
34-41	2	0
42-49	2	1
50-57	2	0
58-65	1	3
66-73	9	8
74-81	12	7
82-89	4	13
90-97	0	1
Total	32	33

As shown in Table 1, both the control and experimental groups display a wide distribution of writing abilities before the intervention. The distribution indicates that while both groups started with mixed writing abilities, the experimental group showed a greater concentration of high scorers, whereas the control group was more clustered in the middle ranges. This baseline distribution provides a foundation for comparing post-test results after the Project-Based Learning (PjBL) intervention.

b. Pre-test Results of Students' Autonomy

The data of students' autonomy pretest scores in Table 2 are grouped by using Sturges formula. The result of the grouping can be seen on the following table:

Table 2. Students' Autonomy Pre-test Score Distribution

Score Range	Control	Experiment
64-69	1	2
70-75	3	3
76-81	10	6
82-87	6	9
88-93	8	7
94-99	3	4
100-105	1	2
Total	32	33

The overall statistic of students' autonomy pre-test can be seen on the following table:

Table 3. Statistic of the pre-test score of students' autonomy

	Control	Experiment
Maximum Score	102	105
Minimum Score	67	64
Mean Score	84.0937	85.3939

Table 3 presents the pre-test statistics for students' autonomy scores in both the control and experimental groups, showing that the experimental group had a slightly higher maximum score (105 vs. 102) and a slightly lower minimum score (64 vs. 67) compared to the control group; however, both groups demonstrated similar average scores, with the experimental group having a marginally higher mean (85.39 vs. 84.09), indicating comparable levels of autonomy prior to the intervention.

c. Pre-test Results of Students' Creativity

The data for students' creative pretest scores in Table 4 are grouped using the Sturges formula. The grouping results can be seen in the following table.

Table 4. Students' creativity pre-test score distribution

Score Range	Control	Experiment
35-39	2	3
40-44	1	0
45-49	11	8
50-54	10	15
55-59	4	4
60-64	2	1
65-69	2	2

The following table shows the statistic of students' creativity.

Table 5. Statistic of the Pre-test score of students' creativity

	Control	Experiment
Maximum Score	67	68
Minimum Score	37	35
Mean Score	51.2813	51.5151

Table 5 displays the pre-test statistics for students' autonomy scores in the control and experimental groups, showing very similar performance between the two groups; the experimental group had a slightly higher maximum score (68 vs. 67) and a slightly lower minimum score (35 vs. 37), while the mean scores were nearly identical, with the experimental group having a marginally higher average (51.52 vs. 51.28), suggesting that both groups started from a comparable baseline level of creativity before the intervention.

d. Pre-test Results of Students' Engagement

Furthermore, the data for learning engagement pretest scores in Table 6 are grouped using the Sturges formula. The result of the grouping can be seen on the following table:

Table 6. Learning engagement pre-test score distribution

Score Range	Control	Experiment
75-80	2	5
81-86	11	6
87-92	6	7
93-98	6	8
99-104	5	3
105-110	2	2
111-116	0	2

The overall statistic of students' learning engagement pre-test can be seen on the following table:

Table 7. Statistic of the pre-test score of learning engagement

	Control	Experiment
Maximum Score	107	112
Minimum Score	79	75
Mean Score	90.4063	91.0909

Table 7 presents the pre-test statistics for students' autonomy scores in the control and experimental groups, showing that both groups levels of autonomy before the intervention; the experimental group had a slightly higher maximum score (112 vs. 107) and a lower minimum score (75 vs. 79), while the mean scores were very close, with the experimental group having a marginally higher average (91.09 vs. 90.41), indicating that the two groups were relatively similar in terms of engagement at the start of the study.

2. Post-test Results

a. Post-test of Writing Ability

The scores of students' writing postest in Table 8 are also grouped by using Sturges formula. The result of the grouping can be seen on the following table:

Table 8. Students' writing post-test score distribution

Score Range	Pre-test	
	Control	Experiment
34-41	0	0
42-49	0	1
50-57	0	0
58-65	0	3
66-73	7	8
74-81	16	7
82-89	9	13
90-97	0	1

Table 8 shows the distribution of students' writing post-test scores for both the control group and the experimental group. The table suggests that both groups improved after the treatment, but the experimental group showed stronger performance in the higher score ranges, especially between 58–65 and 82–89.

b. Post-test Results of Students' Autonomy

Then, the scores about students' autonomy post-test result are grouped by using Sturges formula. The result of the grouping can be seen on the following table:

Table 9. Students' autonomy post-test score distribution

Score Range	Control	Experiment
69-74	7	0
75-80	8	2
81-86	4	7
87-92	7	12
93-98	2	6
99-104	4	4
105-110	0	2
total	32	33

The Table 10 performed the statistic of students' autonomy post-test:

Table 10. Statistic of the post-test score of students' autonomy

	Control	Experiment
Maximum Score	100	106
Minimum Score	69	78
Mean Score	83.8437	90.9696

Table 10 presents the post-test statistics for students' autonomy scores in the control and experimental groups, revealing a noticeable difference between the two groups; the experimental group not only had a higher maximum score (106 vs. 100) but also a higher minimum score (78 vs. 69), and the mean score was substantially higher in the experimental group (90.97 vs. 83.84), indicating a greater improvement in autonomy among students who received the intervention compared to those in the control group.

c. Post-test Results of Students' Creativity

Moreover, the scores about students' creativity post-test results are grouped by using Sturges formula. The result of the grouping can be seen on the following table:

Table 11. Students' creativity post-test score distribution

Score Range	Control	Experiment
35-41	1	0
42-48	6	0
49-55	17	13
56-62	6	17
63-69	2	1
70-76	0	1
77-83	0	1
Total	32	33

The overall statistic of students' creativity post-test can be seen on the following table:

Table 12. Statistic of the post-test score of students' creativity

	Control	Experiment
Maximum Score	67	80
Minimum Score	35	50
Mean Score	52.4063	57.5757

Table 12 displays the post-test statistics for students' creativity scores in the control and experimental groups, showing a clear difference between the two groups; the experimental group had a higher maximum score (80 vs. 67), a higher minimum score (50 vs. 35), and a notably higher mean score (57.58 vs. 52.41), suggesting that the intervention had a positive impact on enhancing students' creativity compared to the control group.

d. Post-test Results of Students' Engagement

Furthermore, the scores in Table 13 are grouped by using Sturges formula. The result of the grouping can be seen on the following table:

Table 13. Learning engagement post-test score distribution

Score Range	Control	Experiment
75-81	4	1
82-88	9	7
89-95	7	9
96-102	6	8
103-109	3	4
110-116	3	3
117-123	0	1
Total	32	33

The statistic of students' learning engagement post-test can be seen on the following table:

Table 14. Statistic of the post-test score of students' learning engagement

	Control	Experiment
Maximum Score	112	122
Minimum Score	75	77
Mean Score	92.1875	96.0909

Table 14 presents the post-test statistics for students' learning engagement scores in the control and experimental groups, indicating a noticeable difference between the two groups; the experimental group had a higher maximum score (122 vs. 112), a slightly higher minimum score (77 vs. 75), and a significantly higher mean score (96.09 vs. 92.19), suggesting that the intervention positively influenced students' learning engagement compared to the control group.

3. Analysis of the Prerequisite Data

Before conducting data analysis, it is essential to meet certain prerequisites to ensure the correct result. These include testing for normality and homogeneity test. The result of normality test can be seen on the following table:

Table 15. Normality Test Result

Questionnaire	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
LAQ_Cont_Pre	,111	32	,200*	,984	32	,893
LAQ_Cont_Post	,136	32	,136	,949	32	,133
LAQ_Exp_Pre	,063	33	,200*	,988	33	,972
LAQ_Exp_Post	,104	33	,200*	,973	33	,555
SCQ_Cont_Pre	,115	32	,200*	,961	32	,295
SCQ_Cont_Post	,109	32	,200*	,968	32	,457
SCQ_Exp_Pre	,158	33	,035	,930	33	,036
SCQ_Exp_Post	,224	33	,000	,798	33	,000
TEQ_Cont_Pre	,150	32	,064	,938	32	,065
TEQ_Cont_Post	,090	32	,200*	,967	32	,422
TEQ_Exp_Pre	,091	33	,200*	,966	33	,385
TEQ_Exp_Post	,121	33	,200*	,979	33	,766

Based on Table 15, there are 2 data that are not normally distributed. The sig score is lower than alpha of 0.05 which mean this data cannot be tested by using parametric test, hence non-parametric test was be used to test the hypotheses.

The result of homogeneity test can be seen on the following table:

Table 16. Homogeneity Test Result

		Levene Statistic	df1	df2	Sig.
Score	Based on Mean	2.789	11	378	.002
	Based on Median	2.638	11	378	.003
	Based on Median and with adjusted df	2.638	11	356.131	.003
	Based on trimmed mean	2.822	11	378	.001

Based on Table 4.16, the data was not homogeneous since the sig score was smaller than alpha (0.002 < 0.05). This add information that the data cannot be tested by using parametric test. Hence the Mann Whitney test (u-test) was be used to test the hypotheses.

4. Hypotheses Testing

The first hypothesis is to find out whether PjBL has any effect toward students' writing. The data that used was experiment students writing pre-test and post-test. The result can be seen on the following table:

Table 17. First hypothesis

	Pre_Exp -Post_Exp
Mann-Whitney U	289,000
Wilcoxon W	884,000
Z	-3,550
Asymp. Sig. (2-tailed)	,000

The test result shows an asymptotic significance (2-tailed) of ,000 , which means there is statistically significant difference between the pre-test and post-test scores. In other words, the implementation of Project Based Learning gives significant effect of students writing ability. Therefore, Ho is rejected or Ha is accepted.

The second hypothesis was to find out the difference of students' writing ability between the students were taught by using PjBL and those who were not taught by using it. The result can be seen on the following table:

Table 18. Second hypothesis

	Skor
Mann-Whitney U	496,500
Wilcoxon W	1024,500
Z	-,610
Asymp. Sig. (2-tailed)	,542

The asymp. Sig. (2-tailed) (0.542) is greater than the commonly used significance level of 0.05 , which means that the difference in writing scores between the two groups is not statistically significant . In other words, there is no strong evidence to suggest that teaching with PjBL led to better writing ability compared to not using PjBL. So, Ho is accepted or Ha is rejected. In summary, the result indicates that there is no significant difference in writing achievement between students taught using PjBL and those who were not.

The third hypothesis was to find out whether PjBL has any effect toward students' autonomy. The data that was used was experiment students LAQ pre-test and post-test. The result can be seen on the following table:

Table 19. Third hypothesis

	LAQ_Post_Exp - LAQ_Pre_Exp
Z	-4.586b
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

Based on Table 19, the sig score was smaller than alpha (0.05), which indicates that the result is statistically significant. Therefore, we reject the null hypothesis (Ho) and accept the alternative hypothesis (Ha). This means that there is a significant effect of using Problem-Based Learning (PjBL) toward students' autonomy. In other words, the implementation of PjBL has a statistically significant impact on improving students' autonomy, as measured by the LAQ (Learning Autonomy Questionnaire) pre-test and post-test scores of the experimental group.

The fourth hypothesis was to find out the difference of students' autonomy between the students were taught by using PjBL and those who were not taught by using it. The result can be seen on the following table:

Table 20. Fourth hypothesis

	Score
Mann-Whitney U	280.500
Wilcoxon W	808.500
Z	-3.252
Asymp. Sig. (2-tailed)	.001

Based on Table 20, the significance (sig) score is 0.001 , which is smaller than the alpha level of 0.05 . This indicates that the result is statistically significant. Therefore, we reject the null hypothesis (Ho) and accept the alternative hypothesis (Ha) .

This means that there is a significant difference in students' autonomy between those who were taught using Project-Based Learning (PjBL) and those who were not taught using PjBL . The negative Z-score (-3.252) suggests that the mean rank of the PjBL group is lower than that of the non-PjBL group, indicating that the PjBL group showed higher levels of autonomy compared to the non-PjBL group, assuming that lower scores indicated less autonomy.

In conclusion, the implementation of PjBL appears to have a positive effect on students' autonomy when comparing the experimental group (taught with PjBL) to the control group (not taught with PjBL).

The fifth hypothesis was to find out the effect of PjBL toward students' creativity. The data that were used was experiment students' SCQ pre-test and post-test. The result can be seen on the following table:

Table 21. Fifth hypothesis

	SCQ_Post_Exp - SCQ_Pre_EXp
Z	-4.890b
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

Based on Table 21, the significance (sig) score is 0.000, which is less than the alpha level of 0.05. This indicates that the result is statistically significant. Therefore, we reject the null hypothesis (Ho) and accept the alternative hypothesis (Ha).

This means that there is a significant effect of using Project-Based Learning (PjBL) toward students' creativity, as measured by the SCQ (Student Creativity Questionnaire) pre-test and post-test scores of the experimental group. In other words, the implementation of PjBL has a statistically significant positive effect on enhancing students' creativity.

The sixth hypothesis was to find out the difference of students' creativity between the students were taught by using PjBL and those who were not taught by using it. The result can be seen on the following table:

Table 22. Sixth hypothesis

	Score
Mann-Whitney U	264.000
Wilcoxon W	792.000
Z	-3.474
Asymp. Sig. (2-tailed)	.001

Based on Table 22, the significance (sig) score is 0.001, which is less than the alpha level of 0.05. This indicates that the result is statistically significant. Therefore, we reject the null hypothesis (Ho) and accept the alternative hypothesis (Ha).This means that there is a significant difference in students' creativity between those who were taught using Project-Based Learning (PjBL) and those who were not taught using PjBL.

The negative Z-score (-3.474) suggests that the experimental group (taught with PjBL) had higher creativity scores compared to the control group, assuming that the ranking reflects higher creativity with lower scores (as is typical in such tests when differences are calculated based on post-intervention improvements).

In conclusion, the use of PjBL has a positive and statistically significant effect on students' creativity when comparing the experimental group to the control group.

The seventh hypothesis was to find out the effect of PjBL toward students' learning engagement. The data that were used was experiment students' SCQ pre-test and post-test. The result can be seen on the following table:

Table 23. Seventh hypothesis

	TEQ_Post_Exp - TEQ_Pre_Exp
Z	-4.123b
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

Based on Table 23, the significance (sig) score is 0.000, which is less than the alpha level of 0.05, indicating that the result is statistically significant. Therefore, we reject the null hypothesis (Ho) and accept the alternative hypothesis (Ha).

This means that there is a significant effect of using Project-Based Learning (PjBL) toward students' learning engagement, as measured by the TEQ (Task Engagement Questionnaire) pre-test and post-test scores of the experimental group. In other words, the implementation of PjBL has a statistically significant positive effect on improving students' learning engagement.

The eighth hypothesis was to find out the difference of students' learning engagement between the students were taught by using PjBL and those who were not taught by using it. The result can be seen on the following table:

Table 24. Eighth hypothesis

	TEQ_Post_Exp - TEQ_Pre_Exp
Z	-4.123b
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

The eighth hypothesis aimed to determine whether there was a significant difference in students' learning engagement between those who were taught using Project-Based Learning (PjBL) and those who were not. The alternative hypothesis (Ha) stated that there is a difference, while the null hypothesis (Ho) claimed there is no difference. To test this hypothesis, a Wilcoxon Signed Ranks Test was conducted, comparing the post-experimental (TEQ_Post_Exp) and pre-experimental (TEQ_Pre_Exp) task engagement scores. The test yielded a Z-score of -4.123 with an asymptotic significance (2-tailed) of .000, indicating a statistically significant difference. Based on these results, the null hypothesis was rejected,

suggesting that the implementation of PjBL had a significant effect on students' learning engagement compared to conventional teaching methods.

Discussion

The findings of the study reveal a comprehensive picture of how Project-Based Learning (PjBL) affects students' writing, autonomy, creativity, and learning engagement. The analyses of the eight hypotheses provide evidence for the effectiveness of PjBL in certain areas while highlighting limitations, particularly in relation to writing skill.

First, the results showed statistically significant improvement in students' writing test as a result of PjBL implementation. The hypothesis related to writing—H1 (effect within the experimental group) was accepted based on significant p-scores. This suggests that PjBL, as implemented in this study, significantly enhance writing skills.

These finding is consistent with some previous studies about the effects of PjBL in language learning, particularly in the improving writing skills. Hasani et al. (2017) found that PjBL improved students' logical thinking and coherence in writing argumentative text. Similarly, Praba et al. (2018) demonstrated that students involved in PjBL activities produced more developed written text than those in conventional method. Yulianti & Roza (2023) concluded that the students were more active and confident when writng on the topics they had explored on the project based activities. Hakimah (2023) also found the effectiveness of PjBL in enhancing students' writing skills within the context of procedure text. Furthermore, Armijos Rivera (2024) reported the significant improvement on students' writing skills after implementing PjBL. Last, Nasution (2025) in her thesis about The Influence of Project Based Learning on Students Writing Skills found that PjBL positively influenced students writing skills.

Based on the finding of this study and some previous study confirms that PjBL can significantly enhance students' writing skills when applied in a well-structured and engaging manner. This improvement may be attributed to the nature of the PjBL approach, which encourages students to take ownership of their learning process and to become actively involved in writing tasks that are meaningful and contextually relevant. Unlike conventional models that often emphasize mechanical and isolated writing practices, PjBL provides opportunities for students to engage in collaborative discussions, explore ideas in depth, and revise their work in response to feedback. All of them are essential features of effective writing instruction.

However, the second hypothesis (H2) - difference between groups - examined the difference in writing skills between students taught with and without PjBL. The p-score indicated no statistically significant difference. It is possible that both teaching models were effective in improving writing skills to similar levels, at least within the time frame of the study. This finding is supported by some previous studies that demonstrated that conventional strategies still generate relevant learning outcomes in writing. Zuliani & Sakti (2021) discovered that the students taught with conventional strategies were able to reach "good" writing proficiency levels, indicating that conventional instruction still plays a critical role in achieving expected writing standards. Similarly, Cahyaningrum & Widyantoro (2020) investigated the effects of PjBL, Problem-Based Learning (PBL), and conventional approaches on students' writing abilities. While PjBL demonstrated slightly higher improvement, the difference was not significantly greater, especially in the short term. This lends support to the idea that well-executed conventional approaches can still help students acquire great writing skills.

Additionally, Chikita, et al. (2013) in their quasi-experimental design at SMAN 5 Mataram found that there was no significant relationship between teaching approaches (PjBL and conventional) and students' learning discipline level (high or low) on their writing competency. In other words, whether the students were taught using PjBL or conventional approach, regardless of whether they highly disciplined or not, the outcomes in writing achievement were statistically similar across the groups.

Furthermore, Rahmalia & Utari (2021) discovered that PjBL did not result in substantial gains in students' writing skills when compared to conventional approaches. Similarly, Fajrina et al. (2023) found that students' writing skills did not increase considerably before or after implementing PjBL. These data suggest that PjBL may not always be more effective than conventional strategies, particularly when time and implementation quality are considered.

Relying on the findings above, one possible interpretation of this outcome is that the conventional writing model used in the control group was also highly effective. It offered a clear structure and teacher guidance, which may have benefited students who were more accustomed to conventional classroom routines. Unlike PjBL, which requires a high level of student autonomy and initiative, conventional model supports students through a more scaffolded, step-by-step approach, which may reduce cognitive overload for some students. As a result, both groups were given access to solid instruction in planning, drafting, editing, and revising—core components of effective writing.

While the effects of PjBL on students writing skills show the mix results compared to conventional strategies, PjBL demonstrated strong outcomes in improving non-cognitive factors. There is strong evidence supporting the positive effects of PjBL on students' autonomy. Hypotheses H3 (the effect within experimental group) and H4 (the difference between two groups) both rejected, with statistically significant differences observed in favor of the PjBL group. This aligns well with prior research by Guven & Valais (2014) and Hidayatulloh (2020), who reported increases in student autonomy through PjBL. In this study, students exposed to PjBL demonstrated higher levels of autonomy, likely due to the nature of PjBL itself, which encourages self-direction, decision-making, and reflection.

This finding is especially important because autonomy is one of the most critical non-cognitive skills needed for success in the 21st century, and it is strongly emphasized in the Merdeka Curriculum. In this curriculum, students are expected to take a more active role in their learning, set goals, manage their time, and evaluate their progress—skills that align closely with the principles of PjBL.

The findings from H3 and H4 clearly demonstrate that PjBL is highly effective in nurturing student autonomy, which is essential not only for academic success but also for lifelong learning. The ability to take initiative, reflect on one's work, and make independent learning decisions is crucial in preparing students for future challenges, especially in a fast changing, knowledge-based world.

The third variable in this study is students' creativity. PjBL demonstrated a positive effect on students' creativity, with both H5 and H6 being rejected. This supports existing literature such as Barak & Yuan (2021) and Han et al. (2015), which emphasizes PjBL's ability to encourage creative problem-solving and open-ended exploration. Within this study, students taught using PjBL showed significantly greater improvements in creativity scores compared to those in conventional classrooms. This is consistent with Henriksen et al. (2017), who linked creativity in PjBL to iterative design processes that foster innovation. By engaging students in real-world tasks

that require diverse perspectives and original solutions, PjBL appears to be an effective strategy to cultivate creative thinking skills. These findings underscore the score of embedding opportunities for divergent thinking and imaginative problem-solving in instructional practices.

In the context of this study, creativity was demonstrated in various ways. Students wrote with more originality, proposed unique perspectives in their arguments in their writing. Some students designed slides, or info graphics to support their project writing, indicating that they were engaging in multimodal creative expression, not just writing traditional essays.

These data indicate that PjBL is an effective teaching paradigm for developing students' creativity, particularly in writing activities. It encourages students to be creative, take responsibility of their ideas, and find new methods to express themselves. Those skills are essential for academic and real-world success.

Finally, PjBL had a highly significant influence on students' learning engagement, as evidenced by the rejection of H7 and H8. Simatupang & Yusuf (2024) previously noted that PjBL enhances behavioral and cognitive engagement due to its collaborative and authentic nature. Similarly, Almulla (2020) highlighted the relationship between PjBL and increased students' engagement, noting that PjBL integrates multiple dimensions of learning like collaboration, authenticity, and iterative learning that lead to enhanced engagement. In this study, students participating in PjBL activities showed higher average engagement scores post-intervention, suggesting that the model successfully motivates students to become more actively involved in their learning.

This findings illustrate that PjBL does more than just improve academic outcomes. It invites students to become emotionally, cognitively, and behaviorally invested in their learning process. In the PjBL classroom, students did not merely complete writing tasks to fulfill assignments; instead, they collaborated, took initiative, shared responsibilities, and showed genuine interest in seeing their projects come to life.

This study's findings also tie directly into the Merdeka Curriculum, which emphasizes active participation, student voice, and holistic learning. The observed increase in engagement among students taught with PjBL confirms that this model supports the curriculum's goals by promoting deeper, more meaningful learning experiences.

Collectively, the findings of this study highlight the multifaceted strengths of PjB) in shaping both cognitive and non-cognitive student outcomes. While PjBL showed significant improvement in writing skills within the experimental group, its comparative effect to conventional methods was not statistically significant. It suggests that PjBL and conventional instruction can both be effective when well implemented. However, the advantages of PjBL became particularly evident in the development of learner autonomy, creativity, and learning engagement. These non-cognitive skills are essential for 21st-century learners and closely align with the principles of Merdeka Curriculum, which advocates for student-centered, inquiry-driven, and meaningful learning experiences. Autonomy empowered students to take charge of their writing, creativity allowed them to approach tasks with innovation and originality, and engagement ensured sustained interest and effort. The interaction of these three affective factors also appeared to reinforce one another as students became more autonomous, they also became more creative and engaged. Therefore, although PjBL may not always guarantee superior academic outcomes in isolation, it plays a crucial role in building the attitudes, strategies, and lifelong learning behaviors that underpin enduring academic and personal success. These findings

affirm that writing instruction should not only focus on technical accuracy but also nurture students' ownership, imagination, and investment in the process.

CONCLUSION

The study's findings offer a comprehensive view of how Project-Based Learning (PjBL) affects students' writing skills, autonomy, creativity, and task engagement at SMAN 2 Lintau Buo. The study concludes that:

The first result showed that PjBL significantly enhanced students' writing abilities in the experimental group. Students who received writing instruction through Project-Based Learning made significant progress from pre-test to post-test, demonstrating that PjBL effectively supports writing growth through actual activities, collaborative learning, and student-centered approach. However, there was no statistically significant difference between the experimental and control groups' post-test scores. This implies that, while PjBL can improve writing ability, it might not compete with conventional instructional methods, particularly when both are well implemented. The conventional method employed in this study also provided a structured and scaffold strategy for students to enhance their writing during the drafting, editing, and revising stages.

The second finding indicated that students' autonomy was significantly improved. This was demonstrated by the ability to make writing decisions independently, identify and solve their own writing problems, rewrite their work without depending exclusively on teacher comments, and establish personal standards and processes during the writing process. These behaviors demonstrate the development of cognitive, meta-cognitive, and affective skills, all of which are essential components of learner autonomy.

The third outcome discovered that PjBL had a beneficial and significant effect on students' creativity. This was proved by characteristics consistent with Torrance's theory of creativity, such as fluency (generating various ideas), flexibility (changing perspectives or styles), originality (creating unique and inventive ideas), and elaboration. The flexible format of the projects allowed students to freely explore creative ideas.

The last effect displayed that PjBL had a significant beneficial influence on student task engagement. The collaborative, relevant, and student-centered aspect of PjBL encouraged students to actively participate and persevere in learning tasks. As a result, teachers are encouraged to create PjBL assignments that are relevant to students' lives, socially important, and allow for teamwork and presentations.

Therefore, while PjBL may not always produce higher academic results when tested using standardized writing tests, its contribution to the development of student-centered values and soft skills is clear. This conclusion emphasizes the need of combining PjBL with structured academic education to maximize its effectiveness in developing both hard and soft skills.

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