Students' Writing Ability and Their Attitude: Examining the Effect of Online PjBL

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ABSTRACT: This study examines the effect of online PjBL on students' writing abilities and their attitudes toward online PjBL. A mixed method was employed in this research. 72 students majoring in English at a university in Indonesia took part as participants with informed consent. Two groups—control and experimental—were formed. The experimental group utilized online PjBL, whereas the control group used traditional teaching. Tests, questionnaires, and interview questions were employed to collect data. The collected data were analyzed both quantitatively and qualitatively. The findings of the research showed that the mean score of the experimental group was higher than that of the control group. Furthermore, an independent sample t-test revealed that the sig. value was 0.023 = 0.05. It indicated that there is a significant effect of online PjBL on students' writing ability. Furthermore, the students showed positive attitudes toward the implementation of online PjBL. It is indicated by the students' responses to the questionnaire, where thirty out of thirty-six students indicated that they strongly agree that the online PjBL makes them more comfortable writing an argumentative essay. Seven out of ten students interviewed said peer feedback activities improve writing the most in online PjBL. Recommendations for further researchers were also provided.

KEYWORDS: Students' Writing Ability, Attitude, Online PjBL (Project-Based Learning), Effect, Examining

I. INTRODUCTION

Over recent years, the widespread adoption of mobile devices and advancements in wireless technologies have revolutionized the landscape of online learning. This transformation has made e-learning not only more accessible and convenient but also highly personalized and adaptable to the needs of individual learners (Liu & Yu, 2022: Veeramanju, 2022). In tandem with this digital evolution, English has solidified its position as the global lingua franca. Its prominence is not merely a linguistic phenomenon; it reflects broader socio-economic and technological trends. Due to the surging waves of globalization and internationalization over recent years, English has become pivotal in academia, the electronics industry, global commerce, and cutting-edge technology. Integrating online learning with other efficacious instructional methods, such as Project-Based Learning (PjBL), holds the potential to elevate the quality of education and significantly enhance learning outcomes (Chistyakov et al., 2023; Maryati et al., 2022; Sugianto et al., 2020) Online PjBL not only underscores the role of social interaction and collaboration in the learning process but also cultivates a culture where students are encouraged to be independent, creative thinkers. By fostering such an environment, students are not just gaining knowledge; they are being equipped with the skills and mindset to achieve greater academic heights. Additionally, this method promotes lifelong learning, preparing students to adapt and thrive in an ever-evolving global landscape (Chen, 2019; Susanti et al. 2023).

There has been a marked uptick in research efforts aimed at understanding the effects of PjBL in the realms of EFL (English as a Foreign Language) and ESL (English as a Second Language). This growing interest underscores the significance and potential transformative power of PjBL in language education. To illustrate, Sari & Prasetyo (2021) embarked on a comprehensive study to investigate how PjBL might influence students' reading skills. Their study threw light on the nuances of integrating project-based techniques into reading comprehension modules. In a similar vein, Winasih et al. (2019) delved into the realm of spoken English, attempting to ascertain the effectiveness of PjBL in enhancing speaking proficiency among learners. Their findings have important implications for educators aiming to bolster oral communication skills through innovative teaching methods. Shifting the focus to another critical aspect of language learning, Zahro & Mitarlis (2021) implemented PjBL strategies to foster and enhance students' creative thinking within the EFL environment. Their research is particularly crucial as it merges linguistic competencies with cognitive skill enhancement, offering a broader perspective on the multifaceted advantages of PjBL. However, a significant gap in the literature pertains to students' attitudes and perceptions. The studies mentioned above, while invaluable, do not delve deeply into how students feel about PjBL or their levels of engagement and satisfaction with this teaching methodology. Understanding student attitudes is vital because it can greatly influence the outcomes and effectiveness

of the teaching approach. Moreover, it is worth noting that much of the preceding research has been grounded in traditional research methodologies. In the rapidly evolving landscape of education research, there is an imperative need for more contemporary, perhaps mixed-method, approaches that capture the complexities of modern classroom environments and diverse student populations.

To the authors' best knowledge, there is a noticeable gap in research concerning the impact of online PjBL in an online setting on students' writing proficiency, especially within the Indonesian milieu. Moreover, the exploration of students' perceptions and attitudes towards the deployment of online PjBL remains relatively uncharted in this context. The present study aims to bridge this knowledge gap. It does not just offer insights into the potential benefits of online PjBL on enhancing students' writing skills; it also delves into the empirical realm by presenting data on students' sentiments and perspectives regarding the adoption of online PjBL in EFL classrooms. In doing so, this research contributes substantially to the growing body of literature, highlighting both the educational outcomes and the experiential aspects of learners in the modern, digital-centric educational environment.

The primary objective of the present study is to meticulously evaluate the impact of online PjBL in an online environment on students' writing prowess. Additionally, it seeks to delve into students' perceptions and feelings regarding the adoption and execution of online PjBL methodologies. Understanding these dynamics is paramount. The results of this research will furnish educators and learners alike with invaluable insights, aiding them in navigating and addressing challenges associated with teaching and learning writing skills at the tertiary level. By gaining a deeper comprehension of students' experiences and attitudes toward online PjBL, educators are better positioned to tailor or even innovate instructional methods. Such customization ensures that the teaching approaches resonate more effectively with the students' preferences and requirements, thus enhancing the overall educational experience.

II.   REVIEW OF RELATED LITERATURE
The Efficacy of online Project Based learning
In online PjBL practices, web quests, Learning Management Systems (LMS), emails, blogs, online forums, and social networking can be utilized to look up information, share or change ideas, work together, or cooperate. As such, students are able to do research, offer hypotheses and explanations, engage in intellectual discourse, question the assumptions of others, and test the viability of alternative perspectives (Bell, 2010; Krajcik et al., 1994; Leggett & Harrington, 2021).

Pertinent to the efficacy of online PjBL Aghajani & Adloo, (2018) revealed that the use of online PjBL via telegram application have a significant effect on students writing ability particularly in all five dimensions of writing (i.e., content, organization, vocabulary, language use and mechanics). Besides, they also found that the students had positive attitude toward using telegram cooperative learning. In addition, Chanpet et al., (2020) provide evident of the effectiveness of embedding technology in PjBL activities. According to their findings, technology served as a stepping stone for both student and teacher engagement. Learners and teachers both benefited from the system's built-in communication and file-sharing features as well as its ability to facilitate both formative and summative evaluations of student progress. Post-implementation measurements of PBL knowledge and ability were much higher for the online part, and student feedback was overwhelmingly favorable.

Guo et al., (2021) investigated the students' perspective of the online PjBL toward students' social presence, cognitive presence, and academic performance. They found that certain levels and sub-levels of students' cognitive presence, as well as certain components and sub-components of their social presence, were found to have a favorable association with the students' academic achievement. Meanwhile, Lin, (2018) incorporated group awareness (GA) and peer evaluation in computer-supported collaborative learning (CSCL's) project-based learning environment in her research. The findings demonstrated that the experimental class's group awareness and peer assessment (GAPE) moderately reduced the free-rider effect and significantly increased both socially shared regulation of learning (SSRL) and self-regulated learning (SRL), in comparison to the NO-GAPE condition (i.e., the control group). Additionally, the results of this study indicate that perceived SSRL can properly predict SRL. In the same vein, Abuhmaid, (2020) examined the Jordanians students' perception toward the impact of online learning environment on project-based teaching method. The findings of the research indicated that students (both online and in-class) have favorable attitudes regarding learning through project-based learning. It was interesting to note that the results showed that students who learned in-person had a greater opinion of project-based learning than students who learned online.

In the Indonesian context, Salma (2020) investigated the effect of PjBL during the online learning on the student's learning achievement. She concluded that Project-based blended learning improves student achievement in experimental and control classrooms, thus it has a significant impact. In a similar investigation, Sudira et al., (2022) measured the effectiveness of online PjBL combined with evaluative method (i.e., plan, do, and check (PDCE)) during training and coaching of vocational teachers. They found that the application of online PjBL combined with PDCE approach is effective to improve the understanding of the trainee on the material presented during the training session.

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The Online Teaching for Writing

The global pandemic triggered an unprecedented shift in the education sector, pressing educators worldwide to transition from traditional classroom teaching to online learning platforms (Marzuki et al., 2023). This sudden and massive shift not only impacted the methodologies and strategies educators employ but also transformed the very essence of how students absorb and interact with their educational content.

Central to this transformation has been the role of technology. It has become the backbone, facilitating the continuity of education in a time of social distancing and lockdowns. In this new landscape of online education, the aptitude to harness the potential of digital tools is no longer just an advantage—it is a necessity. For effective online instruction, educators must be adept at navigating and employing various online learning applications, ranging from Zoom and Google Meet to Learning Management Systems (LMS) and Google Classroom, among others (Alsudais et al., 2022; Anggraini et al., 2022). Focusing on the domain of writing, platforms like Google Meet and Google Classroom have emerged as instrumental resources. These platforms are not just mediums for virtual communication; they are enablers, helping students hone their writing skills and maintain their enthusiasm for the subject. This sentiment is echoed by research from Shelvam et al. (2021), which underscores the effectiveness of these platforms in bolstering students' writing prowess and motivation levels.

In addition, tools like Google Docs have been repurposed beyond their primary functions. As Neumann & Kopcha (2019) found, when used in online writing classes, Google Docs serves as a dynamic platform for feedback activities. By leveraging the collaborative nature of Google Docs, where both peers and instructors can provide real-time input, students witness tangible improvements in their writing outcomes. Moreover, innovative applications like Jam Board are paving the way for new techniques in the brainstorming process. As Khuong posits, students can harness Jam Board's capabilities to generate ideas via digital mind mapping, setting a strong foundation before they commence their writing tasks. In conclusion, as technology continues to evolve and interweave itself into the fabric of education, it is imperative for educators to keep pace. This is not just about staying current; it is about ensuring that the educational journey is enriched, interactive, and adaptive to the demands of our changing world.

III. METHOD

A Mixed-method design was employed in this research. It because two types of data were required to be collected those are quantitative and qualitative data. In more detail, the current research applied Mixed-method with Sequential Explanatory Design (SED) as advocated by Morse (2016). In the SED design, the researchers collect the quantitative data and the analysis first followed by the qualitative data and the interpretation. The quantitative data was obtained from the result of the pretest and posttest of the students' writing. While qualitative data was obtained from the result of an open-ended questionnaire and interview.

The participant of this research was second-year students of English Department at a University in Indonesia. There were 72 students who served as participants in the current research in which 36 students were treated as a control group and the rest were treated as an experimental group. Those students were enrolled in the writing course provided by the English Department of the University. Informed consent was applied prior to taking the participants into this research. It was done by asking permission from the participants and explaining the purpose of this study. Therefore, all participants voluntarily joined the research.

The data were collected by employing some instruments following the research question that would be answered. The first research question dealing with the effect of online PjBL. The instrument used was a test that consisted of a pretest and a posttest. The second research question related to the students' attitude toward the implementation of online PjBL. The instrument used were a questionnaire and an interview. Both questionnaire and interview questions were constructed in line with the procedure of online PjBL that the students have experienced.

The collected data were then analyzed with different approaches. The data relating to the quantitative was analyzed statistically by using IBM SPSS 26. The data relating to the qualitative was analyzed by crosscutting and integrating the result of the instruments (i.e questionnaire and interview) and explaining the result in the narrative form as detailed as possible. To get the conclusion, both quantitative and qualitative data were integrated and interpreted as a final conclusion.

IV. FINDINGS AND DISCUSSIONS

Before implementing the online PjBL, the instructor distributed an online writing pretest to both the control group and the experimental group. It was done to measure the initial ability of both groups. The following table presented the result of their writing ability.

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Table 1. The result of the pretest of both the control group and the experimental group.

			Pretest Result		
Pretest Score	Group	N	Mean	Std. Deviation	Std. Error Mean
	Control Group	36	71.67	5.976	.996
	Experimental Group	36	71.53	5.185	.864

Regarding the table above, there were 36 students of both the control and experimental group who attended the writing pretest respectively. As can be seen, it is clear that the pretest score of both groups almost at the same level. In the control group, the mean score was 71.67 and the pretest score of the experimental group was 71.53. It indicated that the writing ability of both groups was comparable.

Research Procedure

Both the control and experimental groups underwent a writing ability test. Following this, the experimental group experienced the online Project-Based Learning (PjBL) method. Meanwhile, the control group used a traditional teaching approach, where they were instructed to write an argumentative essay and submit it by the deadline. The subsequent charts outline the research procedure.


Chart. 1 The Procedure of treatment of both groups

In the above chart, the control group's activity appeared consistent. Students were introduced to their task—writing an argumentative essay. After understanding the assignment, they worked independently for a set duration before submitting their essays. On the other hand, the experimental group followed a different approach, integrating online Project-Based Learning (PjBL). Initially, students planned out their writing projects, selecting topics and outlining the process. They then collaborated in small groups of two or three. Within these groups, they discussed their essay structure and exchanged feedback, evidence of which can be found in their LMS chat box (refer to Fig. 1). Once their writing projects were completed, the groups presented their work in an online forum. Peer groups listened and subsequently offered feedback, especially focusing on essay organization, grammar, and punctuation (see Fig. 2). Using this feedback, students made revisions. The instructor further guided them on improvements. Finally, students submitted their revised essays to the instructor for grading.
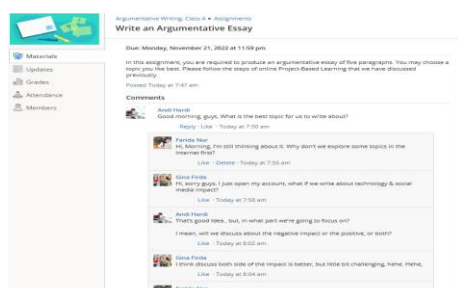
Picture 1. Students' chat box in LMS while discussing the topic of their Writing
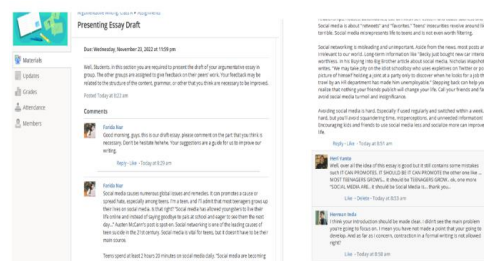
Picture 2. Students are giving feedback to their peers in LMS

After a seven-week series of activities, the instructor gave a posttest, which was identical to the pretest. Students were tasked with writing a five-paragraph argumentative essay. The table below presents the statistical analysis of the writing scores from both groups.

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Table 2. The result of the Posttest of both the control and experimental group

	Result of Posttest				
Posttest Score	Group	N	Mean	Std. Deviation	Std. Error Mean
	Control Group	36	77.36	6.379	1.063
	Experimental Group	36	80.56	5.179	.863

From the table, both the control and experimental groups each had 36 students attending the posttest. The control group's mean score was 77.36, up from a pretest score of 71.67. The experimental group showed an increase from 71.53 in the pretest to 80.56 in the posttest. While both groups demonstrated improvement, the experimental group's mean score increase was more pronounced than the control groups. This suggests that students in the experimental group performed better than those in the control group.

The effect of Online PjBL on Students' Writing Ability

To assess the impact of online PjBL on students' writing ability, we applied an independent sample t-test. Prior to this, a normality test was conducted using IBM SPSS 26 to ensure the data distribution was appropriate for our analysis. This test helps decide the type of statistical formula to use, either parametric or non-parametric. Data is deemed normally distributed if the significance result exceeds 0.05. The results of the normality test, as processed by IBM SPSS version 26, are presented in the table below.

Table 3. The result of normality tests

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.227	36	.000	.867	36	.000
Posttest	.209	36	.000	.902	36	.004

From the table provided, the Shapiro-Wilk test gives a significance value of 0.000 for the pretest, which is below the 0.05 threshold. Similarly, the posttest shows a significance value of 0.004, also below the 0.05 threshold. Given that both pretest and posttest significance values are under 0.05, the data is concluded to be not normally distributed.

Table. 4 The result of the independent sample t-test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
Posttest_Score		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
	Equal variances assumed	2.200	.143	-2.333	70	.023	-3.194	1.370	-5.926	-.463
	Equal variances not assumed			-2.333	67.166	.023	-3.194	1.370	-5.928	-.461

Given the data's normal distribution, an independent sample t-test was employed. If the significance value is less than 0.05, the data is considered significant. The analysis showed a significance value of 0.023 (for equal variances assumed), which is below the 0.05 threshold. Thus, it is evident that online PjBL had a significant effect on the students' ability to write an argumentative essay.

The students' attitude toward the implementation of Online PjBL.

To gauge the students' attitudes towards the implementation of online PjBL, a questionnaire was distributed via Google Forms to the experimental group of 36 students. Their responses are presented in the table below.

Table 5. **The result of the questionnaire**

No	Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	Planning sessions of online PjBL help me to organize ideas to write an argumentative essay	29	7	0	0	0
2	Working in a group provided me with more ideas about writing an argumentative essay	28	8	0	0	0
3	I feel confident presenting my writing product in front of my friends	29	7	0	0	0
4	The peer feedback activity gives more insight to improve my writing	30	6	0	0	0
5	Revising activity gives me a chance to improve my writing product	28	8	0	0	0
6	I feel confident about the result of my writing to be submitted to the teacher	29	7	0	0	0

From the provided table, the majority of students expressed favorable views on the online PjBL implementation during their writing course. 29 of the 36 students strongly believed that the planning sessions significantly aided in organizing their ideas prior to writing, with the remaining 7 in agreement. When it came to the benefits of group work, 28 students felt it endowed them with a richer pool of ideas for their argumentative essays, while 8 others agreed with this sentiment. Confidence in presenting their essays in front of peers was high, with 29 students strongly agreeing and 7 agreeing. Additionally, feedback was highly valued; 30 students strongly felt that feedback deepened their understanding and honed their writing skills, with 6 others in agreement. In terms of revisions, 28 students strongly believed they had sufficient opportunities to polish their work, and 8 concurred. Lastly, 29 students were highly confident in submitting their final pieces to the instructor, with the remaining 7 agreeing. Across all items, it is noteworthy that no students harbored any negative attitudes toward the online PjBL approach.

The result of the interview

Ten students from the experimental group were interviewed. The selected students were those who have a writing score above the mean score of the post-test. It would be better if all the students in the experimental group were interviewed. However, for the reason of intensity and accuracy of the experience manifested after the implementation of online PjBL, it was decided to interview only ten students that have a higher score than the mean score of the posttest. There were three questions employed to the students.

Q1: In what way does online PjBL improve your writing ability?

In responding to the question, seven students have the same responses that their writing gets improvement after they experienced online PjBL because they have enough time to prepare their topic before starting to write. Besides, they also argue that in the discussion session they many insights about what and how to write an argumentative essay with various topics. Two of five responses were presented in the following excerpt.

> *AH: I think my writing improve after following online PjBL because I have time to prepare my topic in the planning session and discussion session.*
>
> *FN: My writing getting better because we have time to discuss in the group about what and how to finish our task to write argumentative writing.*

While three students argue that their writing gets better after experiencing online PjBL because they get many feedbacks from their peers and instructor. The following excerpt showed their responses.

> *GF: My writing gets improvement because of the feedback provided by our friends and also the teacher.*
>
> *HY: I use the feedback from my friends to revise my writing till it becomes better than the previous one.*

HI: In online PjBL, we were provided with feedback from friends and also the teacher. With that feedback, we improve our writing. Besides, the feedback becomes our memory to write better in the future.

Q2: In what part of the activity of Online PjBL do you think help you in writing an argumentative essay?

Related to the second question, seven out of ten students responded that peer feedback helps them to improve their writing. They argued that the feedback from their peer, as well as the teacher, make them realize the weaknesses of their writing either the construction of the content or the grammatical mistake they produced.

Three of seven responses were presented in the following excerpt.

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> *FH: I think the most interesting part is the peer feedback session. In that session, I and my friends know the mistake that we made. So, we can directly revise the mistake to improve our writing product.*

> *MG: The peer feedback session is the most important part for us because we can identify the mistakes that we overlooked. The mistake can be related to the structure of the essay and the grammatical mistake we made.*

> *MH: To my experience during the learning process in online PjBL, the feedback from my friends and teacher gives more insight about writing an essay. In that session, I got more knowledge about what to consider in writing an essay. I use the feedback as my guidance to improve my writing for the next task.*

Among the ten students interviewed, three students reported that working in a group provide them with more help in writing an essay. They argued that working in a group expanded their knowledge about the topic, and how the topic should be framed and developed into a written form. The following excerpt presented their responses to the question:

> *TD: I love to study together, so I think the group discussion is the best part that improves my writing. In this session, I get more insight about the topic that would be written.*

> *GF: The group discussion provided me with a way how to start my writing and give me a knowledge stock to be developed in the written form.*

> *HM: I got my best experience in writing when I and my friends discussed together the topic, how to develop the topic, and presented it in our writing.*

Q3: Will you apply online PjBL for your next learning experiences?

They have the same expressions when responding to the above question. All of them agree to use the steps in the online PjBL to figure out their next assignment. They argued that the steps of online PjBL provide a massive benefit for their learning experiences. They mentioned that some of the benefits they got were knowledge improvement due to the sharing session, the improvement of their confidence toward the accomplished assignment, and the ability to monitor their progress as the result of peer and teacher feedback. Four of their reports were presented in the following excerpt unveiling their responses.

> *MG: I will follow the steps online PjBL that I experienced during the process of learning to complete my next task. The steps of online PjBL provided me with a guide to approaching the assignment that should be accomplished. Besides, it fits best for me because I can get more insight through the sharing session with friends.*

> *HY: To me, the steps in online PjBL really help. Therefore, I am going to use it to complete my task during the learning process.*

> *FN: Sometimes, I am not confident to submit my writing assignment to the teacher because I feel there are many mistakes in it. But having discussed it with friends and get peer feedback from the teacher I feel more confident to submit it. Therefore, I will use it for my next learning.*

> *AH: I am going to use the steps of online PjBL for my next assignment because I can monitor my progress through the feedback given by peers and the teacher.*

In line with the students' responses to the three-interview question proposed by the researcher, the students showed a positive attitude toward the implementation of online PjBL in writing an argumentative essay. These findings support the data revealed from the questionnaire that indicated that students enjoy the implementation of online PjBL in their learning process particularly in completing their writing assignments.

V. DISCUSSION

This study was principally designed to evaluate the efficacy of online PjBL in writing instruction and to capture students' perceptions of its implementation. Through meticulous statistical scrutiny, it was determined that students exposed to the online PjBL method achieved notably higher results, with a posttest average score of 80.56. This is in contrast to the control group, which achieved an average of 77.36. This disparity in scores clearly indicates that the online PjBL cohort surpassed the performance of those in the traditional setting. Furthermore, a deep dive into the results of the independent sample t-test, showing a significance value of 0.023—well below the 0.05 benchmark—offers compelling evidence of the potency of online PjBL in bolstering students' proficiency in crafting argumentative essays.

Building on this foundation, a number of preceding studies, including those by Aghajani & Adloo (2018), Praba' et al. (2018), Syarifah & Emiliasari (2019), and Wardani et al. (2021), have underscored the value of PjBL in the realm of writing instruction. A standout contribution was made by Wardani et al. (2021), who undertook a comprehensive exploration of how PjBL influences various facets of writing, spanning content, organization, structure, vocabulary, to mechanics. Furthermore, their research suggested that PjBL acts as a catalyst, nurturing students' abilities in critical thinking, creativity, and fostering a collaborative ethos. Interestingly, while their research was extensive, Wardani et al. (2021) did not venture into evaluating

students' reactions post the PjBL experience. This is where our research bridges the gap, offering a nuanced understanding of students' sentiments after their engagement with online PjBL, which will be elaborated upon in the ensuing segments.

In addition to its core objectives, this study delved into discerning students' sentiments post-implementation of online PjBL. A clear trend emerged from the collected data: students felt positively influenced by the online PjBL approach. This assertion is corroborated by their feedback across both structured questionnaires and more open-ended interview sessions. The questionnaire was structured with six targeted items that delved into the nuances of online PjBL, with responses anchored on a Likert scale. A significant chunk of participants resonated with the "strongly agree" category across these statements (as detailed in table 2). Significantly, the fourth item stood out, attracting affirmatives from 30 of the 36 participants. This feedback accentuated the importance students attributed to peer evaluations, shedding light on its pivotal role in enriching their writing journey. The inference is clear: the peer review component within the online PjBL framework served as a cornerstone in students' writing endeavors, fostering growth and self-awareness.

Delving deeper, the interview results furnished a more nuanced understanding of students' viewpoints. These interviews, targeting those whose scores exceeded the posttest mean, revealed an overwhelming appreciation for the structured approach of online PjBL. When probed about which component of online PjBL left the most indelible mark on their writing journey, the consensus tilted heavily towards the peer feedback sessions. Students recounted how these sessions widened their horizons, bolstered their self-assurance, and provided a tangible roadmap to trace their writing enhancements. Corroborating these findings, research by Jin et al. (2022) underlined the instrumental role of peer feedback in bolstering writing acumen in the context of higher education. In a similar vein, Banaruee et al. (2018) accentuated the transformative power of recast feedback in amplifying student writing prowess.

Upon meticulous examination, evaluation, and contrasting of the data presented, our findings unequivocally suggest the efficacy of online PjBL in augmenting students' writing proficiencies. Additionally, the overwhelmingly positive inclination displayed by students towards the pedagogical approach of online PjBL is evident. In light of these conclusions, we earnestly recommend the integration of online PjBL as a potent alternative in pedagogical strategies, particularly within higher education writing curricula.

VI. CONCLUSION

This study aimed to assess the potential benefits of online PjBL within a writing course framework and to capture students' perceptions regarding this teaching strategy. The results unequivocally demonstrated the efficacy of online PjBL. This was evident from the significant rise in mean scores from the pretest to posttest for the experimental group, which underwent the online PjBL intervention. Their scores surged from an initial 71.53 to a commendable 80.56 post-intervention. Conversely, while the control group also exhibited an improvement, their ascent from a mean score of 71.67 to 77.36 in the post-test was less pronounced compared to the experimental group. This clearly underlines the superior efficacy of online PjBL over conventional teaching methods employed for the control group. Reinforcing this conclusion, the statistical significance from the independent sample t-test, having a value of 0.023 (which is less than the accepted threshold of 0.05), points towards the tangible impact of online PjBL on honing students' capabilities in crafting argumentative essays. Further enriching these findings, students' feedback unveiled an overwhelmingly positive disposition towards online PjBL, particularly lauding the peer feedback sessions. They opined that these sessions armed them with deeper insights, bolstered their confidence in their writing, and offered them a lens to discern and rectify their errors more effectively.

In reflecting on the constraints of the current study, several suggestions emerge for future researchers exploring similar topics. Firstly, a larger participant sample is advisable, ensuring more representative and comprehensive data. Additionally, delving into the potential influence of gender can yield nuanced insights into perceptions surrounding the use of online PjBL. It would also be valuable to investigate the challenges faced by both educators and students when implementing this approach. Importantly, for the successful deployment of online PjBL, it is crucial that educators are well-versed in its mechanisms, ensuring that its potential benefits are fully realized.

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