Effects of Problem Based Instruction on EFL Students' Writing Performance

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Abstract

This study aimed to investigate the effects of problem-based learning on EFL students' writing performance. On a single participant group of 35 students who were enrolled in the Department of Political Science and International Relations during the academic year 2023/2024. A quasi-experimental approach of a repeated measures design was applied. Data were gathered using tests and a reflective journal kept. Three argumentative essay writing pretests and posttests were administered before and after the intervention. The instrument's inter-rater reliability was examined using the Kappa value. The Repeated Measures of ANOVA method was used to analyze the quantitative data. The quantitative data result showed that problem-based instruction improves students' writing performance. Thematic analysis was used to examine the reflective journals' qualitative data. In spite of their unfavorable reflections, the students' thoughts on the methods of instruction used in the writing classroom were found to be significantly positive, according to the findings of their reflective diaries. Therefore, it is concluded that problem based instruction is recommended as one of the alternative teaching approach that improves students' writing abilities in the ELT writing pedagogy.

Keywords

Problem-Based Instruction, Writing Performance, Argumentative Essay Writing, Repeated Measures Design, English as a Foreign Language

1. Introduction

English has gained global significance due to its widespread use as a lingua franca, enabling communication between individuals who speak different native languages. Additionally, it has become the language of instruction and research in various fields such as science, technology, business, and academia. Consequently, having a strong command of English is essential for those seeking international communication and pursuing academic or professional endeavors.

In Ethiopia, English is a mandatory subject in secondary schools and higher education institutions. It focuses on developing four language skills: listening, speaking, reading, and writing. The acquisition of English is closely tied to academic achievement and effective communication within the country. Recently, there has been a shift in English Language Teaching (ELT) pedagogy, moving away from solely emphasizing linguistic aspects towards a greater emphasis on acquiring and applying soft skills. This shift involves adapting more participatory teaching methods and a constructivist perspective. Within this context, strong writing skills are in high demand, especially in the 21st century, where the ability to retain knowledge plays a crucial role, (Lalley & Miller, 2007).

Writing in English has numerous benefits, such as self-expression, effective communication, critical thinking, problem-solving, logical and persuasive arguments, feedback, and academic and employment preparation (Farisha, et al, 2022). To improve students' writing skills, different teaching approaches have been introduced, including the product, process, genre, and process-genre approaches. However, each approach has faced criticism. In response, the Process

Genre Approach (PGA) has emerged as a combination of the process and genre approaches, offering a viable option for modern ELT classrooms, especially in writing pedagogy (Badger & White, 2000). PGA provides a structured framework that enhances writing skills. According to Hyland and Tse (2004), the process-genre approach promotes writing performance by involving students in the entire writing process, from pre-writing to revising and editing. By focusing on genre awareness, this approach equips students with the tools to effectively convey arguments and analyze information in various writing genres. This genre-specific knowledge empowers students to develop their overall writing performance.

Current language teaching approaches in English language teaching may not fully align with the demands of 21st-century skills. Traditional approaches focus on knowledge transmission and rote memorization, limiting communicative skills development (Celce-Murcia, 2001). To meet the demands of the 21st century, an instructional approach that actively engages students and enhances their 21st-century skills is necessary (Santosa, 2014). Traditional approaches limit student ownership of the learning process, and intercultural competence may not be adequately addressed (Byram, 2021). Thus, the current shifts in ELT in the 21st century are a direct response to the limitations of existing language teaching approaches in meeting the demands of 21st-century skills. These shifts have been driven by various factors, including dissatisfaction with traditional ELT methods, concerns regarding declining English language proficiency, the growing need for generic skills, advancements in technology and information, evolving social attitudes, and a shift towards a constructivist perspective (Kumaravadivelu, 2006). As a result, there is a high demand for reconceptualizing and establishing a new ELT approach that is compatible with the demands of 21st-century education paradigms.

Problem-Based Learning (PBL), or Problem-Based Instruction (PBI), is a collaborative and constructivist approach to learning pioneered by Barrows and Tamblyn (1980s) at McMaster University. It uses real-life problems to facilitate knowledge construction and has been adopted in various educational contexts (Kaminskiene & Januliene, 2006; Savin-Baden, 2000). In language education, PBI has been gradually incorporated into the curriculum (Yeh 2017), with Larsson (2001) discussing its role in ELT pedagogy. Studies have shown that PBI can be a groundbreaking approach in ELT education (Azman and Shin, 2012), and its principles have been adopted, adapted, and extended in various ELT pedagogies (Aliyue, 2017).

Although there haven't been many empirical studies on the effect of PBI and its relevance in ELT pedagogy in general, the researcher has done some searches. Jumariati and Sulistyo (2017) pointed out that implementing problem-based instruction as an alternative teaching approach showed promising outcomes, particularly in the realm of teaching writing skills, specifically argumentative essay writing. Khairun (2017) also conducted research on the effects of PBI and writing process combinations in teaching writing, and the results were consistently positive and uplifting.

Conversely, the effectiveness of PBI in ELT pedagogy, specifically in relation to writing performance, has been a topic of debate. Kirschner et al. (2006) conducted a study to compare the effectiveness of problem-based instruction and traditional instruction on writing performance. The researchers found no big differences. They were in writing performance between the two methods. A study by Johnson (2019) found contradictory results. The research indicated that although students enjoyed the problem-solving aspect of PBI, there was no significant improvement in their writing performance compared to traditional instruction methods.

Putting it back to the context of ELT in Ethiopia, local researchers in the writing pedagogy such as Alamirew (2005), Dawit (2013), Meseret (2012), Mesfin (2013), Solomon (2018), Bantalem (2020) confirmed that students face difficulties in writing due to several factors, including poor writing instruction, a lack of adequate writing practice, and a mismatch between the theory of teaching writing skills and the actual classroom implementations. Given the foregoing realities, studies that identified problems in the writing of undergraduates made some recommendations that will improve the students writing performance. However, most of the recommendations seem inadequate as the undergraduates' writing problems persist. Although the local studies were conducted on writing skills in different contexts with different aims, neither of them could treat the effects of PBI on students' writing performance. Hence, there is a need for further research to investigate the effect of problem-based instruction on students' writing performance. This study was also intended to explore students' reflections regarding the practices of problem-based instruction.

2. Objective of the Study
The objective of this research are to investigate the effect of problem-based instruction on students' writing performance. This study also intended to explore students' reflections on the practice of problem-based instruction.

3. Literature Review
3.1 Definitions and Theoretical Background of Problem-Based Instruction Approach
Problem-Based Instruction is a learning method based on the principle of using real-world problems as a starting point for the acquisition and integration of new knowledge. It is an instructional approach that challenges learners to seek solutions to real-world (open-ended) problems by themselves or in groups so that learners can engage in developing their self-direct learning (Barrows, 1982; 2002). It offers teachers a structured method that helps students to develop writing competency while students master important basic knowledge subject. Students take the responsibility of their learning into their hands so that they become active, autonomous and lifelong learners.

After Behaviorist and Cognitivist learning theories, constructivist learning gained popularity in the late 20th century. Problem-Based Instruction a subpart of the constructivist approach was first applied in medicine and then it

began to be applied to other disciplines of science. Historically PBI roots are associated with the writings of John Dewey (1916), but it was originally introduced by (Barrows and Tomblyn, 1980s) at the medical schools at McMaster University in Hamilton, Canada, in the hope that it would increase self-directed learning and improve their problem-solving skills. Though PBI has successfully moved from the medical field into other fields of study and it entered various disciplines a decade after its inception in Canada, humanities and social sciences were among the last discipline to enjoy PBI. One final frontier for instruction is using problem-based learning with English language learners (ELLs). It is new in language learning and teaching. Larsson (2001) was the pioneer and discussed the role of PBI tutorship in the teaching and learning of languages. Following this, further studies were conducted on the effect of PBL on language learning (e.g., Aliyue, 2017; Ansarian, Adlipour, Saber, & Shafiei, 2016; Fonseca Martinez, 2017; Hashim, Selamat, & Raja Sulaiman, 2014; Hawthorne, 2008; Mathews-Aydinli, 2007; Azman & Shin, 2012), and the consensus was that PBL could be a possible approach to language learning.

In closing, though Problem-Based Instruction is used in various fields of study, there is a dearth of relevant studies in ELT. Within the area of EFL/ESL learning and teaching, problem-based instruction aligns with approaches in which students learn the target language and then practicing predetermined language structures. Approaches based on similar principles include Task-Based Learning, Content-Based Learning, and Project-Based Learning. What makes PBI unique is its core focus on learning through solving real, open-ended problems to which there are no fixed solutions.

3.2 The Writing Performance

Writing in EFL can be viewed as a problematic area. Among those problems, the lack of writing performance constitutes a significant place. It is important to teach writing with appropriate technique and purpose. In his study, Lee (2006) found that learners used more sophisticated sentences in their final drafts and the use of process writing instruction has considerable positive effects on writing performance. As it has been seen, in all the writing approaches and their development, there is a shift in emphasis in teaching writing from the product approach (the focus is on the final product of the writing, imitate model text), to the process approach (the focus is on the skills in using language) then to the genre approach (the focus is on knowledge of the context, how to express social purpose effectively). Though the genre writing approach is also an extension of the product approach but with an emphasis on the social context of a particular genre of the text. The process-genre writing approach has been extensively studied and proven to be a more desirable approach for enhancing EFL students' writing performance in argumentative problem essay writing scenarios over the product, process, and genre writing approaches. Several research findings support this approach. Firstly, Hyland and Hyland (2006) conducted a study that showed significant improvement in the writing performance of EFL students who received instruction using the process-genre approach compared to other approaches.

In doing so, based on the explanation above, many experts propose their ideas regarding the aspects of writing performance. It can be concluded that there are several points to pay attention to while writing, namely; the aspects of writing which involve content, organization, discourse, syntax, vocabulary, mechanics, and accuracy. As a result, for this study, the researcher adapted the writing aspects of (Jumariati's & Sulistyo's, 2017) scoring rubric of argumentative essay writing performance, namely: content, organization, vocabulary, language use, and mechanics. The scoring rubric of writing performance was designed based on the scoring system which are categorized into five aspects of writing, namely: content, organization, vocabulary, language use, and mechanics.

3. Research Design and Methods

The study's experimental design was a quasi-experiment with a multiple time series design in which the dependent variables were measured at multiple time points before and after the presentation of the intervention. The researcher held a pragmatic position, which is suitable for this study because pragmatism embraces mixed methods as the third research community.

3.1 Participants, Setting, and Sampling Techniques of the Study

The participants of the study were 35 second-year students in the Department of Political Sciences and International Relations at Debre Markos University in the 2023–2024 academic year. In this study, the researcher employed purposive sampling methods, which are non-random sampling techniques, to determine the single group participants. As a result, non-randomized assignments of samples were used. Besides, the researcher gave training to the trainee instructors.

3.2 Data Collection Instruments
3.2.1 The Essay Writing Tests

To assess the students' existing writing performance, three consecutive argumentative framed prompt pre-tests requiring argumentative essay writing were provided before, and after the intervention. In administering the posttests, that is, immediately after the experimental intervention, posttest 1 was administered and another experimental intervention was employed; then, immediately, posttest 2 was administered in the group; and after the experimental intervention posttest 3 was administered.

3.2.1.1 Writing Performance Rubric

The quality of the writing product, which focuses on its content, vocabulary, language use, organization, and mechanics, mostly indicates how well students write. It was adapted from (Jumariati & Sulistyo (2017). The scoring rubric for writing performance used a four-scale score that included "very good", "good", average," and "poor.

3.2.1.2 Students' Reflective Journals

Meanwhile, the students' reflective journals were used to assess their reflections on the overall practices of PBI. These qualitative data were used as complementary to the quantitative data. Since the study employed a quasi-experimental research design with a mixed-methods approach and it was best suited to an "umbrella" paradigm of pragmatism, the convergent design strategy was used for analysis. The convergent design strategy involves collecting quantitative and qualitative data concurrently in each phase (parallel to the quantitative data) and analyzing the two data sets separately. To do so, qualitative technique was used to analyze the reflective data. Initially, the students' reflective journal data had given their ID as data collecting code to determine the major themes. Then, students' reflections were arranged based on their thematic categories. After that, the data were refined and grouped to produce themes that go in line with the quantitative data. Finally, the researcher chose two students' reflective journals randomly and carefully analyzed thematically.

3.3 Data Collection Procedure

3.3.1 The Pre-Intervention Phase

The students were made aware of the objectives of the study prior to the study. Due to the researcher's desire to monitor the successful implementation of the training, the facilitators received extensive training and were required to attend weekly sessions [1 hour and 30 minutes daily for a total of 7 hours of training over 5 days]. The training was designed on the basis of the following points: To begin with, the core training areas were devoted to building the conceptual framework of the PBI approach. In this sense, raising awareness of the importance of PBI was critical to ensuring that the facilitators had a thorough understanding of the concept and instructional technique. In addition, the training was grounded in the phases of instruction. Finally, the students were given three argumentative essay writing pretests (pre-intervention problem scenarios) and examined their writing performance before they were assigned to the intervention.

3.3.2 During The Intervention Phase

During this phase, the facilitator provided training to the participants about the Problem-based instruction steps in the writing classroom and how they practiced each PBI step in their argumentative essay writing problem scenarios.
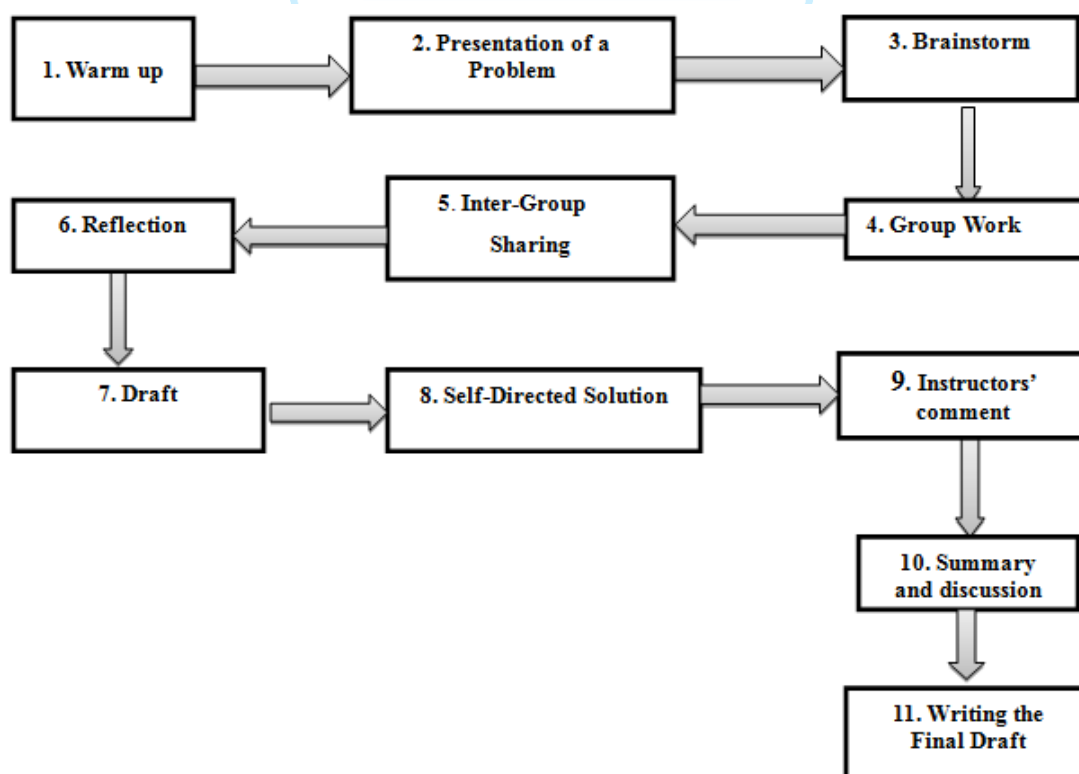

Fig. 1 Problem-based instruction model (*Adapted from Yibo, 2012*)

As it describes in figure 1 above, a study examining the effects of problem-based instruction (PBI) on EFL students' writing performance in argumentative essay writing scenarios, the following instructional activities were implemented:

1. **Warm-up (whole activity):** The students were divided into smaller groups and assigned group roles. Scaffolding was provided to support low-ability students, emphasizing the importance of mixed-ability groups. This created an interactive and engaging learning environment that promoted critical thinking and problem-solving skills and write a well-organized argumentative essay.
2. **Present the problem (whole activity):** Ill-structured real-world problems were introduced using visual aids to help students identify the known and unknown points of the issue. By actively engaging with the material, students developed a deeper understanding of the argumentative essay writing problem scenario.
3. **Brainstorming (whole activity):** Students generated ideas and potential solutions by reflecting on their personal experiences related to the problem scenarios. This step promoted active engagement and collaboration among students, encouraging them to work together to develop innovative and effective solutions.
4. **Working in groups (group activity):** Students actively participated in group discussions, fostering a collaborative and respectful environment. They listened to each other's ideas, considered different viewpoints, and worked towards a consensus. This activity promoted critical thinking, problem-solving skills, and effective communication within the group.
5. **Inter-group sharing (whole activity):** Students actively listened to other groups' ideas and respectfully expressed their own opinions and perspectives. This activity promoted critical thinking, collaboration, problem-solving skills, and effective written communication skills.
6. **Students' reflections (individual activity):** By combining their group's arguments and solutions with their own, students gained a deeper understanding of their own learning and collaboration processes.
7. **Self-directed Solutions (individual activity):** Students independently developed their own solutions based on the arguments and solutions discussed during previous steps. This promoted their writing skills.
8. **Drafting (individual activity):** Students were encouraged to clearly state their thesis, provide supporting evidence, counter opposing arguments, and offer logical reasoning. They were reminded to use proper essay structure and revise and edit their essays for clarity, coherence, and proper grammar and punctuation.
9. **Instructor and peer comments (instructor and peer activity):** The teacher and peers provided feedback and guidance to support students' learning and skill improvement. Students provided each other with peer feedback, revised their writing based on the feedback received, and received feedback from the instructor. This created a supportive and constructive learning environment.
10. **Discussion and Summary (whole class activity):** The teacher facilitated a class-wide discussion to summarize the drafting process and deepen students' understanding. This fostered a positive and collaborative learning environment and provided meaningful feedback.
11. **Writing the final draft (individual activity):** Students revised and finalized their argumentative essays, taking into account the feedback and insights they had received. They adhered to proper essay structure and made necessary revisions to strengthen their arguments, enhance clarity, and improve overall coherence.

3.3.3 The Post-Intervention Phase

The three posttests were administered in the manner aforementioned. After they were introduced to the particular genre, argumentative essay writing in particular, in the PBI classroom, students wrote three argumentative essays by themselves during the post-implementation phase. The data collected through tests and reflective journals were analyzed concurrently using a convergent design strategy during the post-intervention phase of the study. At this phase, analysis of the post-intervention data was carried out to see the changes that the PBI intervention had resulted in.

3.4 Validity and Reliability of the Instruments

The argumentative written prompt scenarios were given to EFL Language Specialists, PhD Candidates, Supervisors, Educational Measurement and Evaluation Professionals, and Political Sciences and International Relations' Professionals before their use in data collection to check their appropriateness. They were also asked to review the written prompt problem scenarios and fill out a validation form.

After the ratings have been completed, the researcher calculated the inter-rater reliability using a statistical measure such as Cohen's Kappa. The analysis revealed a high level of significant agreement in writing performance rubrics (Kappa value of .818). These values indicate strong agreement between the raters' ratings, with agreement percentages of 82%. The Kappa values suggest almost near perfect agreement, indicating highly consistent ratings between the two raters.

3.5 Data Analysis Methods

The data analysis involved descriptive and inferential statistics. Quantitative and qualitative data were employed to measure the effects of PBI on students' writing performance. The inferential data was analyzed with one-way repeated measures ANOVA using the Statistical Package for Social Sciences (SPSS) version 20, while the qualitative data were analyzed through thematic analysis. Once the raters had been trained, they independently rated the students' argumentative essays using the established criteria. After the ratings have been completed, the researcher calculated the inter-rater reliability using a statistical measure such as Cohen's Kappa. The analysis revealed a high level of significant

agreement in the writing performance rubrics (Kappa value of .82). This values indicates strong agreement between the raters' ratings, with agreement percentages of 82%. The Kappa values suggest almost near perfect agreement, indicating highly consistent ratings between the two raters.

3.6 Ethical Concerns of the Research

The following ethics approvals for participants were taken into account: participants' voluntariness, privacy, data confidentiality, anonymity, and future usage are respected throughout the research process. Prior to the formal data collection, a signed Consent Form (CF) and Participant Information Sheet (PIS) were sent to the Political Sciences and International Relations department and the College of Social Sciences and Humanities, Research, Community Service, and Postgraduate Studies coordinating offices to request permission. The offices were informed about the details of the study. Additionally, participants' confidentiality, anonymity, privacy, and ability to use a pseudonym during the study were all assured. Consent forms were available in English.

4. Analysis and Findings of the Quantitative Data
4.1 Effects of Problem-Based Instruction on EFL Students' Writing Performance
4.1.1 Results of the Study

Repeated Measures ANOVA was used to compare the pretest and posttest scores of a single participant group to determine the first research question on the effects of problem-based instruction on EFL students' writing performance. The results were presented using descriptive statistics, Multivariate Tests, the Within-Subject Effects, and Pairwise Comparisons in different tables below:

Table 1 Repeated Measures of ANOVA Descriptive Statistics: Students' Writing Performance (WP) Test Scores before and after the Intervention (N=33)

Tests	Mean	Std. Deviation	N
Pre-test 1	9.4485	1.07707	33
Pre-test 2	9.6970	1.50924	33
Pre-test 3	10.4424	1.24374	33
Post-test 1	12.6848	1.56287	33
Post-test 2	12.7636	1.68483	33
Post-test 3	13.5879	1.45081	33

Table 1 above presents the mean and standard deviation of the students' writing performance test results before the intervention were (pre-test-1, M = 9.4485, *SD* = 1.07707; pre-test-2, M = 9.6970, SD = 1.50924; and pre-test-3, M = 10.4424, SD = 1.24374), which showed that the results had no significant differences. This means that the students' mean scores in the pre-tests were almost similar despite some differences. Similarly, the mean and standard deviation of the students' writing performance post-test scores were (post-test-1, M = 12.6848, SD = 1.56287; post-test-2, M = 12.7636, SD = 1.68483; and post-test-3, M = 13.5879, SD = 1.45081), which indicated that the results have no significant differences except some differences. However, when the mean scores in the pre-tests and post-tests were compared, they showed significant differences. This implies that the students' writing performance has improved after the intervention and problem-based instruction in the writing classroom.

Table 2 Repeated Measures of ANOVA: Multivariate Tests[a]

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[c]
time	Pillai's Trace	.864	38.126[b]	5.000	30.000	.000	.864	190.630	1.000
	Wilks' Lambda	.136	38.126[b]	5.000	30.000	.000	.864	190.630	1.000
	Hotelling's Trace	6.354	38.126[b]	5.000	30.000	.000	.864	190.630	1.000
	Roy's Largest Root	6.354	38.126[b]	5.000	30.000	.000	.864	190.630	1.000
a. Design: Intercept Within Subjects Design: time									
b. Exact statistic									
c. Computed using alpha = .05									

From Table 2 above, the results of the multivariate tests indicate that there was a significant effect of Problem-Based Instruction (PBI) on students' writing performance. The most commonly reported statistic, Wilks' Lambda, had a value of .000, which indicates a significant effect ($p < .05$). The Wilks' Lambda statistic revealed the following results: Wilk's Lambda (λ =.000, *F* 5, .864) =38.126[b], *p*=.000, = OP=1.000). In other words, the use of PBI in Basic Writing classes had a significant impact on students' writing performance scores in terms of content, vocabulary, language use, organization, and mechanics. The effect size, as indicated by the partial eta squared value of 0.864, is large, indicating that the time factor explains a significant proportion of the variance in the students' writing performance.

Table 3 Repeated Measures of ANOVA: Tests of Within-Subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Time	Sphericity Assumed	525.177	5	105.035	53.439	.000	.625	267.195	1.000
	Greenhouse-Geisser	525.177	3.135	167.544	53.439	.000	.625	167.508	1.000
	Huynh-Feldt	525.177	3.514	149.442	53.439	.000	.625	187.798	1.000
	Lower-bound	525.177	1.000	525.177	53.439	.000	.625	53.439	1.000
Error (time)	Sphericity Assumed	314.483	160	1.966					
	Greenhouse-Geisser	314.483	100.306	3.135					
	Huynh-Feldt	314.483	112.456	2.796					
	Lower-bound	314.483	32.000	9.828					

a. Computed using alpha = .05

Since the assumptions of Mauchly's Test of Sphericity were violated, it is recommended to use the p-value of the correction row in the 'Tests of Within-Subject Effects' of the Repeated Measures of ANOVA row of the Greenhouse-Geisser value in (Table 3) above. The difference between the means is statistically significant. $F_{(5:160)} = 53.439$, $P < .05$, $\eta p2 = .625$, observed power = 1.000. Since the p-value of the Greenhouse-Geisser ($\mathcal{E} = .000$) which is ($p < .05$) then it is evident that there was a statistically significant main effect among the observations of the outcome or within-subjects. Hence, the report Greenhouse-Geisser, i.e., ($\mathcal{E} = .000$, i.e., $\mathcal{E} < 0.05$) shows significant results. This is to mean that there are significant differences in each aspect of the writing performance (content, vocabulary, language use, organization, and mechanics) over the different time scores. As soon as a significant main effect is found, pairwise comparison should also be used to establish within-subject differences in the variable time.

Table 4 Repeated Measures of ANOVA: Pairwise Comparisons

(I) time	(J) time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
Pretest1	Pretest2	-1.314	1.200	1.000	-5.103	2.474
	Pretest3	-8.657*	1.517	.000	-13.446	-3.869
	Posttest1	-13.029*	2.768	.001	-21.768	-4.289
	Posttest2	-26.600*	2.031	.000	-33.012	-20.188
	Posttest3	-14.886*	1.833	.000	-20.673	-9.098
Pretest2	Pretest1	1.314	1.200	1.000	-2.474	5.103
	Pretest3	-7.343*	1.574	.001	-12.312	-2.374
	Posttest1	-11.714*	2.863	.004	-20.752	-2.676
	Posttest2	-25.286*	2.027	.000	-31.683	-18.888
	Posttest3	-13.571*	1.881	.000	-19.508	-7.634
Pretest3	Pretest1	8.657*	1.517	.000	3.869	13.446
	Pretest2	7.343*	1.574	.001	2.374	12.312
	Posttest1	-4.371	2.592	1.000	-12.555	3.812
	Posttest2	-17.943*	2.148	.000	-24.725	-11.161
	Posttest3	-6.229	2.171	.106	-13.083	.626
Posttest1	Pretest1	13.029*	2.768	.001	4.289	21.768
	Pretest2	11.714*	2.863	.004	2.676	20.752
	Pretest3	4.371	2.592	1.000	-3.812	12.555
	Posttest2	-13.571*	3.311	.004	-24.023	-3.120
	Posttest3	-1.857	3.167	1.000	-11.854	8.140
Posttest2	Pretest1	26.600*	2.031	.000	20.188	33.012
	Pretest2	25.286*	2.027	.000	18.888	31.683
	Pretest3	17.943*	2.148	.000	11.161	24.725
	Posttest1	13.571*	3.311	.004	3.120	24.023
	Posttest3	11.714*	2.183	.000	4.824	18.605
Posttest3	Pretest1	14.886*	1.833	.000	9.098	20.673
	Pretest2	13.571*	1.881	.000	7.634	19.508
	Pretest3	6.229	2.171	.106	-.626	13.083
	Posttest1	1.857	3.167	1.000	-8.140	11.854
	Posttest2	-11.714*	2.183	.000	-18.605	-4.824
Based on estimated marginal means						
*. The mean difference is significant at the .05 level. b. Adjustment for multiple comparisons: Bonferroni.						

Table 4 above presents the results of a repeated measures ANOVA pairwise comparison analysis on the effects of problem-based instruction on EFL students' writing performance in argumentative essay writing problem scenarios. The results indicate that there are significant differences between the mean scores of the different time points. The asterisk (*) indicates that the mean difference is significant at the .05 level.

As a result, the results indicated that there were significant differences in mean scores between the different time points. For instance, the mean difference between Pretest1 and Pretest2 was -1.314, but this difference was not statistically significant (p = 1.000). However, the mean difference between Pretest1 and Pretest3 was -8.657, and this difference was statistically significant (p = .000). Similar significant differences were observed between Pretest2 and Pretest3, as well as between each pretest and each posttest. These findings suggest that problem-based instruction had a significant effect on the writing performance of EFL students in argumentative essay writing scenarios. Specifically, the students' performance showed significant improvement from the pretests to the posttests. It is worth noting that the Bonferroni adjustment was applied to account for multiple comparisons. Hence, the intervention improved the students' aspects of writing performance (content, vocabulary, language use, organization, and mechanics).

4.2 Analysis and Findings of Qualitative Data
4.2.1 Students' Reflective Journal on the Implementation of the Intervention
The second research question of the present study also aimed to answer the following question: "what are students' reflection on the practice of problem based instruction in improving EFL students' writing performance?"

Theme 1: Students' Engagement and Experience with Problem-Based Instruction
Students' Engagement and Experience with Problem-Based Instruction" can include both positive and negative reflections on the practice of PBI in the writing classroom. This theme encompasses students' overall involvement, interest, and satisfaction with the problem-based instruction approach. It allows students to express their experiences, feelings, and opinions, which may include positive aspects such as excitement, enjoyment, and active participation, as well as negative aspects such as challenges, difficulties, or areas for improvement. By including both positive and negative reflections, a comprehensive understanding of students' engagement and experience with PBI can be obtained.

Student 1:
> *"In my opinion the lesson was interesting as it helped me improve my vocabulary knowledge. During the different steps of PBI, students raised different ideas concerning the argumentative problem scenarios given, suggest solutions. This was a good opportunity to increase my vocabulary knowledge."*

Another student also found the lesson interesting and beneficial for improving his/her vocabulary knowledge. This was reflected in their daily PBI lessons. Participating in activities like discussing argumentative problem scenarios can indeed be an effective way to enhance his/her language skills. The group members also generated different vocabularies during the implementation of the problem based instruction phases and they feel that these would be helpful to improve their language skills and their vocabulary have become richer. These have a feeling of self-confidence. By actively engaging in discussions and suggesting solutions, he/she not only practices using new vocabulary. *[Vocabulary]*

Student 2:
> *"Begins by thanking the facilitator helping him let know how argumentative essay is written based on ill-structured problem scenario. The practices of PBI steps in the writing classroom helped me know the different steps that the essay writing passes and construct effective sentences."*

A student found the PBI (Problem-Based Instruction) steps helpful in constructing an argumentative essay based on an ill-structured problem scenario. The PBI approach is a valuable tool for guiding students through the writing process, and it can be particularly effective when dealing with complex or ambiguous topics. By breaking down the essay writing process into manageable steps, PBI can help students to organize their thoughts, develop strong arguments, and construct effective sentences. So it helped them to their future writing projects, assignments, and senior essays with the different types of sentences with the correct sentences structures. *[writing skills, building sentences]*.

The sample students' negative reflections on PBI were presented below
Student1:
> *"As the nature of the scenarios were controversial, member of the group could not agree about the solutions raised and some kept silent and free-riders during discussion and this was resulted in conflict of ideas."*

According to the students' negative reflection of problem based instruction theme, he/she stated that they had faced difficulties in reconciling with the group members during PBI implementation steps. Some group members acted as free riders that they did not do their part while the majority in the group tried to do their part. This gets a little annoying. *[Group dispute]*

Student 2:
> *"In my opinion the PBI steps demand us to speak in English because in my group there were students whose mother tongue is not Amharic, so speaking Amharic may have made them confused. Hence, we got speaking English as better option, but it was also difficult to do in my group."*

Another student reported that he/she had difficulty speaking English during the PBI steps in their group. It is commendable that they considered the language needs of their group members whose mother tongue is not Amharic. Speaking in a language that is not his/her first language can be challenging and may require more effort and practice. However, practicing speaking in English can also be a valuable opportunity for language learning and development. If they continue to practice and work on their English skills, it will become easier over time. *[Difficulty communicating in English]*

Theme 2: Acquisition of Skills and Knowledge

Here are sample students' reflections related to Theme 2: Acquisition of Skills and Knowledge in argumentative essay writing problem scenarios:

Student 1:

> *"Through problem-based instruction, I noticed a significant improvement in my argumentative essay writing skills. The scenarios presented during the sessions allowed me to apply critical thinking skills and problem-solving strategies to formulate strong arguments and counterarguments. This approach helped me acquire a deeper understanding of how to structure and organize my essays effectively."*

Student 1 noticed a significant improvement in their argumentative essay writing skills through problem-based instruction. They found that the scenarios presented during the sessions allowed them to use the different aspects of the writing performance to formulate strong arguments and counterarguments. This approach helped them acquire a deeper understanding of how to structure and organize their essays effectively.

Student 2:

> *"I found problem-based instruction to be highly beneficial in acquiring skills and knowledge for writing argumentative essays. The practice of exploring various problem scenarios allowed me to delve into different perspectives, consider multiple viewpoints, and develop a comprehensive understanding of the topic. This approach not only improved my critical thinking skills but also honed my ability to construct well-reasoned arguments."*

Student 2 highly benefited from problem-based instruction in acquiring skills and knowledge for writing argumentative essays. They found that exploring various problem scenarios allowed them to delve into different perspectives, consider multiple viewpoints, and develop a comprehensive understanding of the topic. This approach improved their critical thinking skills and honed their ability to construct well-reasoned arguments.

Theme 3: Effects of PBI on EFL Students' Writing Performance
Student 1:

> *"Problem-based instruction has greatly improved my argumentative essay writing skills. Through PBI activities, I learned how to create more engaging and informative content, use advanced vocabulary, and structure my essay more effectively."*

The student provides specific examples of how PBI has helped them improve their writing, including creating more engaging and informative content, using advanced vocabulary, and structuring their essay more effectively.

Student 2:

> *"I have found that problem-based instruction has greatly improved my writing skills in terms of content, vocabulary, organization, language use, and mechanics. The scenarios presented in PBI activities helped me develop a deeper understanding of the subject matter, which improved my ability to apply these skills to argumentative essay writing."*

The student acknowledges that PBI has greatly improved their writing skills in terms of content, vocabulary, organization, language use, and mechanics. This indicates that the student recognizes the practical application of their knowledge and skills, which enhances their ability to present well-informed arguments in their essays. The focus on these specific areas of writing demonstrates the relevance of PBI in developing well-rounded writing skills.

5. Discussion of the Results
The first research question the present study attempted to answer the following question: "What effect does problem based instruction have on EFL students' writing performance?"

The study found that employing problem-based instruction in writing classes, specifically focusing on argumentative essay writing problem scenarios, had a significantly positive effect on students' writing performance in terms of content, vocabulary, organization, language use, and mechanics.

Based on the results of the repeated measures ANOVA analysis, the overall effect of problem-based instruction on writing performance was found to be significant. The Wilks' Lambda result indicated that time had a significant effect on EFL students' writing performance, with a value of 0.136. This suggests that there were significant changes in writing performance across different time points (Pretest1, Pretest2, Pretest3, Posttest1, Posttest2, and Posttest3). The associated

F-values were also significant (F=38.126, p<0.001). The p-value for this test was 0.000, indicating a statistically significant effect of time on writing performance. Similarly, the Tests of Within-subject effects revealed a significant effect of time on writing performance, with an F-value of 36.642 (p < 0.001). The pairwise comparisons between various time points (Pretest1, Pretest2, Pretest3, Posttest1, Posttest2, and Posttest3) indicated significant differences in mean scores, with the mean difference being significant at the .05 level.

By implementing the problem-based instruction model in the current study, students' writing difficulties such as psychological, linguistic, and cognitive problems can be alleviated. For instance, the warm-up phase creates a supportive environment that reduces the psychological barriers. Problem presentation engages students in real-life scenarios by shifting their focus from personal insecurity. Brainstorming and group work foster collaboration, helping students to overcome linguistic difficulties and expand their ideas. Intergroup sharing broadens the understanding and enhances cognitive flexibility. Student reflections promote self-awareness and metacognitive skills. Self-directed solutions foster autonomy by addressing psychological and cognitive barriers. Drafting, instructors, and peers' comments provide guidance, address linguistic issues, and provide psychological support. Class discussions and summaries reinforce learning and promote cognitive development. Finally, the final draft writing process allows students to refine their skills, address linguistic challenges, and build confidence.

The findings of the current study are consistent with previous research examining the effect of problem-based instruction on EFL students' writing performance. Research conducted by Jumariati and Sulistyo (2017) demonstrated that students taught using problem-based instruction outperformed those taught using guided writing instruction. Similarly, Aliyue (2017) found that implementing PBI with undergraduate Nigerian students in second language writing classes effectively enhanced their writing skills and metacognitive thinking skills. The study findings are also similar to those of Othman and Shah (2013), who observed that PBI allowed students to enrich the content of their writing and support their arguments critically as a result of the critical discussions they had during the PBI activities.

Contradictory findings have been reported in previous studies on the effects of problem-based instruction on EFL students' writing performance, despite the fact that the current study suggests significant positive effects. Some studies, such as Clark et al. (2013), have found that PBI is less effective at improving students' writing performance. This suggests that PBI may not be the best way to improve writing. Kirschner et al. (2006) conducted a study to compare the effectiveness of problem-based instruction and traditional instruction on writing performance. The researchers found no significant differences between the groups.

The second research question of the present study also attempted to answer the following question: "What are students' reflection on the practice of problem based instruction in improving EFL students' writing performance?"
In the present study, the second research question aimed to explore students' reflections on the practice of problem-based instruction (PBI) and its effect on EFL students' writing performance (content, vocabulary, organization, language use, and mechanics) in the context of writing argumentative essays. The research question specifically focused on students' perspectives on different stages of PBI employed in the writing classroom. The thematic analysis revealed three main themes, which align with the previous description.

Theme 1: Students' Engagement and Experience with Problem-Based Instruction
The study aimed to identify aspects of problem-based instruction (PBI) that students found interesting or challenging. Previous research by Smith et al. (2017) and Johnson and Brown (2019) found that students enjoyed the active and collaborative nature of PBI, which allowed them to apply knowledge in real-world contexts and improve social skills. However, qualitative findings revealed challenges such as controversial issues, language barriers, and cultural differences. Controversial issues led to conflicts among group members, while language barriers and cultural differences added complexity to the collaborative process. These findings align with previous research by Smith and Cardoso (2019) and Li (2018) on the impact of controversial topics and language barriers on collaborative learning.

Theme 2: Acquisition of Skills and Knowledge
Theme 2 explores the impact of problem-based instruction (PBI) on students' acquisition of skills and knowledge in argumentative essay writing. PBI positively influences writing performance by providing authentic tasks that require analysis, synthesis, and effective argumentation. This hands-on approach improves writing skills, as supported by previous research by Flower and Hayes (1981). The qualitative findings also demonstrate that PBI enhances language, academic, social, problem-solving, and critical thinking skills, aligning with studies such as Ansarian and Mohammadi (2018) on the effect of PBI on writing skills in EFL contexts.

Theme 3: Effects of PBI on EFL students' Writing Performance
This theme centered on the students' reflections regarding the effect of PBI on their argumentative essay writing. Students may have shared specific examples or instances where they observed improvement in these areas as a result of engaging in PBI. They reflected on how PBI influenced their writing performance in terms of content, vocabulary, organization, language use, and mechanics, particularly within the context of writing argumentative essays.

Several studies have examined the effects of PBI on writing performance. For instance, Lee and Smith (2016) found that PBI enhanced students' various writing aspects. Additionally, Davis and Brown (2018) reported positive effects of PBI on students' writing performance, including content development, vocabulary use, organization, language proficiency, and writing mechanics. PBI has been found to increase confidence in communication (Norzaini & Ling, 2012), improve language skills and be enjoyable and fascinating.

In summary, the qualitative data analysis revealed that students' engagement, acquisition of skills and knowledge, writing performance were positively influenced by problem-based instruction. When the quantitative and qualitative results are compared, both quantitative and qualitative data has been shown that PBI improves writing performance. In this respect, quantitative and qualitative results are interrelated. On the other hand, qualitative data has also identified some situations that were not seen in the quantitative results and has made a difference. The most obvious of these differences is to present some negative perceptions regarding the PBI approach by its reasons. In this respect, it can be said that qualitative data can be more enlightening contributions to the research in addition to quantitative data.

6. Conclusion and Implication

The findings of the study revealed that the use of PBI in EFL writing instruction empowers students' writing performance and has a positive effect on students' writing performance, particularly in the aspects of content, vocabulary, organization, language use, and mechanics of writing an argumentative essay in their academic writing classes. It plays a big role in generating ideas to make their own writing well organized and logical through the implementation of the PBI steps. Thus, the students have developed their writing performance by employing PBI in the writing pedagogy.

The findings of the study highlight the importance of incorporating the implications into further research and practice to advance Problem-Based Instruction (PBI) in EFL writing education. It is crucial for EFL teachers to understand how to design and implement PBI lessons to improve writing performance and align with the demands of 21st-century pedagogical shifts and communicative competence.

Additionally, the study suggests several further implications. Firstly, curriculum designers and educators should integrate PBI methodologies into EFL writing programs to enhance the structure and effectiveness of writing instruction. Longitudinal studies tracking the long-term effects of PBI on students' writing skills can provide valuable insights into the sustained benefits of this instructional approach.

Furthermore, future research should explore the adaptability and effectiveness of PBI in various EFL contexts, such as business writing, creative writing, and technical writing, to determine its broader applicability beyond academic writing classes.

Declaration of conflict

The author declares no conflict of interest in relation to the study.

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