

Effects of Problem-Based Language Learning on Argumentative Writing Performance

Negar Kiavar¹, Ilyana Jalaluddin¹, Geok Imm Lee¹, Sedigheh Shakib Kotamjani²,
Vahid Nimehchisalem³

¹Faculty of Modern Languages & Communication, University of Putra Malaysia, Selangor, Malaysia

²Department of English Language Teaching and Educational Management, Central Asian University, Tashkent, Uzbekistan

³School of Humanities and Fine Arts, University of Economics and Human Sciences in Warsaw, Warsaw, Poland

Email: ilyana@upm.edu.my

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Abstract

Building a coherent argument is an academic skill that many international tertiary students in Malaysia often do not master because they were first exposed to rote-learning pedagogies. Problem-Based Language Learning (PBLL) is an alternative that has been shown to be a promising method, providing students with real-life, collaborative problem-solving and deeper cognitive development. The present research examines how PBLL can positively influence the performance of international tertiary students in Malaysia in their argumentative writing. A pretest-posttest mixed-methods research design with an experimental group (PBLL) and a control group was employed. A total of 40 international students were randomly assigned to 20 students per group. An argumentative essay was the method of data collection. Independent-samples t-tests were used to assess the effect of PBLL on students' argumentative writing. In the meantime, the results were triangulated through qualitative content analysis, which helps better understand students' learning experiences. The results show that argumentative writing has tremendously improved as compared to the control group. PBLL had a positive effect on students' academic performance, enhancing writing quality, content development, and logical thinking. The findings indicate that PBLL is a useful pedagogical strategy in helping international EFL learners improve their argumentative writing. It represents a viable alternative to traditional writing instruction by providing an active learning experience, group projects, and intellectual stimulation.

Keywords

Problem-Based Language Learning, Argumentative Writing, Tertiary Education, International Students

1. Introduction

The argumentative essay is one of the most popular essay genres that can be found in the ELT classroom and is used in all categories of education. The art of argumentative writing is a social activity, which presupposes that the writer should build an argument based on its relevance, be conscious of the audience, have a specific purpose, and be able to master the linguistic resources (Ferretti & Graham, 2019). The communication between the reader and the writer is important and requires intellectual critical thinking. An excellent work of argument writing ought to demonstrate cognitive aptitudes and intellectual character, and to understand, as well as to conduct a critique of arguments and truth claims (Setyowati *et al.*, 2020).

Although argumentative writing skills are required, numerous students and authors of argumentative texts are not able to make effective arguments (Saputra *et al.*, 2021; Gudkova, 2021; Ho & Li, 2018; Seyoum *et al.*, 2022). At the tertiary level, numerous studies have verified that argumentative writing is the most challenging genre to master among both English as a Second Language (ESL) and English as a Foreign Language (EFL) students (Peloghitis, 2016; Saputra *et al.*, 2021). This is because it “stimulates thinking, compels students to concentrate and organise their ideas, and cultivates their ability to summarise, analyse, and criticise” (Maghsoudi, 2013: p. 60).

Malaysia has become a destination of study for many international students who come with different academic, cultural, and language backgrounds. A number of them join English courses in order to satisfy the English-language competency criteria of Malaysian universities. Nonetheless, a significant number of international higher education learners remain unable to write, especially argumentative writing, when they are tested using the CEFR, TOEFL, and IELTS systems, despite enrolling in an English preparatory course (Budjalemba & Listyani, 2020; Darus & Subramaniam, 2009).

Research indicates that international students in Malaysia experience difficulties with academic writing, primarily due to language and cultural barriers, limited academic preparation, and differences in academic expectations (Kaur Mehar Singh, 2019; Kotamjani *et al.*, 2018). In particular, learners in EFL countries tend to have low English proficiency, which influences their skill set in writing and carrying out language-related tasks (Kaur Mehar Singh, 2019; Kotamjani *et al.*, 2018). This situation demands interventions that offer effective learning methods to help students follow writing conventions and ultimately improve their writing proficiency. However, no empirical studies have investigated PBL for argumentative writing among international tertiary students in Malaysia, leaving a pedagogical and empirical gap.

Problem-Based Learning (PBL) is one of the learning methods that combine cognition and critical thinking. Collaborative learning, the delivery of learning resources according to the skills of higher-order thinking, and attention to the practical side of learning could assist in overcoming this issue due to the char-

acteristics of PBL (Jumariati *et al.*, 2017; Jumariati *et al.*, 2021). There is minimal evidence in the literature of already conducted studies that entangle the use of PBL in enhancing argumentative writing among international tertiary students in Malaysia. This illustrates why the current study is necessary because it examines how PBL will influence the argumentative writing of international students in Malaysia. The next subsections elaborate on the problem-based learning method (PBL).

2. Literature Review

Problem-Based Language Learning is a pedagogical approach that aims to emphasize the learning outcomes of students and to help develop their critical thinking and other skills in a classroom setting by working in teams (Savery & Duffy, 1995; Ansarian & Teoh, 2018) and solving real-life issues, which enables the teacher to inspire students to learn (Mathews-Aydinli, 2007; Othman & Shah, 2013). Unlike the conventional teacher-based approach, PBL is more of a student-based approach (Wilkerson & Gijsselaers, 1996), where students decide and explore areas of their study and how they will study them. The effectiveness of the PBL approach was also extended to include works by Ellis (2003) and Mathews-Aydinli (2007), which are based on the premise that students learn best in the real world, especially when they are involved in real-life tasks.

Many teachers do not develop problem-solving skills in their teaching. As an example, Suryani (2024) concluded that language teachers usually manage to teach language proficiency and knowledge without ever attempting to model or encourage learners to think critically and analytically or to deploy higher-order thinking skills in college-level language courses. Arviani *et al.* (2023) and Hu (2026) confirm that the problem-based learning process enhances the problem-solving skills of students, whereas Enríquez Canto *et al.* (2021) observe that problem-solving skills enable students to succeed in their academic lives.

Moreover, educators often fail to encourage students to employ higher-order thinking skills; they demand lower-level thinking, which increases the already high course load of students (Ansarian & Teoh, 2018). Apparently, there should be motivation to develop higher-order thinking skills in profession-specific learning to enable students to comprehend these courses. Thus, PBL is regarded as the most promising teaching method for helping students use higher-order levels of thinking and learn better (Nguyen & Nguyen, 2022; Barrero Gómez, 2016; Tang *et al.*, 2020).

Few studies have discovered that PBL could be used to assist students in enhancing writing (Othman & Shah, 2013; Dawilai *et al.*, 2021) and speaking abilities (Lin *et al.*, 2019). Dwisnu (2021), Wulandari and Hastini (2024), and Jumariati and Arapah (2024) reported that the PBL intervention significantly improved students' argumentative writing. They confirmed that students' engagement with authentic problems reinforced their idea development and coherence. Pratiwi *et al.* (2019) also found that the PBL intervention improved students' argumentation

skills by engaging them in observing, questioning, hypothesizing, and communicating activities that enhanced the cognitive and rhetorical processes involved in constructing persuasive texts. Sari *et al.* (2021) reported that PBL interventions also improved students' academic literacy. Conversely, Ghanbari and Salari (2022) found that PBL explicitly scaffolded students' reasoning, use of evidence, and argumentative structure.

Nonetheless, to the best of the researcher's knowledge, no such study has been conducted in Malaysia to determine whether PBL can play a role in improving the teaching and learning of argumentative writing at any level. This research seeks to contribute to the existing literature by implementing PBL in writing classes to evaluate the argumentative writing skills of international tertiary students in Malaysia.

Teachers in Malaysia often adopt the product method, which focuses on the technical accuracy of the final product and limits student engagement, offering little support for the argumentative writing process. Previous studies show that the PBL approach improves metacognition, content knowledge, lifelong learning, critical thinking, and problem-solving skills, and that PBL provides both linguistic and affective benefits. Research on PBL and argumentative writing is limited, often involving short interventions and lacking detailed analysis of writing based on the Analytic Scale of Argumentative Writing (ASAW) in terms of content, organization, vocabulary, language conventions, and overall effectiveness. There is an instructional gap in teaching argumentative writing to multilingual international students in Malaysia, and PBL has not been empirically tested for this context. Therefore, further research is needed to investigate the effectiveness of the PBL approach in enhancing tertiary students' argumentative writing. The following research questions have been formulated:

RQ1: How does problem-based language learning (PBL) influence the experimental and control groups in terms of overall performance in argumentative writing?

RQ2: How does problem-based language learning (PBL) influence the elements of argumentative writing among international tertiary students in Malaysia?

The research questions led to the following hypotheses of the research:

H01. PBL does not significantly affect the argumentative writing abilities of international tertiary students in Malaysia.

H02. The PBL does not significantly affect the elements of argumentative writing abilities of international tertiary students in Malaysia.

The research was based on Constructivist Theory and Information Processing Theory (Schmidt *et al.*, 1989), which formed a solid theoretical basis for how learners build knowledge by solving problems, being active, and processing information. The study implemented the Classical Argument Framework suggested by Ramage, Bean, and Johnson (2017) to guide teaching and assessment in argument writing, given its structured, rhetorically based model for creating coherent and

persuasive arguments.

3. Method

3.1. Research Design

The current study used a mixed-method design. A true experimental, pretest–posttest control-group design was used in the quantitative section. Qualitative content analysis was used to measure the effects of (PBL) on students' argumentative writing performance across different components of content, organization, vocabulary, language conventions, and overall effectiveness. Quantitative data were used to answer the first research question. The effect of Problem-Based Language Learning (PBL) on the argumentative writing skills of international tertiary students in Malaysia is measured by comparing pre- and post-treatment mean essay scores. For the qualitative section, qualitative content analysis (QCA) was used to supplement and expand upon the findings from the second research question.

Problem-Based Language Learning (PBL) as an intervention to improve the argumentative writing ability of Malaysian international tertiary students is evaluated using pre- and post-treatment mean essay marks. To address the qualitative section, the findings of the first research question were complemented and expanded using qualitative content analysis (QCA).

3.2. Participants

The study involved 40 international diploma students participating in an English writing workshop, comprising 18 males and 22 females aged between 18 and 25 years. The participants represented diverse linguistic backgrounds, with the largest groups originating from Yemen, China, and Saudi Arabia. All participants had received formal English instruction for between three and seven years prior to participating in the study. Detailed demographic characteristics of the participants, including gender, nationality/first language, and prior English-learning experience, are presented in **Table 1** below. The participants were separated into experimental ($N = 20$) and control ($N = 20$) groups; the researcher minimized bias by placing all students' names on slips of paper and drawing them from a bowl. They were found to have nearly the same level of English proficiency, as measured by the Oxford Placement Test (OPT) Version 1.1.

The study was conducted with the help of one teacher who taught both groups (briefed on the PBL method, its goals, and how to coach and facilitate PBL learning for the experimental group, while teaching the control group argumentative writing using the genre approach). The scoring and coding of the argumentative writing tests were carried out by four experienced writing teachers, all with more than ten years of experience; two held PhD qualifications and two held master's degrees. These raters received a briefing on the argumentative writing rubrics and were asked to explain and justify any inconsistencies in their decisions.

Table 1. Demographic characteristics of participants (N = 40).

Variable	Category	n (%)
Gender	Male	18 (45.0)
	Female	22 (55.0)
Nationality/First Language	Chinese (Mandarin)	6 (15.0)
	Yemeni (Arabic)	8 (20.0)
	Saudi Arabian (Arabic)	6 (15.0)
	Japanese (Japanese)	3 (7.5)
	Korean (Korean)	4 (10.0)
	Russian (Russian)	3 (7.5)
	German (German)	2 (5.0)
	Kazakhstani (Kazakh)	3 (7.5)
	Turkish (Turkish)	3 (7.5)
	Italian (Italian)	2 (5.0)
Prior English-Learning Experience	3 years	4 (10.0)
	4 years	8 (20.0)
	5 years	12 (30.0)
	6 years	10 (25.0)
	7 years	6 (15.0)

3.3. Instruments and Materials

This study employed different instruments and materials. This section describes the research materials and research instruments used.

3.3.1. Argumentative Writing Test

The participants received the pre- and post-tests in the form of argumentative writing. Both the experimental and the control groups were expected to write two 250 - 300-word argumentative essays within a period of 40 minutes. The writing topics were developed according to the curriculum in the institution. All the participants wrote these essays separately. An analytical rubric and qualitative content analysis were used to evaluate the writing scripts.

In the current research, as a structured, rhetorically-based model of teaching and analyzing argumentative writing, the Classical Argument Framework, as developed by Ramage, Bean, and Johnson (2017), is used. The classical argument framework can work especially well in combination with PBL when the students cooperatively solve real-world, ill-structured problems. Such a setting naturally promotes the development of arguments, since learners have to make definite statements, back them up with reasonable evidence, preempt counterarguments and counter views, and employ skills that are expressly engineered into the system of Ramage et al. (Budjalemba & Listyani, 2020; Darus & Subramaniam, 2009). Ramage et al. identify five large parts to the classical argument, namely, an inter-

esting introduction involving a hook, background, and a concise thesis statement; a statement of the position of the writer with logical reasoning and evidence that are fairly and thoroughly presented; a reasonable summary of counterarguments; a well-considered reply to counterarguments by refuting or compromising; and a strong conclusion that supports the argument and can, in many cases, demand action or further consideration.

3.3.2. Analytical Scale of Argumentative Writing (ASAW)

The students' essays were graded using the Analytic Scale of Argumentative Writing (ASAW) developed by Nimehchisalem *et al.* (2021). ASAW is an assessment of five aspects of argumentative writing: content, organization, vocabulary, language conventions, and overall effectiveness. The total score was 100, with each part having a score of 20. The scale provides diagnostic data on learners' proficiency in argumentative writing and is specifically tailored to assess argumentative texts.

3.3.3. PBL Activities

The experimental group engaged in PBL activities in accordance with the model by Ansarian and Teoh (2018) that incorporates the key aspects of existing problem-based learning models (e.g., Hmelo-Silver, 2004; 3C3R model of Hung). In small groups, students solved real-life, poorly constructed problems in a systematic sequence of presentation of the problem, guided inquiry, collaborative reasoning, drafting, feedback, revision, and reflection. In the process, instructional scaffolding helped the students to reason and become coherent and in line with the conventions of argumentative writing. The ASAW rubric was used to evaluate final drafts.

3.3.4. FILA Table

The FILA table is used as a decoding-analyzing tool for the problem, including facts, ideas, learning concerns, and action plans as a systematic guideline. The students proceeded to the problem exposure (the 2nd stage of PBL activities) and examined the issue on a FILA table.

4. Procedure

Initially, 51 students enrolled in a writing workshop course were screened for eligibility. To ensure homogeneity in English language proficiency, all participants completed Version 1.1 of the Oxford Placement Test. Only students whose scores fell within the intermediate range (41 - 60), corresponding to the B1 level, met the inclusion criterion. Eleven students scored outside this range and were therefore excluded. The remaining 40 participants were randomly assigned to either the control group ($n = 20$) or the experimental PBL group ($n = 20$). This sample size is considered adequate for experimental research, as recommended by Cohen *et al.* (2007) and Gall *et al.* (1996).

Following group assignment, both groups completed a pre-test in argumentative writing. The control group received conventional genre-based instruction over 16 sessions based on Hyland's (2003) three-stage model, consisting of modelling, joint construction, and independent construction of texts. Instruction fo-

cused on vocabulary, grammatical structures, text models, summarizing, paraphrasing, and individual writing with teacher feedback. The experimental group also underwent 16 instructional sessions.

After the pre-test, the 20 participants in the experimental group were further divided into four PBLT groups of five students each through systematic random sampling. During the intervention, students collaboratively addressed four ill-structured problems, with each problem culminating in one collaborative argumentative essay per group. Instruction in both groups was delivered by the same experienced English writing instructor, who had received prior training in PBLT procedures.

In each PBLT cycle, the instructor introduced the problem scenario, facilitated inquiry and group discussion, guided students' problem-solving processes without providing direct answers, monitored participation and collaboration, and provided formative feedback while encouraging critical reflection on the written arguments. Each instructional session lasted approximately 120 minutes. The PBLT intervention implemented in this study followed the model proposed by [Ansarian and Teoh \(2018\)](#), which comprises nine stages: problem creation, problem exposure, researching, reasoning, synthesis, application, reapplication, reflection, and knowledge construction.

In contrast, participants in the control group received teacher-directed genre-based instruction using the same topics and completed the writing tasks individually. The instructor adopted a more directive role by explaining the structure and features of argumentative essays, modeling writing techniques and sample texts, guiding students through controlled writing activities, and providing corrective feedback on language use, organization, and content.

Because the same instructor taught both groups, instructional fidelity was maintained through a structured training and debriefing session conducted before the intervention. Detailed guidelines for both PBLT and genre-based instruction were provided, and the instructor followed predetermined lesson plans and clearly defined role descriptions throughout the study to ensure consistency and adherence to the intended instructional approaches.

Upon completion of the intervention, both groups completed a post-test in argumentative writing. Four experienced raters independently scored the pre-test and post-test essays using the Analytical Scale for Argumentative Writing (ASAW). To minimize bias, all essays were anonymized and assigned identification codes prior to evaluation. The raters were blinded to participants' group membership and test phase. Before scoring, a calibration session was conducted to establish a common understanding of the rubric, and any discrepancies were discussed until consensus was achieved.

In addition to the quantitative scoring, a qualitative content analysis based on [Hsieh and Shannon's \(2005\)](#) approach was conducted to examine changes in students' argumentative writing following participation in PBLT activities. A deductive coding scheme derived from the ASAW was employed. The units of analysis comprised the five components of argumentative writing: content, vocabulary, organization, language conventions, and overall effectiveness. Each essay was first

analyzed according to these predetermined categories and subsequently classified into one of five performance levels: A (Excellent), B (Competent), C (Modest), D (Basic), and F (Very Limited). Four coders independently evaluated each component of every essay to determine the extent of improvement after the intervention. The coded data were then compared across coders, and an intercoder consistency analysis was performed to ensure coding reliability. Finally, representative excerpts from students' essays were selected to illustrate typical improvements and differences across performance levels.

5. Results

The study was designed as a mixed-methods study involving quantitative and qualitative analysis. RQ1 was addressed using quantitative statistical packages like SPSS (Version 26), whereas RQ2 was addressed using qualitative content analysis.

The quantitative data analysis aimed to examine the effect of Problem-Based Language Learning (PBL) on students' performance in writing arguments. Before the inferential analysis, Exploratory Data Analysis (EDA) was performed in SPSS to filter missing data, outliers, and violations of assumptions. The skewness and kurtosis indices were used to assess normality, which was supported by visual inspection of histograms and boxplots. All values were within the range of acceptable values (± 2), which validated the appropriateness of parametric testing. In order to identify the effect of PBL, the Analytic Scale of Argumentative Writing (ASAW) was used to compare post-test writing scores of the experimental and control groups using five components: content, organization, vocabulary, language conventions, and overall effectiveness, and independent-samples t-tests.

The qualitative data were analyzed using Qualitative Content Analysis (QCA), based on the model proposed by Hsieh and Shannon (2005), to understand the effect PBL had on certain elements of argumentative writing. The unit of analysis was the essay students wrote, and it was coded based on the five ASAW dimensions: content, organization, vocabulary, language conventions, and overall effectiveness.

5.1. Data Reliability Test

5.1.1. Reliability of the Quantitative Data

To answer RQ 1, four independent raters graded the argument writing of students based on the ASAW rubric. An interrater reliability analysis was conducted to ensure consistency and reliability of the scoring process. Table 2 shows strong interrater reliability across all components: the content (ICC = 0.81), organization (ICC = 0.79), vocabulary (ICC = 0.76), language conventions (ICC = 0.83), and overall effectiveness (ICC = 0.84), and all the coefficients are significant ($p < 0.001$). These results reflect the consistency of rubric application by raters in each part of the argumentative writing.

The inter-rater reliability for the average measure was also very high (ICC = 0.875, $F = 8.534$, $p = 0.001$, 95% CI = 0.761 - 0.952), indicating excellent inter-rater reliability. This level of agreement indicates high reliability and shows that

most of the variation in scores is due to genuine differences in students' writing performance, not to rating inconsistency (**Table 3**).

Table 2. Inter-rater reliability results by components of argumentative writing (ICC).

Component	ICC	95% CI	Sig. (p)
Content	0.81	0.72 - 0.88	0.000
Organization	0.79	0.70 - 0.87	0.000
Vocabulary	0.76	0.66 - 0.85	0.000
Language Conventions	0.83	0.74 - 0.90	0.000
Overall Effectiveness	0.84	0.76 - 0.91	0.000

ICC = Intraclass correlation coefficient; CI = confidence interval.

Table 3. Overall inter-rater reliability of participants' writing scores (ICC).

Measure	ICC	95% Confidence Interval	F-Value	df1	df2	Sig.
Average Measures	0.875	0.761 - 0.952	8.534	18	52	0.000

ICC = Intraclass correlation coefficient; CI = confidence interval.

5.1.2. Reliability of the Qualitative Data

To answer RQ2, qualitative content analysis was conducted using the framework established by Hsieh and Shannon (2005) to examine how students' argumentative writing has changed following the PBL intervention. The units of analysis were five writing components, namely, content, organization, vocabulary, language conventions, and overall effectiveness, which were rated on a five-level scale (Excellent to Very Limited). All scripts were assessed by four independent coders.

Fleiss' Kappa was used to determine intercoder reliability when more than two coders were used, which is suitable. The Kappa value lies between -1 and 1; values above 0.60 are considered indicative of a high level of agreement, and values above 0.80 are generally considered indicative of almost perfect agreement among coders (Landis & Koch, 1977). The results in **Table 4** show substantial to near-perfect agreement on all of the components ($\kappa = 0.76 - 0.84$), and an overall reliability ($\kappa = 0.82$) of $p < 0.001$, showing high consistency between coders and the credibility of the qualitative results.

Table 4. Intercoder reliability results of participants' writing coding scheme.

Component	Fleiss' Kappa (κ)	95% CI	Sig. (p)
Content	0.81	0.72 - 0.88	0.000
Organization	0.79	0.70 - 0.87	0.000
Vocabulary	0.76	0.66 - 0.85	0.000
Language Conventions	0.83	0.74 - 0.90	0.000
Overall Effectiveness	0.84	0.76 - 0.91	0.000
Overall (all components)	0.82	0.74 - 0.89	0.000

Exploratory Data Analysis (EDA) in SPSS was performed before inferential analysis to identify missing data, outliers, and violations of assumptions. The skew and kurtosis indices were also used to determine normality, which was justified by the visualization of the histograms and boxplots. **Table 5** shows skewness (ranging from -0.34 to 0.88) and kurtosis (ranging from -1.44 to 1.93) within acceptable ranges (George & Mallery, 2003), confirming that the data met the conditions for parametric tests.

Table 5. Skewness and kurtosis for the writing scores.

Writing Scores	Skewness	Kurtosis
Cont. Content	0.844	1.652
Exp. Content	0.880	1.930
Cont. Organization	0.654	0.381
Exp. Organization	0.230	-0.614
Cont. Vocabulary	0.758	0.447
Exp. Vocabulary	0.638	1.399
Cont. Language Conventions	0.853	-0.621
Exp. Language Conventions	0.401	-1.438
Cont. Overall Effectiveness	1.131	-0.545
Exp. Overall Effectiveness	-0.343	0.735

5.2. The Impact of PBL on Overall Writing Performance

5.2.1. Effect of PBL on Argumentative Writing Performance: Pretest Comparison

Regarding RQ 1, an independent-samples *t*-test was conducted to determine whether there was a significant difference in argumentative writing performance between the experimental and control groups before the intervention. **Table 6** shows that the experimental group ($M = 53.18$, $SD = 3.14$) and the control group ($M = 52.91$, $SD = 3.09$) had very similar pretest scores. The difference between the two groups was not statistically significant, $t(38) = 0.27$, $p = 0.79$. These findings indicate that the participants in both groups possessed comparable levels of argumentative writing proficiency at the outset of the study. Therefore, any subsequent differences observed in the posttest scores could be attributed primarily to the PBL intervention rather than to pre-existing differences between the groups.

Table 6. Independent samples *t*-Test on *Pre-Test* scores of argumentative writing.

Group	N	Mean	SD	Df	T	P
Experimental	20	53.18	3.14	38	0.27	.79
Control	20	52.91	3.09			

5.2.2. Effect of PBL on Argumentative Writing Performance: Post-Test Comparison

Following the intervention, an independent-samples *t*-test was conducted to com-

pare the argumentative writing performance of the experimental and control groups. **Table 7** reveals a statistically significant difference between the two groups, indicating that participants exposed to the Problem-Based Language Learning (PBLL) approach outperformed those who received conventional instruction. Specifically, the experimental group ($M = 68.67$, $SD = 5.05$) obtained significantly higher posttest scores than the control group ($M = 53.40$, $SD = 6.74$), with a mean difference of 15.27 points. The difference was statistically significant, $t(38) = 8.09$, $p < 0.001$.

These findings demonstrate that the PBLL intervention had a substantial positive effect on the argumentative writing performance of international tertiary students in Malaysia. Whereas the control group showed relatively lower performance following traditional instruction, the experimental group exhibited considerably stronger writing proficiency after participating in PBLL activities. Given that both groups were found to be comparable at the pretest stage, the significant difference observed at posttest can be attributed to the effectiveness of the PBLL approach.

Table 7. Independent samples *t*-Test on *Post-Test* scores of argumentative writing.

Group	N	Mean	SD	Df	T	P
Experimental	20	68.67	5.05	38	8.09	0.000
Control	20	53.40	6.74			

5.3. Effect of PBLL on Components of Argumentative Writing Performance: Pretest Comparison

To determine the impact of Problem-Based Language Learning (PBLL), independent-samples *t*-tests were also used to determine the post-test argumentative writing scores between the experimental and the control group in terms of five components evaluated using the Analytic Scale of Argumentative Writing (ASAW): content, organization, vocabulary, language conventions, and overall effectiveness. The statistical significance was set at $p < 0.05$.

Table 8 provides the results of the analysis, indicating that the experimental group ranked significantly higher than the control group in all components of writing. The most significant improvements were in content development (mean difference = 4.31, $t = 9.65$, $p < 0.001$), followed by organization (mean difference = 3.51, $t = 7.83$, $p < 0.001$). Also, vocabulary ($t = 6.31$, $p = 0.004$), language conventions ($t = 6.35$, $p = 0.004$), and overall effectiveness ($t = 5.41$, $p = 0.004$) were significantly improved. The overall writing performance improved considerably, with a mean score of 53.40 (control group) and a mean score of 68.67 (experimental group), and a mean difference of 15.27 points ($t = 8.09$, $p < 0.001$).

Table 8. Independent-sample *t*-test results for control and experimental writing scores ($n = 20$).

Component	Cont. Mean	Exp. Mean	Mean Diff.	SD	t-value	Sig. (2-tailed)
Content	12.22	16.53	4.31	0.92	9.65	0.000
Organization	10.12	13.63	3.51	0.98	7.83	0.000

Continued

Vocabulary	10.30	12.34	2.04	1.67	6.31	0.004
Language conventions	9.66	12.67	3.01	1.91	6.35	0.004
Overall Effectiveness	11.10	13.50	2.40	1.67	5.41	0.004
Total	53.40	68.67	15.27	5.05	8.09	0.000

To assess the effectiveness of the Problem-Based Language Learning (PBLL) approach with respect to participants' argumentative writing, an effect-size analysis using Pearson's r was conducted. **Table 9** demonstrates that PBLL had significant effects on content ($r = 0.62$), organization ($r = 0.53$), and overall effectiveness ($r = 0.59$), and medium-to-large effects on vocabulary ($r = 0.49$) and language conventions ($r = 0.46$). The effect size ($r = 0.61$) is quite large and educationally significant, which suggests that PBLL has a strong impact on the performance of students in argumentative writing.

Table 9. Effect size of the control and experimental writing scores.

Components	Effect Size (r)
Content	0.62
Organization	0.53
Vocabulary	0.49
Language conventions	0.46
Overall effectiveness	0.59
Total	0.61

Regarding RQ 2, the following subsections present qualitative data from the participants' essays to support the quantitative results.

5.4. Content Development

The qualitative analysis revealed a distinct change in the nature of claims: in the pre-treatment period, shallow, unsubstantiated arguments were used, whereas in the post-PBLL period, the argumentation was evidence-based and multi-perspective. Prior to PBLL, writing by students was characterized by generalizations, lack of elaboration, and lack of counterarguments. Post-intervention essays also showed better reasoning, use of non-self-generated evidence, and rebuttals, which are characteristic of higher-order thought and consistency with the Classical Argument Model (Ramage *et al.*, 2017). Before the intervention, the students' arguments were mostly unsupported and descriptive. An example of this is in a comment made by one of the students, student B, who wrote:

"Social media is bad, as it wastes time."

The use of arguments after PBLL was evidence-based, as is depicted in the following passage:

"Too much use of social media decreases academic concentration, because stu-

dents dedicate more time to the Internet than to academic work.”

These qualitative gains are in agreement with the quantitative results, in which content development had the highest effect size, meaning that PBLL had a significant positive effect on the development of arguments and critical interaction.

5.5. Organization

Students improved the organization of the essay following PBLL. There were often no clear thesis statements, logical organization, or cohesive paragraphs in pre-treatment essays. Conversely, the writing in the post-treatment had more vivid introductions, logical body paragraphs, useful use of transitions, and more meaningful conclusions. Collaborative planning and scaffolded problem-solving, which were formulated as part of PBLL, also seemed to positively contribute to students’ capacity to arrange arguments logically, which was statistically significant.

For instance, student C wrote, “Although social media offers educational benefits, excessive use reduces students’ concentration and academic performance; therefore, learners must manage their online time responsibly,” illustrating improved control over argumentative structure.

5.6. Vocabulary

Qualitative results indicated that it was not only the lexical range that was developing, but also appropriateness and academic register. The students used repetitive informal vocabulary before PBLL. Lexical precision, the use of academic and discipline-specific vocabulary, and collocations were more effective after the intervention in essays.

As an illustration, Student D employed the word good several times in the sentence without specific adjectives or scholarly terminology in “Social media is bad. It is not good for students.”

On the same note, the words used tended to be casual, which diminished the general tone of the academic content in the essays by students E and F.

Student E: “Individuals are fond of social media, which is not always of assistance.”

Student F: “I think online learning is better as it is helpful to students. It makes learning easier.”

Nevertheless, the post-treatment essays were full of scholarly words and lexical complexity, including words like excessive, digital dependency, and ability to remain. Student D’s revised essay showed that it was able to employ topic-related terminology to increase the levels of clarity and persuasiveness as observed in the sentence below:

Student D: “Too much social media use creates digital addiction and the inability to develop deep concentration and deep learning abilities in students.”

The proposed changes indicate an increase in audience awareness and a control of rhetoric, which confirms the moderate-to-large quantitative gains in vocabulary.

5.7. Language Conventions

Grammatical accuracy and sentence structure were observed to have improved, but variably among the participants. The pre-treatment essays were full of subject-verb agreement, verb tense, spelling, and sentence structure mistakes, which usually hindered understanding. During the post-treatment writing, the syntactic control was superior, and more complex sentence structures were used; some repetitive errors were present. These results match the quantitative results, showing significant yet relatively minor improvements in language conventions and the necessity of long-term scaffolding in addition to PBL.

5.8. Overall Effectiveness

The overall effectiveness of students improved dramatically after PBL. The persuasiveness of pre-intervention essays was often not convincing, and the awareness of the audience and the logical conclusions were also not consistent. After the intervention, texts demonstrated more observable rhetorical intent, greater consideration of opposing opinions, and more logical recommendations or solutions.

In pre-treatment essays, a large number of participants were unable to meet the demands of the correct tone, style, logical progression, a well-developed thesis, and a purposeful conclusion. For instance,

Participant J wrote:

“Social media is bad. Students use it too much and waste time. It is evil and should stop, and I do not like it because many students are lazy because of social media.”

The participant did not provide any further explanation, evidence, or context to support these statements. The writing lacked rhetorical appeal, logical progression, and awareness of the audience, leaving the impression of a superficial opinion rather than a persuasive argument. As a result, the response demonstrated no clear ability to present and justify arguments effectively.

Nonetheless, the overall argumentative effectiveness improved considerably after the PBL intervention. As an example, Participant J’s post-intervention essay below reflects a more engaging style and adopts a problem-solution approach while considering the needs of the audience.

Participant J wrote:

“Although social media offers educational benefits and facilitates communication, excessive use may negatively affect students’ academic performance and time management. Instead of banning social media completely, schools and parents should encourage responsible use and promote digital literacy. Therefore, a balanced approach is a more effective solution than complete restriction.”

Compared with the pre-intervention text, the participant demonstrated greater rhetorical intent, clearer organization, improved audience awareness, and a more purposeful conclusion. The argument acknowledged alternative perspectives and offered logical recommendations, resulting in a highly engaging and persuasive

response. The content analysis results revealed that students shifted to more indirect and problem-solution-oriented arguments, implying an increase in persuasive competence. These qualitative trends are consistent with the large quantitative gain in overall effectiveness.

6. Discussion

The core objective was to ascertain how PBL would enhance the academic writing performance of students, especially in argumentative essays, in a Malaysian higher learning environment. The finding indicated that PBL intervention could be useful in assisting students to produce ideas and elaborate on them. This is also justified by [Shafamarwa et al. \(2024\)](#), who found that the content of argumentative writing among students has improved considerably due to the application of PBL. The question that may be present here is why the content was better than other factors. The probable explanation is that PBL gets students to discuss real-world issues, which activates their prior knowledge and idea generation.

Students' organization also improved, but not as dramatically as the content. Students were provided with rich opportunities for collaborative reasoning in PBL activities. However, the findings suggest that some students seemed to struggle with rhetorical structure even after the PBL intervention. This finding aligns with [Ghanbari and Salari \(2022\)](#), who reported that many EFL learners fail to internalize counterarguments, rebuttals, and warranting. This suggests that PBL may not provide enough explicit instruction on rhetorical patterns unless teachers intentionally integrate them.

Students' vocabulary improved, but their scores were lower compared with content and organization. PBL supports lexical development by exposing students to real-world and meaningful use, but it may not provide sufficient repetition or intentional practice for deeper vocabulary acquisition. Students may learn topic-related words during investigation, but long-term retention and grammatical accuracy may remain limited. This result is supported by [Pratiwi et al. \(2019\)](#) and [Sari et al. \(2021\)](#), who found that PBL improved reasoning and conceptual understanding more than lexical acquisition.

It was found that students' language use and mechanics showed the least improvement. It has also been proposed that PBL does not enhance grammatical accuracy. This can be explained by the fact that students tend to be more concerned with expressing ideas than with enhancing linguistic form, which does not help avoid repeating the same mistake. These results are in line with [Shafamarwa et al. \(2024\)](#) and [Dwisnu \(2021\)](#), who also established that the writing scores of students were low with regard to mechanics. Likewise, [Ghanbari and Salari \(2022\)](#) discovered that grammatical accuracy is a significant barrier to effective argumentation.

The results for both research questions indicate the same: PBL has pedagogical value in facilitating complex academic skills. Not only was the intervention statistically significant, but it was also educationally meaningful to the writing persua-

siveness ability of the learners. Although the changes in elements such as vocabulary and grammar were modest, the overall outcomes suggest that PBL is an effective and theoretically valid teaching method for EFL students in higher education institutions.

7. Implications and Limitations

7.1. Pedagogical Implications

This research inquiry has a number of significant pedagogical implications for language learning and teaching. The fact that Problem-Based Language Learning (PBL) can improve writing performance implies that the given strategy can be efficiently incorporated into language classrooms to increase linguistic and cognitive performance.

For instructors, the findings highlight the importance of creating tasks based on ill-structured, real-world problems to enable students to ask, debate, and reason based on evidence. It is possible to use PBL not only to enhance the essay's content and organization but also to teach critical thinking by considering counterarguments, assessing evidence, and reflecting on the process. Teachers are therefore encouraged to consider the prior knowledge of the students, their interests, as well as real-life experience when framing problems in order to make them cognitively accessible and interesting. Students feel more encouraged and engaged in the process of learning when they see a relation between what they do in the classroom and what they experience in the real world. In addition, to be successfully implemented, PBL entails structured collaboration among peers and ongoing scaffolding by instructors to meet diverse learning needs and facilitate productive group dynamics.

The implications of this study's results are also significant for learners. PBL, on the part of the learner, encourages learner agency, critical thinking, and collaboration skills, along with empowering the student to develop knowledge actively as opposed to receiving it passively. Problem-solving and peer interaction give students transferable skills, including teamwork, decision-making, and self-directed learning, which contribute to success in school and future employability.

The implications of the findings at the curricular and policy levels are that writing programs can be refined to no longer be product-based, but instead adopt inquiry-based and student-centered pedagogies, including PBL. Professional development, the provision of necessary resources, and alignment of the curriculum are aspects that need institutional support to ensure the effective implementation of PBL and the creation of a culture of active learning in higher education.

7.2. Theoretical Implications

This paper has significant theoretical implications based on the creation of the Problem-Based Argumentation Framework (PBAF), which combines Constructivist Theory, Information Processing Theory (Schmidt *et al.*, 1989), and the Classical Argument Framework (Ramage, Bean, & Johnson, 2017) to describe how

Problem-Based Language Learning (PBLL) can be used to develop argumentative writing.

According to the constructivist approach, the results affirm the fact that learning is a socially mediated and co-constructed activity through interaction and problem-solving. The role of scaffolding, peer negotiation, and the Zone of Proximal Development (ZPD) is also suggested as an improvement in content development, organization, and persuasiveness to support second language writing in PBLL contexts. Information-processing-wise, PBLL involves the learner in repetitive processes of attention, encoding, recall, and tracking by asking questions, talking, writing, and revising. Vocabulary gains and rhetorical accuracy indicate that PBLL facilitates noticing, including academic language, in the long term, and the metacognitive control of writing performance.

Using argumentation theory, the implementation of the Classical Argument Model into PBLL shows that the most effective rhetorical structures are integrated into problem-based inquiry, which is a real one. The results indicate that genre knowledge is a versatile tool that strengthens reasoning, awareness of the audience, and balanced argumentation through the use of evidence and counterarguments. The PBAF builds upon previous PBLL models, conspicuously connecting social interaction, cognitive processing, and rhetorical structure. Having considered both linguistic and cognitive development, the framework extends constructivist and cognitive theories to applied linguistics and offers a theoretically sound explanation of how PBLL can develop effective argumentative writing in EFL/ESL learners (see **Figure 1**).

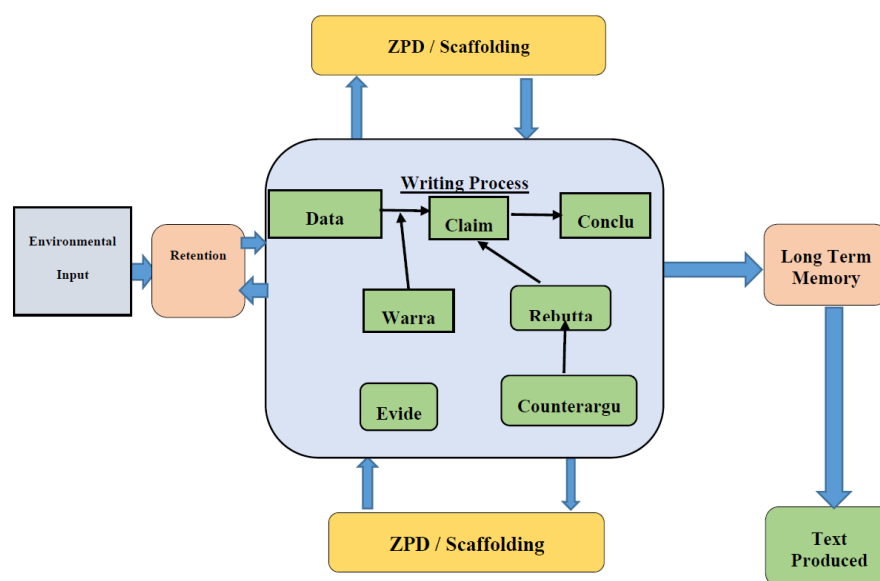


Figure 1. Conceptual model of the study (PBAF).

The proposed framework combines the principles of Problem-Based Language Learning (PBLL) with the process of argumentative writing. The problem-based learning setting emphasizes that argument creation is grounded in interaction,

collaboration, and scaffolding, as suggested by Vygotsky's (1978) zone of proximal development (ZPD) concept.

The model also expands the model of Toulmin (1958) of argumentation, which comprises claim, data, warrant, rebuttal, and conclusion. Although the Toulmin model provides the rational framework of the argumentation process, it fails to discuss how these aspects can be created and sharpened by learners during teaching. The current framework, based on the Classical Argument Model proposed by Ramage *et al.* (2017), places the elements of Toulmin's model within the writing cycle, where, through the guidance and feedback mechanism, data, claims, warrants, evidence, counterarguments, and rebuttals interact dynamically. The scaffolding provided by the ZPD in the entry and exit phases of writing ensures constant support for idea generation, reflection, and revision.

Another peculiarity is that environmental input and retention are also included as stages before the writing process. This highlights the role of contextual and experience-based factors, which were ignored in previous models. Real problem activities and discussion boards offer environmental stimulation that contributes to the retention phase to maximize understanding and knowledge building prior to beginning the writing process.

In addition, the framework shows the connection between writing and the development of long-term memory Atkinson and Shiffrin (1968), a connection that has been ignored in other models. By repeatedly practicing problem-solving activities, learners process, organize, and archive knowledge in ways that enhance understanding and promote long-term learning. The direction of the writing process toward long-term memory indicates the internalization of language and reasoning strategies through prolonged problem-solving and reflective writing.

Overall, the framework differs from existing models by incorporating rhetorical, cognitive, and sociocultural approaches within a PBL context. It provides a holistic account of the role that PBL tasks, ZPD scaffolding, and argumentative structures play together in developing argumentative writing competence among learners in second language academic contexts.

7.3. Limitations and Recommendations for Further Research

This study offers insight into how Problem-Based Language Learning (PBL) affects international students' ability to write an argument. Yet, several limitations need to be considered. A relatively small sample of 40 students was used in the study. Although the findings were significant, they are limited in their power to extrapolate to a large population. In addition, the cultural and linguistic diversity of participants was not considered as an independent variable. Future studies are advised to involve bigger and more heterogeneous groups, and comparative studies in various backgrounds and levels of proficiency to enhance the validity of the results.

The PBL program was a semester-long program. The development of writing, especially in a second-language setting, is a process that has to be carried out over

a long period of time with the assistance of repetition and consistent feedback. The limited period, accordingly, might have limited the richness of noted gains, especially in vocabulary and grammatical accuracy. Longitudinal studies over an extended period and across several semesters would help determine whether PBLL creates long-term advantages and follows the path of skill acquisition. The research allowed for concentrating on writing arguments. Although this range allows for a level of depth, it restrains the conclusions that can be made regarding the overall effect of PBLL on learning the language. The study is to be applied in further research on other types of writing (narrative, descriptive, expository, etc.) and on other skills that can be equally influenced by PBLL (speaking, reading, listening). This would help determine whether PBLL could be a holistic pedagogical model.

Since the participants were selected from the same institution, there was a possibility of cross-contamination of knowledge between the control and experimental groups, which may have affected the results. Subsequent studies can help address this problem either by conducting research in various institutions or by using online platforms that would allow stricter separation of cohorts.

To conclude, although this research paper suggests that the potential of PBLL in improving academic writing is real, these limitations will help researchers develop more inclusive, generalizable, and lasting information about this approach in future studies.

8. Conclusion

This paper underscores the transformative nature of Problem-Based Language Learning (PBLL) as an effective and student-centered strategy for building argumentative writing skills among students. Through an interactive, question-based approach to learning, PBLL can provide language teachers with an effective and efficient way to increase students' writing proficiency across different levels of language proficiency. The complex stages presented in the current paper offer a clear and repeatable framework for incorporating PBLL in the teaching of writing, which guarantees that its advantages can be provided to as many learners as possible. The results indicate that PBLL is an effective instrument that transcends language and cultural boundaries and is a practical approach for teaching in ESL and EFL classrooms, not only in the Malaysian setting. With educators and institutions worldwide seeking new ways to attract learners and enhance language learning, PBLL is among the most adaptable and innovative approaches to developing students who will excel academically and become knowledgeable members of the global community.

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