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BLENDED PROBLEM BASED-LEARNING: ENHANCING READING COMPREHENSION

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abstract

Reading comprehension remains challenging for many English as a Foreign Language (EFL) students, particularly when instruction provides limited opportunities for active engagement and collaboration. Although Problem-Based Learning (PBL) supports active learning, limited research has examined its blended implementation in EFL reading while considering students' self-efficacy. This study aimed to examine the effectiveness of Blended Problem-Based Learning (Blended-PBL) in improving reading ability across different self-efficacy levels and to explore students' perceptions of its implementation. A quantitative quasi-experimental approach involved 32 undergraduate English Education students, classified into high self-efficacy ($n = 16$) and low self-efficacy ($n = 16$) groups. Data were collected through pre- and post-reading assessments, a self-efficacy questionnaire, and a perception survey. The data were analyzed using paired-samples t -tests and descriptive analysis. The findings showed improvement in students' reading performance, while students generally perceived Blended-PBL positively, particularly in supporting motivation, collaboration, confidence, and problem-solving. The findings imply that Blended-PBL can serve as an alternative approach to EFL reading instruction by promoting active engagement and a collaborative learning environment while accommodating differences in students' self-efficacy.

INTRODUCTION

In English as a Foreign Language (EFL) contexts, reading is one of the most challenging yet important skills to learn. Reading is unlike spoken or written skills, which require the reader to identify and interpret written language, as well as understand and decode the meaning, while keeping motivated, focused, and constantly monitoring their level of understanding. Barriers encountered by EFL learners include limited exposure to written texts, lack of vocabulary, anxiety associated with reading, and lack of reading practice (Limeranto & Subekti, 2021; Nguyen & Dang, 2024). The challenges persist, which indicates the need to use learning models that provide more interactive, guided, and learner-centered learning.

To address these challenges, several teaching models such as Flipped Classroom (FC), Problem Based Learning (PBL), and recently Blended Problem Based Learning (Blended-PBL), have been developed. Flipped learning places learners in charge of their instructional materials outside of the classroom to enable the teacher to utilize the classroom time productively for practice, collaboration and guidance (Almulla, 2019; Almulla, 2020). PBL relies on contextual learning and on the learners developing their knowledge through problem solving. Blended PBL, initiated by the integration of these models, combines problem based learning with the off and online integration of learning, resulting in more practice of reading comprehension, autonomy, and deeper engagement (Samiei & Ebadi, 2021; Umar et al., 2023).

There are many positive effects of FL and PBL on learning, such as activation of critical thinking, increased motivation and achievement at measures (Camelia & Maknun, 2021; Hikmawati & Ningsih, 2020; Ibrahim et al., 2022). For example, flipped class teaching has improved engagement and student satisfaction (Fisher, Perenyi & Birdthistle, 2018). PBL has developed participants' skills in solving problems and participating in self-directed learning (Almulla, 2019). That being said, the literature on the effects of both FL and PBL on reading in the EFL context is still not extensive. Although some researches have noted improvements in reading fluency and comprehension (Xu et al., 2021), others still showed obstacles to reading progress due to negative reading attitudes, including anxiety and loss of confidence (Iftanti, 2022). For FL and PBL models, the determinants of reading attitudes seem to be person related.

Among the person-related determinants, self-efficacy is the most important factor in reading instruction. Self-efficacy is the belief in one's ability to succeed in performing the task and overcoming challenges (Bandura, 2017). In reading, high self-efficacy has been positively associated with engagement, persistence, defiance of performance anxiety and avoidance, and low self-efficacy with refusal and reluctance to read (Gabriel et al., 2020; Usher et al., 2023).

These findings support the self-efficacy model, in relation to instructional and psychological components of language pedagogy, as one of the most powerful psychological traits in evaluating language learning models (Warren et al., 2020).

Blended-PBL can be useful in a digital and post-pandemic world. These teaching strategies incorporate learning through cooperative problem solving and the application of digital resources. They are adaptable and can create engaging learning environments (Umar et al., 2023). Still, they do not work the same for all learners. It has been shown that learners who possess certain psychological traits, such as self-regulation, are more motivated and display greater self-efficacy, are more inclined to use and benefit from the technology (Aquino & BuShell, 2020; Bahar & Latif, 2019; Arafah & Hasyim, 2019). However, existing studies have rarely examined whether the effectiveness of Blended-PBL in EFL reading varies according to students' levels of self-efficacy.

Even though we know that both FC and PBL can be effective, there is limited empirical evidence on their integration into Blended-PBL, particularly in EFL reading contexts. More importantly, few studies have simultaneously examined the relationship between Blended-PBL, reading performance, and different levels of self-efficacy. Existing research also provides limited evidence on how Blended-PBL influences learners' perceptions of their confidence and readiness to perform reading comprehension tasks (Camelia & Maknun, 2021; Ibrahim et al., 2022). Thus, the novelty of the present study lies in examining Blended-PBL not only as an instructional approach for improving EFL reading performance, but also through a self-efficacy lens by comparing learners with high and low self-efficacy and examining their perceptions of the learning process. This integrated focus addresses a gap between research on instructional effectiveness and research on learner characteristics, providing a more differentiated understanding of how Blended-PBL may support EFL reading. Such evidence is important for refining language teaching strategies and responding more appropriately to differences in learners' needs.

This study aims to test the effectiveness of a blended model of Problem-Based Learning (PBL) to develop the reading skills of learners of English as a Foreign Language (EFL) while also testing the role of self-efficacy. Regarding both cognitive and affective outcomes, this study attempts to answer the following two questions: (a) What is the effectiveness of the blended PBL methodology regarding the development of reading skills for students with varying self-efficacy? (b) What is the perception of the students toward the blended PBL methodology regarding the development of reading skills? It is expected that the outcomes of

this study will provide a frame of reference to develop more flexible and adaptive instructional methods, which, in turn, will improve the reading methods of EFL learners.

METHOD

The present study adopted a quasi-experimental pretest-posttest design to examine the efficacy of the Blended Problem-Based Learning (Blended-PBL) approach on EFL students' reading performance and to explore their perceptions of the approach in reading instruction. A quasi-experimental design was selected because randomization was not possible, as the intervention was systematically implemented within an intact group of learners (Sugiyono, 2021; Neuman, 2019). This design is appropriate for educational research in which existing groups receive the same instructional procedure, allowing the effect of an intervention to be examined without random assignment. The study focused on two aspects: students' reading performance across different levels of self-efficacy and their perceptions of Blended-PBL in reading classes.

The participants were 32 students enrolled at SMA Negeri 1 Tulang Bawang Tengah, Lampung, during the 2025/2026 academic year. Purposive sampling was employed based on two criteria: students' self-efficacy levels and their participation in Blended-PBL instruction (Miles & Huberman, 2019). Based on their self-efficacy scores, 16 students were categorized as having high self-efficacy and 16 as having low self-efficacy. The grouping was determined using a median-split procedure. Although this procedure may reduce statistical power and oversimplify the self-efficacy construct, it was used to facilitate balanced comparisons between the two groups.

Three instruments were used to collect the data: a reading performance test, a self-efficacy questionnaire, and a perception questionnaire. The reading test was administered as a pretest and posttest and assessed comprehension, reading fluency, vocabulary, and word-recognition accuracy using an analytic rubric, with independent scoring by two raters. The self-efficacy questionnaire was a Likert-scale instrument adapted from Bandura (2017) and Usher et al. (2023), while the perception questionnaire was a close-ended Likert-scale survey administered after the intervention. The reading rubric was reviewed by two academic staff from the language assessment unit to establish content validity, and inter-rater agreement was found to be strong. The self-efficacy and perception instruments were reviewed by EFL specialists and piloted with a small non-participant group, yielding good internal consistency (Cronbach's $\alpha > .80$).

The intervention followed a blended PBL model integrating online and offline learning activities. Before class, students accessed digital reading materials and prepared for text-based problems. During class, they engaged in authentic reading activities involving problem identification, inquiry and exploration, solution construction, and reflection. The learning activities were designed to promote active participation, interaction, collaboration, and feedback while maintaining the core principles of PBL within a flexible blended learning environment. This procedure provided a consistent instructional framework for examining changes in reading performance and students' responses to the approach.

Data were analyzed using inferential and descriptive statistics in SPSS Version 27. Paired-samples t-tests were used to examine changes between pretest and posttest reading performance within the self-efficacy groups, while descriptive statistics, including mean, standard deviation, and frequency, were used to summarize students' perceptions of Blended-PBL. Statistical significance was set at $p < .05$. The findings should be interpreted in light of several limitations, including the quasi-experimental design, purposive sampling, small sample size ($n = 32$), and median-split classification of self-efficacy, which constrain statistical power and the

generalizability of the findings. Future research should involve larger samples, alternative designs, and more sensitive approaches to representing self-efficacy.

FINDINGS AND DISCUSSION

Findings

The research findings are presented in accordance with the study objectives and research questions, with particular attention to the effectiveness of Blended Problem-Based Learning (Blended-PBL) in improving students' reading performance. The analysis focuses first on students identified as having low self-efficacy and examines changes in their reading performance before and after the instructional intervention. Reading performance was assessed through pretest and posttest scores covering four dimensions: comprehension, fluency, vocabulary, and word-recognition accuracy. The descriptive and inferential analyses were conducted to determine both the extent of students' improvement and the magnitude of the effect associated with the Blended-PBL intervention. The results are presented in Table 1.

Table 1. Descriptive Statistics of Reading Performance of Low Self-Efficacy Students

Group	N	Minimum	Maximum	Mean	Mean Gain
Pretest	16	16	30	23.44	—
Posttest	16	23	42	30.50	7.06

The descriptive results show a clear improvement in the reading performance of students with low self-efficacy following the implementation of Blended Problem-Based Learning (Blended-PBL). All 16 students completed both the pretest and posttest. The pretest scores ranged from 16 to 30, with a mean score of 23.44. Following the intervention, the scores increased to a range of 23 to 42, while the mean score rose to 30.50. Thus, the mean reading score increased by 7.06 points. The upward movement in both the minimum and maximum scores also suggests that the improvement was not limited to a small number of higher-performing students.

To determine whether this observed improvement was statistically significant, further inferential analyses were conducted. The normality and homogeneity tests were first performed to verify the assumptions for subsequent analysis. A paired-samples *t*-test was then used to examine the significance of the difference between the pretest and posttest scores, while Cohen's *d* was calculated to estimate the magnitude of the effect. The results of these analyses are presented in Table 2.

Table 2. Inferential Analysis and Effect Size of Blended-PBL

Analysis	Statistic	p-value	Effect Size	Interpretation
Normality – Pretest	—	0.470	—	Normally distributed
Normality – Posttest	—	0.240	—	Normally distributed
Homogeneity of variance	—	0.849	—	Homogeneous
Paired-samples <i>t</i> -test	$t = -12.162$	0.001	$d = 3.04$	Very large effect

Before testing the difference between the pretest and posttest scores, assumption testing was conducted. The normality results indicated that both the pretest ($p = 0.470$) and posttest ($p = 0.240$) scores were normally distributed because both significance values exceeded 0.05. The homogeneity test also produced a significance value of 0.849, indicating that the variance

assumption was satisfied. These results provided sufficient justification for conducting a paired-samples *t*-test.

The paired-samples *t*-test revealed a statistically significant difference between students' pretest and posttest reading scores, $t = -12.162$, $p = 0.001$. The negative *t*-value reflects the direction of the calculation between the two paired measurements rather than a negative learning effect. When considered alongside the descriptive results, which show an increase in the mean score from 23.44 to 30.50, the result indicates that students' reading performance improved significantly after participating in Blended-PBL.

The estimated effect size was Cohen's $d = 3.04$, indicating a very large effect. This result is important because statistical significance alone does not indicate the magnitude of an instructional effect. In this case, the substantial effect size, together with the 7.06-point increase in the mean score, suggests that the improvement associated with Blended-PBL was not merely statistically detectable but also educationally meaningful for students with low self-efficacy.

Overall, the findings provide empirical support for the effectiveness of Blended-PBL in improving reading performance among students with low self-efficacy. The result also suggests that students' initially low self-efficacy did not prevent them from making substantial progress when reading instruction was delivered through a blended problem-based learning approach. However, the effect should be interpreted within the limits of the study design, particularly the absence of a comparison-group effect estimates in the results presented here.

Discussion

The findings for Research Question 1 provide support to the finding that Blended-PBL elevated the reading performance of the learners across self-efficacy levels, resulting in a good average gain from the pre- to the post-intervention. This finding brings more evidence to the argument that practice-based and inquiry-based methods can promote growth in reading within EFL environments. From the existing body of literature, PBL has repeatedly shown to have a positive effect on learners' taking the initiative in their own learning, as well as working with others, which has a positive effect on the development of reading within the context of literature. What is more, the iterative problem-solving cycles of PBL provide learners with real-world functions of reading that reduce the problems of decontextualized reading exercises in the limited text-based instruction (Novia Indriani & Mariani, 2019).

This study finds that Blended-PBL exhibits similar benefits for students with high and low self-efficacy, as no significant interaction was found between the two. This supports and challenges some observations in the literature. First, this study shows that Blended-PBL positively impacts students' performance, especially performance gaps, by providing scaffolds and social support (Ashraf et al., 2021). Meanwhile, this study contradicts some literature (Usher et al., 2023) which argues that self-efficacy is a strong moderator in performance and reading tasks, as learners who began with low self-efficacy made gains which were comparable to the high-self-efficacy learners. One explanation could be that Blended-PBL offers multiple ways for students to engage in the activity, and other forms of participation such as online preparation and collaborative peer work, may have lessened the performance anxiety typically experienced by low-self-efficacy students (Kwon, 2017; Xu et al., 2021).

That said, the findings herein open a number of important considerations surrounding self-efficacy. First, while Blended-PBL equalizes short-term reading gains, it is yet to be established whether Blended-PBL develops long-term self-efficacy or whether long-term gains in self-efficacy are sustained. This is similar to some concerns within educational psychology, that the long-term motivational gains brought on by Blended-PBL may be illusory (Bandura, 2017; Warren et al., 2020). For this reason, the focus of research should be on the longitudinal impact

of Blended-PBL, and whether the Blended-PBL affordances lessen the performance anxiety experienced by students but also increase student participation and self-efficacy.

Now let's look at Research Question 2. Students generally had positive views of Blended-PBL. Respondents rated Blended-PBL most positively for enhanced motivation, increased self-confidence and engagement in reading tasks. This is supported by the literature on student-centered pedagogy that focuses on the development of skills yet leads to affective benefits such as reduction in anxiety and improved classroom atmosphere (Fisher et al., 2018; Iftanti, 2022). Confidence-building received the highest rating, which fits with EFL research on reading anxiety being one of the major obstacles to reading literacy (Limeranto & Subekti, 2021; Gabriel et al., 2020). Blended-PBL's text-based tasks embedded in collaborative problem-solving provides a less threatening environment where the fear of being evaluated is reduced.

In addition, the generally positive views expressed by the students show a shift in the overall pedagogy of EFL from a transmissive approach to a constructivist, learner-centered approach. The use of digital tools in collaborative inquiry is aligned with contemporary learning preferences and leads to enhanced engagement and achievement (Bereczki & Kárpáti, 2021). The present studies contribute to this shift by revealing that blended approaches serve a complementary function and enhance reading achievement while at the same supporting the post-pandemic expectation for teaching and learning be student-centered, interactive and autonomous (Aquino & BuShell, 2020).

Most participants liked the Blended PBL method; however, some of the mean scores for statements such time sufficiency and critical thinking, were assessed to be 'good' rather than 'very good', meaning there is room to improve this method in this aspect as this score indicates areas that Blended PBL currently lacks. One example of this is time allocation. Blended PBL methodology may lack time allocation for participants to engage in either deeper levels of thoughts and reflections, or to gain the critical thinking skills, which may need additional scaffolds (Listiqowati et al. 2022). The blending of pedagogy also addresses the cognitive and the emotional sides of a learner. Blended PBL has a lot of potential to positively impact learners' reading skills and attitudes, and it also has a lot of potential to impact learners' self-efficacy in reading, where gains were equally distributed, but it begs the question on the balancing of psychological traits in the reading self-efficacy of learners. This study supports the design of reading instruction to combine the physical and the digital, to include problem-based inquiry and collaborative work in order to design a more inclusive and responsive EFL classroom.

CONCLUSION

It has been shown that Blended-PBL improves reading in participants and helps to boost reading self-efficacy. Gains from pre-test to post-test demonstrate the positive impact of Blended-PBL on collaborative, real-world, problem-based learning, which helps to build participants' self-efficacy in reading. The findings show that Blended-PBL is an inclusive approach that can be adapted to multiple contexts in EFL.

There were highly positive perceptions for Blended-PBL for motivation, collaboration, and problem-solving skills and these perceptions were based on demonstrable positive outcomes. Shifting from the teaching-centered to the learning-centered approach in language education through the use of active inquiry and technology integration, particularly for improving teaching outcomes and more importantly enhancing the learners' engagement and satisfaction levels, is now evident in these results.

For the reasons above, Blended-PBL should be adopted by reading instructors to facilitate learner engagement and ensure a participatory and equitable learning environment. Given the

positive nature of the findings, future studies should include larger and more diverse populations. The implementation of longitudinal research should also be undertaken and the role of the teacher's training and the institutional support after the first phase of the implementation should be explored.

DECLARATION OF AI AND AI-ASSISTED TECHNOLOGIES

The use of generative AI tools (e.g., ChatGPT) or other AI-supported technologies in the preparation of this manuscript must be disclosed by the authors. For instance, during the development of this work, DeepL (version 24.4.3) was employed to enhance linguistic accuracy and readability. All AI-assisted output was subsequently reviewed and revised by the authors, who assume full responsibility for the final content of the publication.

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