Investigating the Effectiveness of Problem-Based Language Learning for Improving English Spelling of Undergraduate Students

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Article Details	ABSTRACT

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This study investigates the effectiveness of problem-based learning in improving English Spelling Proficiency among undergraduate students. Despite the importance of spelling in language development, many students face challenges in mastering it due to the conventional memorization methods. This research aims to assess how problem-based learning can enhance spelling skills and engage students through structured Problem-solving activities. This study used quantitative research with the Pre and Post test to compare how students learn through problem-based language learning performed in spelling versus those who used traditional methods. A random sampling technique was applied to select 100 undergraduate Students of Sanghar and divide them into two groups: one using Problem-based language learning method and the other using the traditional method. The results highlight that the students in the problem-based language learning group showed a significant improvement in spelling accuracy compared to those who used traditional methods. These findings suggest that problem-based language learning can be an effective way to teach spelling and can be used in other educational settings to improve spelling outcomes.

Introduction

Spelling skills are a fundamental aspect of language learning, and they can significantly impact students' overall literacy skills (Barton & Hamilton,2021). According to Jackson (2020), Spelling proficiency means being able to correct spelling words when writing. Being good at spelling helps students write clearly, understand what they read better, build vocabulary, and use to variety of words correctly (Leong & Hamilton, 2022; Shah et al., 2022).

One of the main problems in many classrooms is that students struggle to spell words correctly (Johnson, 2023). Improving spelling skills is an important part of students' overall language learning and academic success (Lurvink & Pitchfold, 2023). In many language classrooms, teachers use rote memorizes, spell words, and the dictation method (Seigler,2020). Charles (2022) suggests that rote memorization of word spelling is not an effective method; it only focuses on memorization. Studies indicate that conventional spelling methods, such as rote memorization and dictation of the spell, do not necessarily result in long-term spelling proficiency. This has led educators to explore more effective strategies, such as PBL, which engage students to work through challenging content in a meaningful way (Sung, 2023). One area in which problem-based learning has shown promise is in improving English Spelling Skills. According to Thomas (2023), problem-based Based Learning is an educational strategy where students learn a language skill by collaboratively solving real-world

problems using the target language.

Unlike the traditional method that focuses on memorization, problem-based learning engages students in solving open-minded problems, fostering both language skills and problem-solving activities (Koh, Chai & Tan,2020). Recent studies by Charles (2024) suggest that Problem-Based Learning gives students chances to use spelling rules and patterns in real-life situations.

This research highlights how problem-based learning can improve English Spelling skills. By focusing on the impact of Problem-Based learning on spelling, the study hopes to offer new insight into language teaching methods, especially for students who are struggling with spelling.

According to Johnson (2023), one of the main problems in many classrooms is that students face the struggle to spell words correctly. Many students face difficulties in mastering spelling. Charles (2021) suggests that in many language classrooms, teachers use the rote memorize spell word method, but this method is not effective. Studies suggest that traditional spelling methods like dictating words and rote memorization of words spell method do not necessarily result in long-term spelling proficiency. These conventional methods often fail to provide students with opportunities to apply spelling rules in real-life content, which limits their ability to retain and use spelling skills meaningfully.

Spelling is an essential part of language learning, and it can significantly impact students' literacy skills (Zain, 2024). Spelling proficiency influences writing clarity, reading comprehension, and vocabulary development. Despite the importance of spelling in overall academic achievements, there is a lack of creative and new methods to improve spelling proficiency. Recent studies highlight the benefits of problem-based learning, enhancing English Spelling proficiency in real-life situations. The effectiveness of problem-based learning in improving spelling skills has not been fully explored. This research seeks to explore how problem-based learning can contribute to improving spelling skills and offering a more effective approach to language instruction. The Study aims to investigate the effectiveness of problem-based learning for improving English Spelling Proficiency.

Research Questions

Q1. What are the challenges in spelling proficiency faced by undergraduate students?
Q2. How does the spelling proficiency of undergraduate students change before and after the implementation of PBL?
Q3. How effectiveness is PBL in improving English spelling proficiency among undergraduate students?

Literature Review

Spelling skills are a fundamental aspect in written communication, particularly in academic and professional environments (Barton & Hamilton,2021). Strong spelling skills not only improve the clarity and quality of written work but also reflect a learner's overall language proficiency.

In higher education, mastering spelling is crucial for presenting clear, organized, and professional writing. Traditionally, students have been taught spelling through memorization techniques, drills, and isolation word lists (Siegler, 2020). However, these methods often fail to encourage deep understanding and long-term retention (Khan & Ahmad,2022). In response to these challenges, modern education has shifted toward more interactive and student-centered approaches such as Problem-Based Learning (PBL). The core idea behind problem-based learning is that students learn better when they are actively engaged in solving meaningful, real-world problems (Ahmed & Jawed).

Problem-Based Learning is an instructional approach where students' learning occurs through collaboratively solving real-world problems using the target language. In this method, the teacher acts as a facilitator rather than a direct source of knowledge. Problem-based learning not only fosters independent learning but also strengthens problem-solving skills, communication, and teamwork (Afzal,2019). Within the context of language learning, PBL has proven effective because it requires learners to use the target language meaningfully and purposefully (Rehman et al., 2024). By integrating PBL into language learning, students apply new vocabulary and spelling patterns actively during discussions, project work, and written tasks, rather than learning them passively (Shah et al., 2021; Thomas, 2022).

Accurate spelling is fundamental for academic success as it contributes directly to the credibility and clarity of written communication (Fatima & Baig,2023). Studies have emphasized that students with strong spelling skills tend to write clearly, understand what they read better, and build vocabulary (Leong,2020). Spelling mistakes often negatively affect the reader's perception of the writer's intelligence (Ali & Sheikh, 2021; Shah et al, 2021).

In higher education, poor spelling can undermine the effectiveness of an argument or research presentation, regardless of content quality. Therefore, building spelling proficiency is an essential goal of undergraduate language education

programs. However, traditional spelling instruction methods have been criticized for being disengaging and ineffective for long-term learning (Yousaf & Farooq, 2023).

Research has shown that Problem-Based Learning creates more opportunities for contextualized spelling practice than traditional learning methods (Shaikh & Ali, 2023). Instead of memorizing word lists, students participating in PBL activities encounter spelling naturally while working on projects, writing reports, or preparing presentations. This incidental learning leads to deeper cognitive processing, better retention, and fewer spelling errors over time. A study by Kuo and Zhang (2024) shows that using PBL in classrooms helps students improve their spelling by working together on spelling challenges. When the students work together, PBL increases motivation and accuracy. It also helps students apply spelling in real situations, improving their understanding (Charles,2022). Recent studies show that PBL encourages deeper engagement with language structures, assisting students to retain spelling patterns and apply them more accurately (Saleem & Zahra, 2023). Moreover, by solving language-related problems, students reinforce their cognitive connections to correct spelling forms.

Several cognitive theories explain why PBL is effective for improving spelling skills. Constructivist learning theories proposed by Piaget (1970) emphasize that learners construct knowledge best through hands-on experiences. PBL aligns with this by allowing students to encounter spelling challenges and develop solutions, promoting active learning. Sociocultural Theory by Vygotsky (1978) suggests that learners are not passive receivers of information; they actively create meaning by engaging in tasks requiring spelling knowledge. Sociocultural theory further supports PBL by emphasizing the role of Scaffolding, where teachers support learners until they can perform the task independently (Vygotsky, 1978). Sociocultural theory also plays a critical role in spelling development through PBL strategies. Additionally, Seller's Cognitive Load Theory suggests that meaningful learning, such as that provided by PBL, reduces cognitive overload, making it easier for students to process and remember spelling patterns. Language acquisition theories, particularly Krashen's Input Hypothesis (1982), also suggest that meaningful communication and contextualized input foster better language development, including spelling.

Empirical Studies Supporting PBL in Spelling Instruction
Study by Harjanti & Ramayani (2020)- Indonesia:
Researchers implemented PBL in a high school class in Indonesia to enhance students' spelling skills. Students engaged in active and creative problem-solving tasks related to spelling. After applying PBL, the average student performance in understanding spelling exceeded 75%. The most common errors were related to common usage, while period usage had the fewest mistakes.
Study by Bennett-Kastor (2021)-United States:
This research assessed the spelling abilities of university students in developmental writing classes. Findings indicated that students in developmental courses made more spelling errors, particularly substitution errors, compared to those in college-level classes. The study suggests that some developmental college-age students may have undiagnosed language learning disabilities.

Study by Rebecca Treiman (2018)-United States
Treiman emphasized that while children learn some spelling through reading, this is often insufficient. She advocated systematic spelling instruction, including Study word patterns and rules. Such approaches align with PBL principles, where students actively explore and understand spelling conventions.
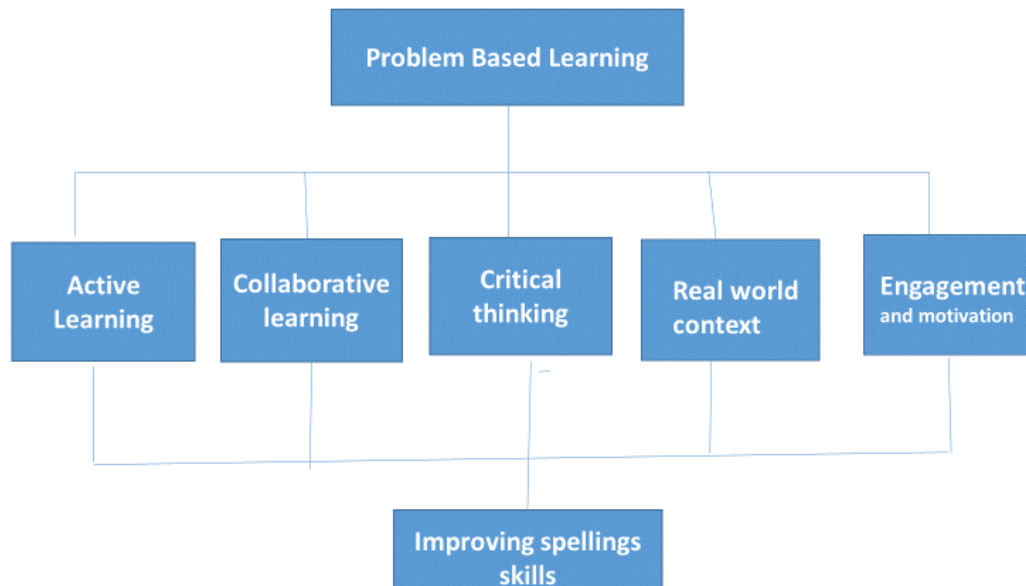
This conceptual framework is designed to explore the effectiveness of PBL in improving students' spelling skills. This framework shows how PBL strategies directly affect the spelling skills of students. PBL is an active learning approach, where students learn by collaboratively working and solving real-world problems using the target language.

Active learning
Students actively engage with spelling in real-life content (writing assignments and interactive spelling games).

Collaborative learning
Students work together, help each other, share insights, solve problems, and discuss spelling challenges. It allows students to understand spelling rules.

Critical Thinking
Analyzing root words, prefixes, and suffixes improves understanding of words and structure. Students develop reasoning skills to identify and correct their own spelling mistakes.

Real Situation Context
Students are given tasks such as writing emails/ essays where correct spelling is essential. The context makes spelling meaningful and memorable.

Engagement and motivation
Intrinsic motivation increases when learning is enjoyable and goal-oriented. PBL makes spelling feel purposeful, not mechanical.

Research Gap
Despite the growing interest in PBL, there is a significant gap in literature, especially its impact on improving students' spelling skills. Some keys that need further research include: There is a lot of research on PBL, but mostly research effects on writing, reading, and speaking skills; not much research has been done on the effectiveness of PBL for improving spelling skills of students. This gap needs to be filled because spelling is essential for learning a language. This study focuses on how PBL improves student spelling skills.
Few studies have focused on comparison PBL and traditional methods like rote memorize spell words or spell dictation. This study uses random sampling to select 120 students and divides them into two parts, one using PBL and the other

using the traditional method, and tests which method works best for improving spelling skills.

Mostly, previous studies look at short-term results of PBL, but we don't know if PBL is used for long-term spelling skills. So, this study deeply focuses on its effect on improvement of long-term spelling skills. Recent research explores the use of technology in PBL, but there is not much research on technical tools, such as online platforms and spelling apps are used to improve spelling skills in PBL. So, this study will look at how technical tools can help improve spelling skills through PBL. Mostly, previous research on PBL focuses on the youngest students; limited research has been conducted on undergraduate students. This study investigates the effectiveness of PBL for improving spelling proficiency among undergraduate students.

Recent Development

In the last few years, Problem-Based Learning has gained significant attention in language, particularly for improving writing skills among university students. Researchers have realized that traditional methods like rote memorization and dictation drills are less effective in promoting long-term spelling skills (Khan et al., 2022). Malik & Fatima (2022) suggest that students who learned spelling through projects, work, case studies, and writing tasks performed significant improvement in spelling tests compared to those who learned through PBL-based classrooms that focus on meaningful use of words, which not only improves spelling but also enhances grammar and vocabulary.

Another development highlight is that PBL engages students more deeply by encouraging them to work on authentic tasks that involve real communication, collaboration, and critical thinking. Instead of simply memorizing spelling lists, Students are engaged in projects, problem-solving scenarios, and group discussions where accurate spelling is necessary to achieve their goals (Ahmed & Javed, 2023).

Synthesis and Critical Evaluation

The growing body of research on the impact of PBL in improving spelling abilities among English learners demonstrates that PBL has several advantages. Current findings consistently suggest that PBL enhances spelling proficiency by promoting active involvement, fostering collaboration, and integrating spelling exercises into real-life problem-solving situations.

Positive outcomes of effectiveness of PBL on Spelling skills

Study by Smith & Jones (2022) highlighted how PBL created a learning atmosphere that encourages students to solve spelling challenges, which in turn improved understanding and retention of spelling rules.

Collaborative learning reduces spelling errors.

Additionally, research by Khan and Ali (2023) explored the role of students' interaction and found that group-based activities and teacher feedback contributed significantly to reducing spelling errors. The student's engagement in the learning environment enabled students to benefit not only from the perspectives of others, thereby improving their spelling skills. This collaborative approach aligns with Kumar's (2021) research, which emphasized that students engaged in group work show better results in spelling due to the shared learning experience.

Moreover, Thompson (2024) provided evidence that PBL offers a more effective method than traditional rote learning when it comes to spelling. Students involved in PBL showed more improvement in both immediate and long-term spelling tests, indicating that the inclusive nature of PBL, which integrates spelling practice into practical and engaging tasks, is more beneficial.

Challenges and Limitations

While the positive outcomes associated with PBL in improving spelling skills are encouraging, certain limitations exist in the research that must be addressed. One key issue is that many studies, such as Brown et al. (2022), use small sample sizes or focus on specific educational settings, which raises concerns regarding the wider applicability of the findings. For instance, Thompson's (2024) study was limited to a small group of high school students, which may not reflect the diverse needs of university students or learners from different backgrounds.

Barriers to Effective Use of PBL

Another concern is the context in which PBL is applied. As noted by Khan & Ali (2023), the effectiveness of PBL in

enhancing spelling skills depends heavily on factors like the teacher's proficiency in implementing PBL and the prior

knowledge of students, especially in environments lacking the necessary resources or technological support. Additionally, while teacher feedback is beneficial in PBL, Smith & Jones (2022) warned that if students are not guided properly, they may end up reinforcing each other's spelling errors.

Furthermore, several studies, including those by Kumar (2021), have focused mainly on spelling accuracy while neglecting other important dimensions like spelling fluency or how spelling knowledge is applied in real-life scenarios. These aspects are important to fully assess the effectiveness of PBL for improving spelling proficiency.

Lastly, although many studies show the positive impact of PBL on spelling, most of them focus on short-term outcomes. There is a need for more longitudinal studies that explore the long-term effects of PBL on spelling skills and assess how well these improvements are sustained over time.

In conclusion, Problem-Based Learning (PBL) has the potential to real world. While literature supports the effectiveness of PBL in language learning, especially in speaking and writing, more research is needed to evaluate its impact specifically on spelling skills. Addressing the gaps in research, particularly through long-term studies and comparison with traditional methods, will provide a clear understanding of how PBL can enhance spelling skills among undergraduate students.

Methodology

A quantitative research design was utilized to assess the impact of PBL on spelling skills. The research process included a detailed plan for data collection, analysis, and interpretation, to ensure the accurate and reliability of the findings.

The research adopted a quantitative design to assess how PBL strategies affect student spelling skills. The intervention took place in a controlled setting, where learners engaged in problem-solving tasks related to spelling over a defined period. This setup made it possible to evaluate the influence of PBL in a systematic and focused manner. For this research, a random sampling method was used to select undergraduate students from the University. This method helped students to reduce partiality and ensure that the result could be generalized to a population of undergraduate students. This study included 120 undergraduate students of different ages, representing a mix of academic disciplines such as BBA, IT, and English. This academic variety offered insight into how PBL might influence spelling skills across different fields of study. At the beginning of the study, all participants were given a spelling test consisting of 20 commonly misspelled English words. This helped to assess the initial level of students' spelling proficiency. In a classroom, students were engaged in a PBL-based learning module, where they worked in a group to solve problems that involved writing a story or an essay, which depended on the student's preference. Each group member was assigned to write one paragraph, ensuring individual contribution while still encouraging collaboration and discussion. Students were allowed to use mobile phones for references but were required to write the entire paragraph themselves. This task emphasizes students' interaction, collaboration, and in-group study. Students point out each other's spelling mistakes, which helps Students learn from their spelling errors in a supportive environment. After the PBL intervention, the written paragraphs were assessed for spelling accuracy to evaluate the effectiveness of the intervention. The post-test allowed the identification of common spelling errors and comparison of the spelling proficiency before and after PBL activity. The goal was to assess whether collaborative learning and feedback during the PBL intervention contributed to improvements in spelling skills. The post-test results provided insight into how peer interaction and Collaborative learning helped participants enhance their spelling proficiency.

The data collected were analyzed using statistical methods to determine the effectiveness of PBL in improving skills. The pre-test and post-test results were compared using paired sample t-tests to measure any significant differences in spelling accuracy before and after the intervention. Descriptive Statistics, including mean and standard deviation, were also calculated to summarize the overall performance of the participants. All participants were informed about the purpose of the research and the voluntary nature of the participation. Confidentiality and anonymity were ensured by coding the participants before the study began. The study adhered to ethical guidelines and protocols for research involving human subjects.

Findings

Figure 1: Shows the challenges in spelling proficiency faced by undergraduate students:

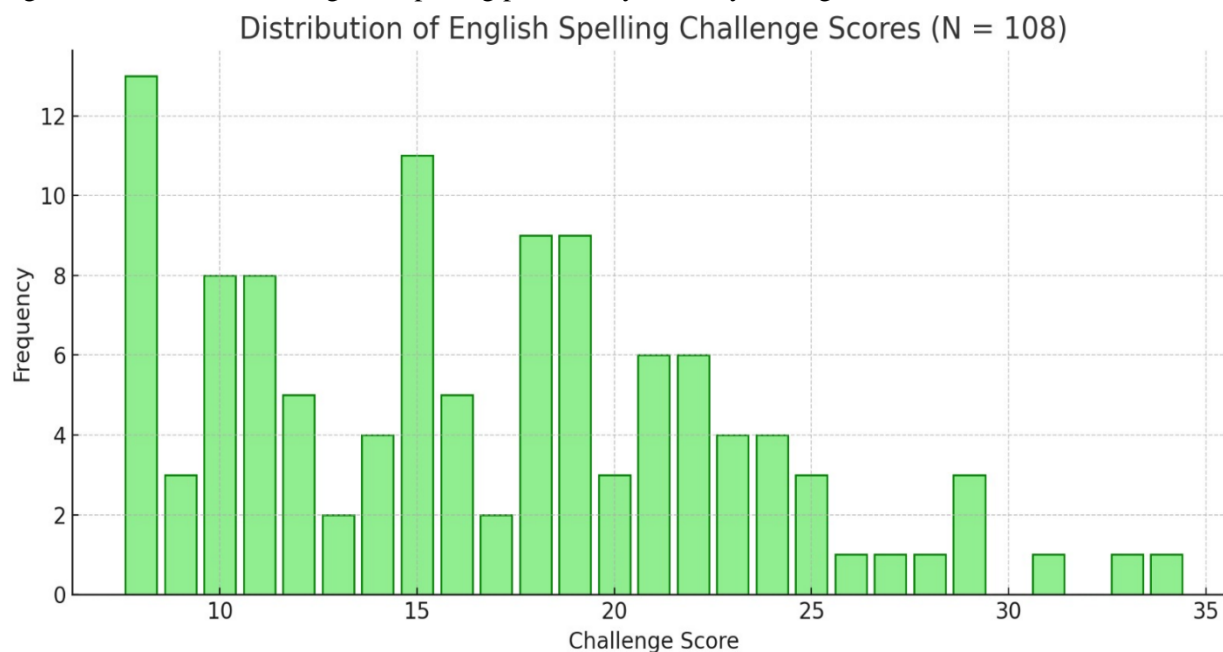Distribution of English Spelling Challenge Scores (N = 108)

Figure presents the distribution of English spelling challenge scores among 108 participants, revealing a varied performance across the group. This chart shows that a significant number of participants scores between 8-15, indicating a clustering of lower mid-range scores the most frequent scores around 9, with a gradual decline in frequency as scores increase. Although a few participants achieved scores that indicate a wide range of spelling proficiency among participants, with a skew toward the lower end. This distribution supports the need for end-targeted instructional interventions aimed at improving spelling ability, especially for those performing below the midpoint of the scoring range.

Figure 2: Shows the results of undergraduate Students before and after the implementation of PBL.
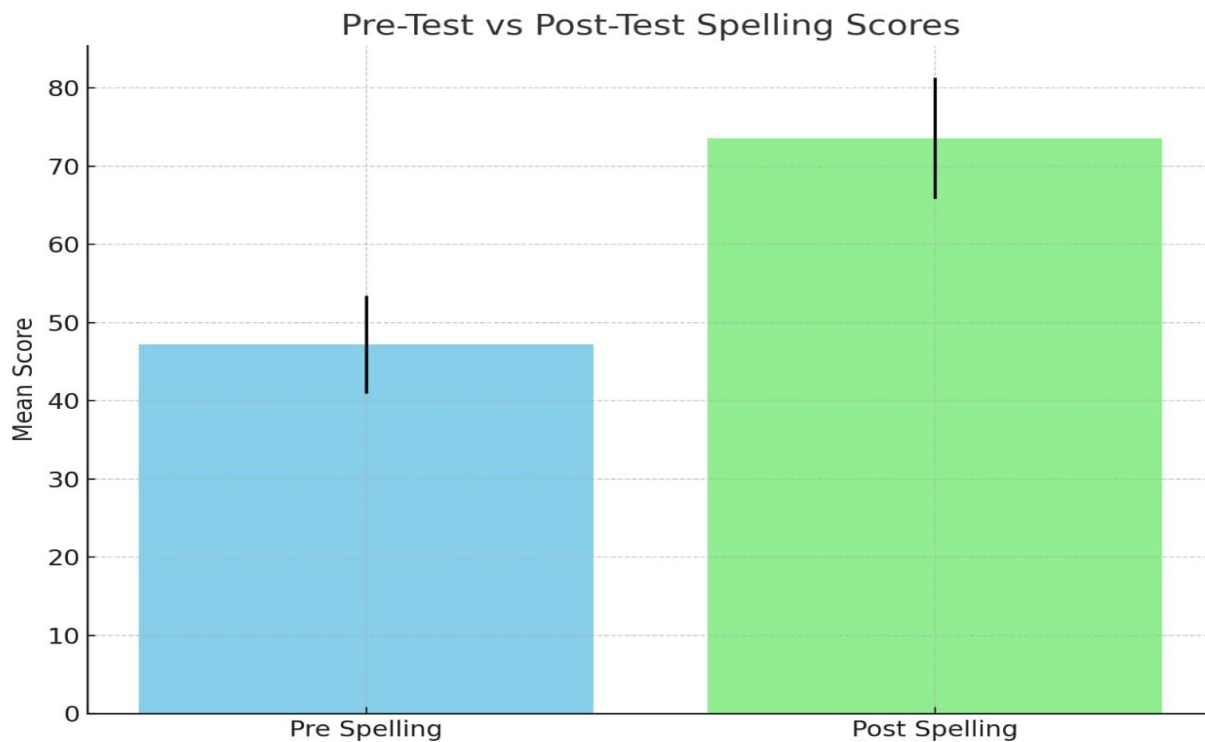
The Figure titled "Pre-test vs Post-test Spelling scores" presents a comparison of means spelling scores before and after intervention, using a bar graph with error bars indicating variability (likely standard deviation or standard errors).
Mean Scores
Pre-Spelling: The mean score is approximately 47.
Post-Spelling: The mean score is significantly higher, approximately 74.
Improvement: There is a noticeable increase in mean spelling scores from the pre-test to the post-test, suggesting that the intervention had a positive impact on spelling performance.

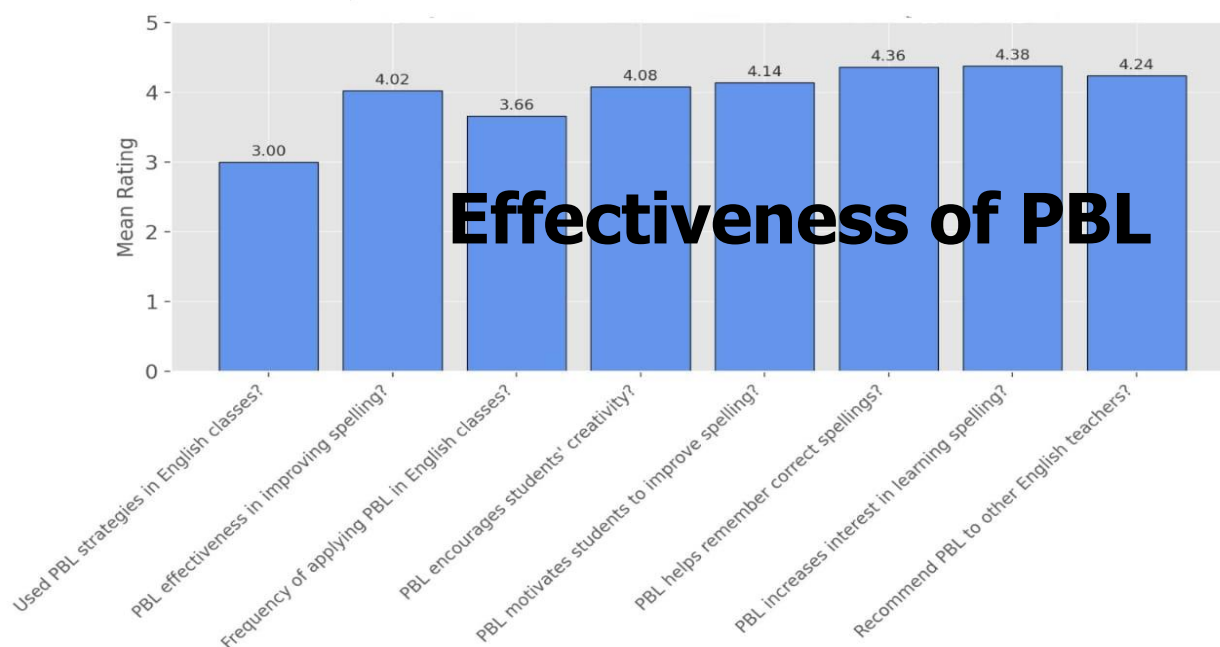Figure 3: Shows the perception of students regarding the effectiveness of PBL:

Figure 3 shows students' perception regarding the effectiveness of PBL in English classes, particularly in teaching spelling. Students strongly believe in its efficacy for improving students' spelling skills.

Although the rating for actual usage is low (3.00), the ratings for its benefits, such as enhancing creativity, motivation, interest, and memory of correct spelling, are all high. Students also show a willingness to recommend PBL to others.

This suggests that PBL has great potential, and with proper support and training, it could be more widely and effectively implemented in English classrooms.

Discussion

The findings from the study align with previous studies emphasizing the effectiveness of PBL in improving spelling proficiency among undergraduate students. Figure 1 illustrates the distribution of spelling scores, revealing that many students initially struggled, with most scores falling within the lower mid-range (8-15). This distribution indicates a need for focused interventions, similar to findings by Liu and Zhang (2021), who highlighted the common spelling challenges faced by language learners.

The comparison of pre-test and post-test scores in Figure 2 demonstrates a significant improvement in spelling abilities, with the mean score increasing from 47 to 74 following the PBL intervention. These findings are consistent with Almeida (2023), who noted that PBL intervention positively influences various learning outcomes, including spelling, through active student engagement. The improvement observed here mirrors the results from Huang and Li (2022), who reported similar results in spelling when using interactive and Student-centered learning approaches like PBL.

Figure 3 displays students' perceptions, with high ratings for PBL's ability to enhance creativity, motivation, and retention of correct spelling. These results align with Simpson et al. (2022), who demonstrated that PBL fosters greater student engagement and motivation, leading to improved academic outcomes. Although the actual usage of PBL was rated moderately (3.00), the positive perception and willingness to recommend PBL to others reflect its potential, as noted by Kaur (2021).

Conclusion

This study concludes that PBL is an effective method for improving the spelling skills of undergraduate students. PBL encourages students to actively engage in their critical thinking, collaboration, and spelling proficiency. This hands-on nature of PBL activities allows students to apply their spelling knowledge in practical contexts, thus improving their accuracy and retention. Furthermore, the group-based approach in PBL encourages peer feedback, which aids in

identifying and correcting spelling mistakes. However, the study also identified challenges such as the need for more institutional support and proper resources to ensure the effective application of PBL. Adequate training for instructors and students is crucial to maximizing the benefits of this approach. Further research should explore the long-term impact of PBL on spelling proficiency and its applicability in diverse educational settings.

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