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Research on Applying Problem-Based Learning (PBL) Teaching Mode to Forestry Translation Classrooms

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Abstract: *Problem-Based Learning (PBL), a student-centered pedagogical approach, has garnered significant attention in educational research for its potential to enhance student engagement, critical thinking and practical problem-solving skills. This study investigates the application of PBL in forestry translation classrooms. In the context of globalization, translation plays an increasingly significant role in the field of forestry. However, the specialized terminology and technical nature of forestry texts often pose great challenges to translators. Traditional teaching methods often fall short in adequately addressing these challenges. Therefore, this research aims to explore the effectiveness of applying PBL mode to forestry translation curricula, trying to improve students' comprehensive ability in handling practical forestry translation tasks and enhancing the quality and effectiveness of specialized translation education. To achieve this aim, a mixed-methods research design was employed, combining quantitative surveys and qualitative interviews with students and educators involved in forestry translation courses. Data collection focused on classroom observation, student feedback and surveys and performance assessments. The findings indicate that PBL fosters a more interactive and student-centered learning environment, encouraging deeper engagement with translation tasks and collaborative problem-solving. The results underscore that PBL not only significantly enhances students' translation accuracy, terminology management, and subject matter understanding, but also cultivates essential skills such as teamwork, research competence, and adaptability—qualities indispensable for professional translators in the forestry sector. However, challenges such as extensive preparatory work for educators and the need for ongoing support for students were also noted. Despite these challenges, the overall results suggest that PBL holds considerable promise for enhancing the effectiveness of forestry translation teaching. Future research should explore the long-term impacts of PBL and the broader applicability of PBL in other translation fields, contributing to innovative translation pedagogy and the development of skilled translators in forestry translation.*

Keywords: *Project-Based Learning (PBL), Forestry Translation, Effectiveness*

1. Introduction

The ever-evolving landscape of global communication has magnified the importance of translation in various specialized fields, including forestry. As the demand for accurate and effective translation of forestry-related texts grows, so does the need for innovative teaching methodologies that can equip future translators with the necessary skills and knowledge. Forestry translation, characterized by its complex technical terminology and specialized subject matter, presents unique challenges that traditional teaching methods often struggle to address. These challenges include not only the accurate conveyance of specialized terms but also the need for a deep understanding of the context and content of the source material.

Problem-Based Learning (PBL), a pedagogical approach that emphasizes student-centered learning through the exploration of real-world problems, has been recognized for its potential to enhance critical thinking, problem-solving, and practical application skills.[1] While PBL has been widely applied in various educational contexts, its use in the domain of translation, particularly in specialized areas such as forestry, remains underexplored. The integration of PBL into translation classrooms offers a promising avenue for addressing the specific challenges associated with forestry translation by fostering a more interactive, practical, and collaborative learning environment.

This research is motivated by the pressing need to improve the quality and effectiveness of forestry translation education. By applying the PBL teaching mode to forestry translation curricula, this study

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aims to enhance students' ability to manage complex translation tasks, particularly those involving specialized terminology and technical content. The research explores the effectiveness of PBL in not only improving students' translation skills but also in cultivating essential competencies such as teamwork, research aptitude, and adaptability—qualities that are critical for professional success in the field of forestry translation. Ultimately, this study seeks to contribute to the development of innovative pedagogical approaches that can better prepare students for the demands of professional translation in specialized fields such as forestry.

2. Literature Review

Problem-based learning (PBL) is an instructional approach that has been used successfully for over thirty years and continues to gain acceptance in multiple disciplines.[2] Initially developed in the 1960s for medical education, PBL was designed to shift away from traditional lecture-based teaching towards a more student-centered model that emphasizes real-world problem-solving and collaborative learning. Over the decades, PBL has been successfully adapted to fields such as the humanities, social sciences, and engineering, where it has been shown to improve student engagement, motivation, and the application of knowledge.[3] The method's focus on active learning and teamwork has made it particularly effective in developing critical thinking and analytical skills, which are essential for navigating complex professional environments.*(Wurdinger, S., & Rudolph, J. 2009; Bell, S. 2010)*[4][5]

Along with the increasing interest in learning-centred constructivist approaches to translator education, there have been proposals to introduce project-based learning (PBL), popular in education, to the teaching of translation.[6] Traditional translation education has typically relied on instructor-led lectures and individual exercises, which, while useful, may not fully prepare students for the dynamic and multifaceted nature of professional translation work. Studies have indicated that PBL enhances translation students' ability to apply theoretical knowledge in practical contexts, improves their research and terminology management skills, and fosters essential soft skills such as teamwork and communication (*Kiraly, D., 2000; Yang, D., 2019; Ribeiro S, et al., 2023*)[7][8][9]. Despite these advantages, the adoption of PBL in translation education is not without challenges. *Li(2024)* pointed that there are challenges of applying problem-based learning to translation classrooms, like the difficulty in assessing and managing of the classroom with this mode of learning, the need for significant preparatory work by educators as well as the requirements of students' self-directed learning ability.[10] In the context of forestry translation, the challenges are particularly pronounced due to the specialized and technical nature of the field. Translators working with forestry texts must navigate complex terminology, scientific language, and region-specific concepts, which require both linguistic proficiency and a deep understanding of the subject matter.[11] Traditional teaching methods may not adequately equip students to meet these demands, highlighting the need for more innovative approaches.

While the existing literature on PBL highlights its potential benefits in translation education, research specifically focused on its application in forestry translation remains limited. Most studies have explored PBL in general translation studies or in other specialized fields, such as medical or legal translation, leaving a gap in understanding how PBL can address the unique challenges of forestry translation. This study aims to fill this gap by investigating the effectiveness of PBL in forestry translation classrooms, providing insights into how this pedagogical approach can enhance students' skills in handling complex, specialized translation tasks.

3. Methodology

This study intends to answer the following three questions: First, Does PBL have an advantage over traditional teaching method in forestry translation teaching? If so, in what aspects? Second, what limitations does PBL exhibit in its implementation in forestry translation teaching? Third, how to improve teaching efficiency in forestry translation courses?

3.1 Research Design

This study employs a mixed-method research design, integrating both quantitative and qualitative approaches to provide a comprehensive analysis of the application of Project-Based Learning (PBL) in forestry translation classrooms. This design allows for the collection and analysis of diverse data types, ensuring a robust evaluation of PBL's effectiveness. The mixed-methods approach integrates both quantitative and qualitative data to provide a comprehensive understanding of how PBL influences

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student learning outcomes, engagement, and skill development in this specialized translation field.

3.2 Participants

The participants of this study include MTI students at a university featuring forestry. The research was conducted over a semester, focusing on the impact of implementing the PBL teaching mode in forestry translation courses. The study compared the students' performance before and after the implementation of the PBL teaching mode. This comparison allowed for a comprehensive assessment of how effectively the PBL method enhanced the students' translation abilities and enriched their overall learning experience.

3.3 Data Collection

Data collection for this study was conducted through a variety of methods to ensure a comprehensive analysis of the impact of the PBL teaching mode:

Surveys: Pre- and post-semester surveys were administered to the participants to gauge their self-perceived competencies in forestry translation, engagement with course materials, and overall satisfaction with the teaching approach. The surveys incorporated both Likert-scale items for quantitative measurement and open-ended questions to capture qualitative insights. This allowed for an in-depth understanding of changes in students' attitudes and perceptions before and after the PBL implementation.

Classroom Observations: Regular classroom observations were conducted throughout the semester to monitor student interactions, engagement levels, and the application of PBL activities. Observations focused on how students collaborated, approached problem-solving tasks, and applied translation strategies in real-time settings. These observations provided valuable insights into the dynamics of the PBL environment and how it influenced students' learning processes.

Performance Assessments: Participants completed a series of translation tasks before and after the implementation of the PBL approach. These tasks were designed to evaluate their proficiency in translating specialized forestry texts, including accuracy in terminology management, contextual understanding, and overall translation quality. The tasks were assessed using a standardized rubric to ensure consistent and objective evaluation of students' translation skills over time.

Interviews: At the end of the semester, semi-structured interviews were conducted with a sample of students and instructors. These interviews aimed to gather detailed perspectives on the effectiveness of the PBL approach, the challenges encountered, and the perceived benefits compared to traditional teaching methods. The interviews provided nuanced feedback on the practical implications of adopting PBL in forestry translation courses, highlighting both successes and areas for improvement

3.4 PBL Project Design

The PBL projects were designed to align with real-world translation tasks in the forestry sector. Each project required students to collaborate in teams to translate complex scientific texts related to forestry, such as research articles, technical reports, and field manuals. The projects were structured to include the following phases:

Project Planning: Identifying project goals, roles, and timelines. Students were guided in setting clear objectives and dividing tasks among team members.

Research and Translation: Conducting background research and performing translation tasks. Students used various resources to understand the subject matter and ensure accurate translations.

Peer Review and Revision: Engaging in peer review sessions to refine translations. Teams exchanged their work for feedback, promoting collaborative learning and critical evaluation.

Presentation: Presenting the final translated texts and reflecting on the learning process. Students showcased their translations and discussed the challenges and strategies employed during the projects.

3.5 Data Analysis

The data collected from surveys, performance assessments, classroom observations, and interviews were analyzed using a combination of quantitative and qualitative methods:

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Quantitative Analysis: The survey responses and performance assessment scores were analyzed using statistical techniques, such as paired t-tests, to identify significant differences in students' translation abilities and engagement levels before and after the implementation of the PBL teaching mode. The analysis focused on measuring improvements in translation accuracy, terminology management, and overall learning outcomes. This approach provided a clear view of the quantitative impact of PBL on students' performance.

Qualitative Analysis: The open-ended survey responses, interview transcripts, and classroom observation notes were analyzed using thematic analysis. This process identified recurring themes related to students' experiences with PBL, challenges faced, and its impact on their learning. The qualitative findings enriched the quantitative results by providing deeper insights into the effectiveness of PBL in enhancing students' development in forestry translation.

3.6 Limitations

While this study provides valuable insights into the application of PBL in forestry translation education, it is important to acknowledge certain limitations. The study was conducted within a single university setting, which may limit the generalizability of the findings to other educational contexts. Additionally, the relatively short duration of the study (one semester) may not capture the long-term effects of PBL on student learning outcomes. Future research could address these limitations by conducting longitudinal studies across multiple institutions and exploring the long-term impact of PBL on students' professional translation skills in the forestry sector.

4. Results and Discussions

This section presents the findings from the study on the application of Problem-Based Learning (PBL) in forestry translation classrooms, followed by a discussion of these results. The analysis includes quantitative performance assessments, survey data on student engagement and satisfaction, as well as qualitative insights from classroom observations and interviews.

4.1 Results

4.1.1 Quantitative Results

Translation Performance: The effectiveness of the PBL teaching mode was evaluated by comparing students' translation performance before and after its implementation. Key metrics included terminology management, contextual accuracy, and overall translation quality. A paired t-test was conducted to analyze the differences in performance before and after PBL implementation. The results are summarized in Table 1 and illustrated in Figure 1.

Table 1: Comparison of Translation Performance before and After PBL Implementation.

Assessment Criteria	Pre-PBL Group (Average Score)	Post-PBL (Average Score)
Terminology Management	70	85
Contextual Accuracy	72	88
Overall Translation Quality	75	90

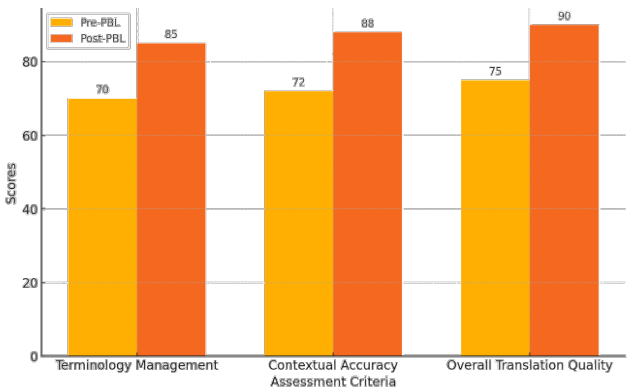

Figure 1: Translation Performance Before and After PBL Implementation.

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The bar chart in Figure 1 above illustrates the significant improvement in translation performance following the PBL implementation. The paired t-test results confirmed that the improvements in terminology management, contextual accuracy, and overall translation quality were statistically significant ($p < 0.05$).

Student Engagement and Satisfaction: Student engagement and satisfaction were assessed through surveys conducted before and after the semester. A paired t-test analysis of the Likert scale ratings (1-5) showed significant increases in both engagement and satisfaction after PBL implementation. The results are summarized in Table 2 and illustrated in Figure 2.

Table 2: Pre- and Post-Semester Survey Results

Survey Category	Pre-Semester (Average)	Post-Semester (Average)
Engagement	3.2	4.5
Satisfaction	3.4	4.6
Confidence	3.0	4.3

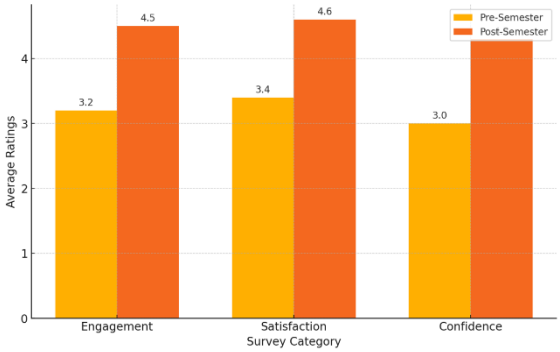

Figure 2: Survey Results Comparison.

This bar chart in Figure 2 above shows the significant increase in student engagement, satisfaction, and confidence after the implementation of the PBL approach. The paired t-test results indicated that these increases were statistically significant ($p < 0.05$).

Overall Comparison: A radar chart was used to provide a comprehensive comparison of various aspects such as engagement, translation accuracy, adaptability, teamwork, and research competence before and after the implementation of PBL. The visual representation in Figure 3 underscores the broad advantages of the PBL approach.

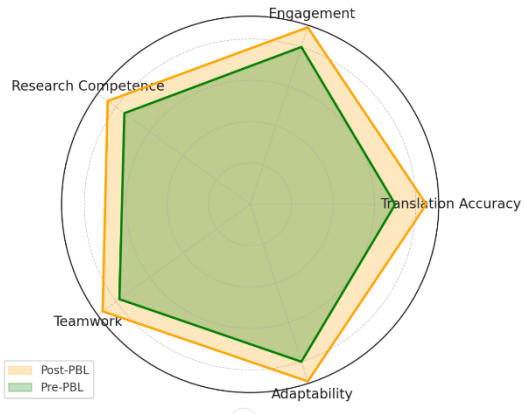

Figure 3: Overall Comparison of Skills.

The radar chart in Figure 3 shows that students exhibited superior performance across all measured aspects after the introduction of PBL, particularly excelling in engagement, teamwork, and research competence.

4.1.2 Qualitative Results

Classroom observations: Classroom observations revealed a notable shift in the dynamics of student interactions and engagement in PBL-based sessions compared to traditional lecture-based methods.

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Students in the PBL group exhibited higher levels of collaboration, frequently engaging in peer discussions to explore various translation challenges. This collaborative environment encouraged students to articulate their reasoning and problem-solving strategies, enhancing their critical thinking skills. Additionally, the PBL sessions were characterized by a more active and participatory atmosphere, with students taking the initiative to seek out additional resources, clarify doubts, and critically evaluate their translation choices. In contrast, the control group, which followed traditional teaching methods, displayed a more passive learning style. Students were observed to rely heavily on the instructor for guidance and solutions, leading to a less interactive and engaging classroom environment. The traditional sessions were predominantly lecture-focused, with limited opportunities for students to actively engage with the material or collaborate with peers.

Interviews: Interviews with students and educators further supported the observations from the classroom. Students in the PBL group expressed strong appreciation for the collaborative and problem-solving aspects of the PBL approach. Common themes that emerged from the interviews included improved teamwork, enhanced research skills, and a more dynamic and engaging learning environment. Many students highlighted that PBL allowed them to apply theoretical knowledge to real-world translation projects, which they found both challenging and rewarding. They noted that this approach not only improved their translation accuracy but also developed essential skills such as time management, teamwork, and adaptability to complex translation tasks. Educators also observed the positive impact of PBL on student motivation and learning outcomes. They noted that students in the PBL group were more proactive and engaged, often demonstrating a deeper understanding of the material. Educators appreciated the critical thinking and problem-solving abilities displayed by students during PBL sessions. However, they also acknowledged the additional effort required to design and facilitate PBL activities, emphasizing the importance of providing adequate support and resources to ensure the successful implementation of this approach.

4.2 Discussion

This study aimed to evaluate the effectiveness of Problem-Based Learning (PBL) in enhancing the translation skills of students in forestry translation classrooms. The quantitative and qualitative results demonstrated that PBL significantly improved students' performance in terminology management, contextual accuracy, and overall translation quality, compared to traditional lecture-based instruction. These findings align with previous research that highlights the benefits of PBL in promoting deeper learning, critical thinking, and active engagement in various educational contexts. The significant improvement in translation performance observed in this study supports the idea that PBL can bridge the gap between theoretical knowledge and practical application, particularly in specialized fields like forestry translation.

In comparison with existing literature, the positive outcomes of this study reinforce the effectiveness of PBL in fostering not only subject-specific skills but also essential soft skills such as teamwork, communication, and adaptability. These results are consistent with the findings of similar studies in other fields, which have shown that PBL enhances students' ability to work collaboratively and apply theoretical knowledge in real-world scenarios. However, this study also revealed some unique insights specific to the context of forestry translation. The pronounced improvement in students' terminology management and contextual accuracy suggests that PBL is particularly effective in fields where precise and specialized language is critical. This finding may indicate that PBL's emphasis on problem-solving and collaboration is especially beneficial in disciplines that require meticulous attention to detail and context.

Unexpectedly, the study uncovered challenges related to time management and the need for additional support, as highlighted in the interviews and classroom observations. While PBL's collaborative nature and focus on real-world tasks were well-received by students, some reported difficulties in balancing the demands of the project with other academic responsibilities. Additionally, a few students felt that they required more guidance during the project phases. These findings suggest that while PBL offers significant benefits, its successful implementation requires careful consideration of the students' workload and the provision of adequate support mechanisms. These challenges also highlight the importance of aligning PBL activities with theoretical models that emphasize scaffolding and structured support, ensuring that students can fully engage with the learning process without feeling overwhelmed.

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5. Conclusion

This study has provided valuable insights into the application of Problem-Based Learning (PBL) in forestry translation classrooms, demonstrating its effectiveness in enhancing students' translation performance and engagement. The results indicate that PBL not only improves technical skills such as terminology management and contextual accuracy but also fosters essential soft skills like collaboration, critical thinking, and adaptability. These findings underscore the potential of PBL to bridge the gap between theoretical knowledge and practical application, particularly in specialized fields where precise and context-sensitive language is crucial.

While the study confirms the benefits of PBL, it also highlights certain challenges that need to be addressed to optimize its implementation. Time management and the need for additional support emerged as significant issues, suggesting that instructors must carefully design PBL activities with these factors in mind. Providing clear timelines, regular feedback, and additional resources can help mitigate these challenges and ensure that students are fully supported throughout the learning process. Moreover, the study emphasizes the importance of aligning PBL with relevant theoretical models that advocate for structured support and scaffolding, enabling students to navigate the complexities of real-world translation tasks more effectively.

In conclusion, the findings of this study contribute to the broader discourse on innovative translation pedagogy, offering a practical framework for integrating PBL into translation education. By addressing the identified challenges and leveraging the positive outcomes, educators can enhance the quality of translation training, better preparing students for the demands of professional work in specialized fields like forestry. Future research could build on these findings by exploring the long-term impacts of PBL on translation proficiency and career readiness, as well as investigating its application in other specialized domains of translation.

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