14. Exploring Teachers' Perspectives on Their Role in Facilitating Project-Based Learning: A Comparative Study of Elementary, Middle, and High School

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ABSTRACT

Project-Based Learning (PjBL) is a prominent instructional model fostering critical thinking, problem-solving, and collaboration skills among students through real-world projects. However, the role of teachers in PjBL implementation remains underexplored. This study investigates teachers' perspectives on their role in PjBL, aiming to identify strategies, challenges, and opportunities in PjBL facilitation. Semi-structured interviews were conducted with experienced PjBL teachers using a qualitative approach. Thematic analysis revealed teachers' multifaceted roles as facilitators, coaches, mentors, and assessors, employing strategies such as scaffolding, collaboration, and technology integration to support student learning. Despite challenges like time constraints and curriculum alignment issues, teachers perceive PjBL as valuable for enhancing student engagement and learning outcomes. The study concludes that teachers' perspectives on PjBL facilitation are influenced by their beliefs, experiences, and contextual factors. To support effective PjBL implementation, continuous professional development, administrative support, and resource access are essential. Recognizing and addressing teachers' perspectives can facilitate successful PjBL adoption in diverse educational settings. This study contributes nuanced insights into teachers' roles in PjBL, offering practical implications for educators, curriculum developers, and policymakers striving to enhance PjBL implementation and effectiveness.

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1. INTRODUCTION

Project-based learning (PjBL) has emerged as a prominent instructional approach to foster deeper learning and 21st-century skills among students. Rooted in constructivist learning theories, PjBL shifts the focus from traditional teacher-led instruction to student-centered inquiry and collaboration, where students engage in authentic, real-world projects to construct knowledge and solve complex problems

(Chang et al., 2024; Melia Astiana, Maya Malinda, Anny Nurbasari, 2021; Şahin & Kılıç, 2024). Over the years, PjBL has garnered attention from educators, researchers, and policymakers for its potential to promote critical thinking, creativity, communication, and collaboration skills, which are essential for success in the modern workforce (Hao et al., 2024; Şahin & Kılıç, 2024; Wijnia et al., 2024). Despite the growing interest and adoption of PjBL in educational practice, there remains a gap in understanding the intricate role of teachers in facilitating this instructional approach. While the literature on PjBL has extensively documented its benefits for student learning outcomes, fewer studies have delved into the specific strategies, challenges, and perspectives of teachers who implement PjBL in their classrooms (Chang et al., 2024; Plews et al., 2024). This gap is significant, considering that teachers are pivotal in shaping students' learning experiences and mediating the effectiveness of PjBL implementation.

Research on PjBL has provided insights into its theoretical foundations, pedagogical principles, and impacts on student learning. Scholars have emphasized the importance of authentic tasks, inquiry-based learning, and collaboration in PjBL, highlighting its alignment with constructivist and sociocultural learning theories (do Amaral et al., 2023; Plews et al., 2024). Studies have shown that students engaged in PjBL projects demonstrate improved academic performance, higher motivation, and enhanced problem-solving skills than those in traditional classrooms (Abuhmaid et al., 2020; Cai et al., 2023; Zhang et al., 2024). Furthermore, research has identified various models and frameworks for designing and implementing PjBL, such as the Buck Institute for Education's (BIE) Gold Standard PBL model and the framework proposed by Thomas in Wijnia (Wijnia et al., 2024). These models emphasize essential elements of effective PjBL, including authentic challenges, student autonomy, inquiry and investigation, and public presentation of learning outcomes (do Amaral et al., 2023; Suartama et al., 2023). Despite the wealth of research on PjBL, there is a notable gap in understanding the role of teachers in effectively facilitating this instructional approach. While studies have examined the impact of PjBL on student learning outcomes, fewer have explored the strategies, challenges, and perspectives of teachers who implement PjBL in their classrooms. This gap is significant because teachers' beliefs, practices, and support structures profoundly influence the success of PjBL implementation. Furthermore, existing research primarily focuses on the experiences of PjBL in specific contexts or disciplines, such as science, technology, engineering, and mathematics (STEM) education (Al-Bahadli et al., 2023; Wijnia et al., 2024). More comprehensive studies are needed to examine PjBL implementation across diverse subject areas and educational settings to provide a holistic understanding of teachers' roles and practices in facilitating PjBL.

Addressing the gap in understanding teachers' perspectives on PjBL is essential for several reasons. Firstly, teachers play a central role in mediating the implementation and effectiveness of PjBL in classrooms. Understanding their strategies, challenges, and perspectives can inform professional development initiatives, curriculum design, and policy decisions to support PjBL implementation (Mukhibat, 2014). Moreover, by exploring teachers' perspectives on PjBL, educators, and researchers can identify best practices, common challenges, and areas for improvement in PjBL implementation. This knowledge can contribute to developing evidence-based guidelines and resources to support teachers in effectively implementing PjBL across diverse educational contexts. Additionally, understanding teachers' perspectives on PjBL can help bridge the gap between theory and practice in educational research. By incorporating teachers' voices and experiences into the research discourse, scholars can ensure that PjBL initiatives are grounded in the realities of classroom practice and responsive to the needs of educators and students.

Project-Based Learning (PjBL) has gained considerable attention in educational research and practice for its potential to enhance student engagement, critical thinking, and problem-solving skills (Chang et al., 2024; Crawford et al., 2024; McLaughlin et al., 2024). This section provides a comprehensive review of the literature on PjBL, focusing on its theoretical foundations, pedagogical models, empirical evidence, and current trends. PjBL is grounded in constructivist theories of learning, which emphasize the active construction of knowledge through authentic experiences and social interaction (Plews et al., 2024). According to Wijnia (2024), PjBL aligns with sociocultural learning

theories by providing opportunities for students to collaborate, communicate, and construct meaning within authentic contexts. Theoretical frameworks such as Vygotsky's zone of proximal development and Dewey's experiential learning theory provide theoretical underpinnings for understanding the cognitive and social processes involved in PjBL (Chang et al., 2024).

Several pedagogical models and frameworks have been proposed to guide the design and implementation of PjBL. The Buck Institute for Education's (BIE) Gold Standard PBL model is one of the most widely used frameworks, emphasizing essential elements such as authentic tasks, student autonomy, inquiry and investigation, and public presentation of learning outcomes (Buck Institute for Education, n.d.). Thomas (2000) in Wijnia (Wijnia et al., 2024) proposed a similar framework highlighting the importance of challenging problems, sustained inquiry, authenticity, and student voice and choice in PjBL. Research on PjBL has provided empirical evidence of its effectiveness in promoting student learning outcomes across various subject areas and grade levels. For example, Chang et al. (Chang et al., 2024) conducted a longitudinal study in higher education classrooms and found that students engaged in PjBL projects demonstrated higher levels of conceptual understanding and problem-solving skills than those in traditional classrooms. Hao et al. (Hao et al., 2024), do Amaral et al. (do Amaral et al., 2023), and Ismail et al. (2024) examined PjBL studies and concluded that PjBL positively impacts student achievement, motivation, and 21st-century skills. While research on PjBL has primarily focused on student outcomes, there is a growing interest in understanding teachers' perspectives on their role in facilitating PjBL. Cai et al. (Cai et al., 2023) conducted a qualitative study exploring elementary teachers' experiences with PjBL implementation and identified factors influencing their instructional practices, including beliefs, professional development, and support structures. Habibi (2022) surveyed PjBL teachers to investigate their perceptions of the benefits, challenges, and strategies associated with PjBL implementation, highlighting the importance of teacher support and collaboration.

Recent trends in PjBL research include a focus on integrating technology, fostering equity and inclusion, and promoting interdisciplinary collaboration (Crawford et al., 2024; McLaughlin et al., 2024; Zhang et al., 2024; Zhong & Lyu, 2022). Researchers have explored innovative ways to leverage technology to enhance PjBL experiences with the widespread adoption of digital tools and online platforms. Additionally, there is growing recognition of the need to address equity issues in PjBL by providing equitable access to resources, supporting diverse student populations, and promoting culturally responsive pedagogy. Furthermore, interdisciplinary approaches to PjBL have gained traction, emphasizing connections between different subject areas and real-world contexts to promote deeper learning and transferable skills.

2. METHOD

This study employed a qualitative research design to explore teachers' perspectives on their role in facilitating Project-Based Learning (PjBL). Qualitative methods are well-suited for capturing rich, in-depth insights into complex phenomena such as teachers' beliefs, practices, and experiences (Chan, 2023; Li et al., 2021; Mohammadi et al., 2021). Through semi-structured interviews, this study aimed to uncover the strategies, challenges, and opportunities perceived by teachers in implementing PjBL in their classrooms. The research procedure involved several key steps, including participant recruitment, data collection, and analysis. Firstly, a purposive sampling strategy was employed to select participants with diverse experiences implementing PjBL across different subject areas and grade levels. Potential participants were identified through professional networks, educational organizations, and online platforms.

Upon obtaining ethical approval from the relevant institutional review board, participants were invited to participate in the study via email or personal contact. Before the interviews, informed consent was obtained from each participant, ensuring voluntary participation and confidentiality of their responses. Semi-structured interviews were conducted with each participant to explore their perspectives on their role in facilitating PjBL. The interview protocol was developed based on the

research objectives and relevant literature, containing open-ended questions designed to elicit detailed responses regarding teachers' practices, challenges, and perceptions of PjBL implementation. Depending on participants ' preferences and logistical constraints, interviews were conducted face-to-face or via video conferencing. Each interview lasted approximately 45-60 minutes and was audio-recorded with participants' consent. The interview protocol consisted of open-ended questions organized into thematic areas related to teachers' experiences with PjBL. Key topics explored during the interviews included teachers' motivations for implementing PjBL, instructional strategies and practices, challenges encountered during PjBL implementation, and perceived student benefits. The interview protocol was pilot-tested with a small group of teachers to ensure clarity, relevance, and comprehensiveness before being finalized for data collection.

The participants were recruited using a purposive sampling strategy to ensure diversity in teaching experience, subject expertise, and school settings. A total of 12 teachers participated in the study, representing various grade levels (elementary, middle, and high school) and subject areas. The participants had an average teaching experience of 8 years, ranging from 3 to 20 years. Additionally, the participants had varying degrees of experience with PjBL, ranging from novice to experienced practitioners. Data analysis followed a thematic approach to identify patterns, themes, and insights from the interview transcripts (Abid et al., 2021; Tay et al., 2021). The analysis process involved several iterative steps, beginning with familiarization with the data through repeated readings of the interview transcripts. Initial codes were then generated to capture meaningful units of data related to teachers' perspectives on their role in facilitating PjBL. These codes were organized into broader themes and sub-themes, which were refined through constant comparison and discussion among the research team. The themes identified reflected commonalities, differences, and nuances in teachers' experiences and perceptions of PjBL implementation. To enhance was conducted by sharing the preliminary findings with participants to validate the accuracy and interpretation of their responses.

3. FINDINGS AND DISCUSSION

The results of the qualitative analysis revealed rich insights into teachers' perspectives on their role in facilitating Project-Based Learning (PjBL). This section presents the key themes and findings from the interviews and discusses their implications for PjBL practice and research.

Table 1. Themes Derived from Teachers' Perspectives on Facilitating PjBL

Themes	Description
Role as Facilitators	Teachers perceive themselves as facilitators who guide and support students in PjBL projects.
Strategies for Support	Teachers employ various strategies to scaffold student learning in PjBL activities.
Challenges and Opportunities	Teachers face challenges such as time constraints and curriculum alignment but recognize opportunities for enhancing student engagement and learning outcomes.
Benefits of PjBL	Teachers acknowledge the benefits of PjBL, including increased student motivation and more profound learning experiences.

Role as Facilitators: Teachers unanimously expressed their role in PjBL as facilitators rather than traditional instructors. They emphasized the importance of guiding and supporting students throughout the project process, providing scaffolding when needed, and fostering a collaborative learning environment. Participant 1 stated, "In PjBL, I see myself more as a facilitator, guiding students through the process rather than delivering content."

Strategies for Support: Teachers shared strategies to support student learning in PjBL. These **strategies** include providing clear project objectives and guidelines, offering peer collaboration and feedback opportunities, and integrating technology to enhance student engagement and productivity.

Participant 2 mentioned, "I scaffold the learning by breaking down complex tasks into smaller, manageable steps and providing guidance along the way."

Challenges and Opportunities: While teachers acknowledged the benefits of PjBL, they also encountered challenges in its implementation. Common challenges include time constraints, limited resources, and the need for alignment with curriculum standards. However, teachers also recognized **opportunities** for enhancing student engagement, motivation, and authentic learning experiences through PjBL. Participant 3 noted, "Although time constraints can be challenging, PjBL allows students to explore real-world problems and develop critical thinking skills."

Benefits of PjBL: Overall, teachers highlighted the positive impact of PjBL on student motivation, engagement, and deeper learning. They observed increased student ownership of learning, collaboration, and problem-solving skills development. Participant 4 remarked, "PjBL encourages students to take ownership of their learning and apply concepts in real-world contexts, leading to deeper understanding and retention."

The findings align with previous research highlighting the transformative role of teachers in PjBL implementation (Cai et al., 2023). By adopting a facilitative role, teachers empower students to take ownership of their learning and develop essential 21st-century skills such as critical thinking, communication, and collaboration. The strategies identified by teachers for supporting student learning in PjBL reflect best practices recommended in the literature, such as providing clear objectives, scaffolding tasks, and fostering collaboration. Despite the challenges, teachers recognize the unique opportunities PjBL offers to promote deeper learning and authentic engagement. These findings underscore the importance of ongoing support and professional development for teachers to implement PjBL in their classrooms effectively. By addressing time constraints, providing access to resources, and fostering a supportive school culture, educators can enhance the implementation and sustainability of PjBL initiatives (Plews et al., 2024). Furthermore, the perceived benefits of PjBL in enhancing student motivation and learning outcomes align with previous empirical evidence (Al-Bahadli et al., 2023). The findings suggest that PjBL holds promise for addressing the diverse learning needs of students and preparing them for success in an increasingly complex and dynamic world.

To provide a comprehensive analysis of the perspectives of elementary, middle, and high school teachers on their role in facilitating Project-Based Learning (PjBL), we can examine the similarities and differences across these educational levels. Teachers at the elementary level often play a more hands-on role in facilitating PjBL, providing direct guidance and support to young students who may be new to project-based approaches. They focus on creating a nurturing, structured environment where students feel comfortable exploring and collaborating on projects. Strategies may include breaking down tasks into smaller, manageable steps, providing visual aids, and offering frequent feedback to scaffold student learning. Elementary teachers may also integrate PjBL with other instructional methods, such as inquiry-based learning and hands-on activities, to cater to young learners' diverse needs and interests. At the middle school level, teachers transition towards a more facilitative role, empowering students to take ownership of their learning and projects. Middle school teachers provide guidance and mentorship while encouraging students to think critically and problem-solve. They may incorporate interdisciplinary projects integrating multiple subject areas, fostering connections between disciplines and real-world contexts. Strategies may include promoting peer collaboration, encouraging self-directed inquiry, and leveraging technology to enhance student engagement and productivity. Middle school teachers also emphasize the development of 21st-century skills, such as communication, collaboration, and digital literacy, through PjBL experiences. High school teachers often adopt a facilitative approach, treating students as independent learners responsible for driving their projects forward. They provide guidance and support as students engage in more complex and in-depth investigations, often tied to specific academic standards or career pathways. High school teachers may design authentic projects that mirror real-world challenges or research inquiries, allowing students to apply their knowledge and skills meaningfully. Strategies may include promoting student autonomy, encouraging reflective practice, and fostering a classroom culture of inquiry and innovation. High

school teachers also prioritize preparing students for college and career readiness, emphasizing problem-solving, critical thinking, and project management skills through PjBL initiatives. Across elementary, middle, and high school levels, teachers perceive their role in facilitating PjBL as crucial for promoting student engagement, motivation, and deeper learning. While the specific strategies and challenges may vary depending on the educational level, the overarching goal remains to empower students to become active, independent learners capable of tackling real-world problems and challenges. By recognizing students' unique needs and characteristics at different developmental stages, teachers can tailor their approach to PjBL implementation and maximize its effectiveness in fostering 21st-century skills and competencies.

4. CONCLUSION

The findings of this study contribute to the existing literature on PjBL by providing a nuanced understanding of teachers' perspectives, practices, and experiences. By adopting a facilitative role, teachers are crucial in guiding and supporting students through the PjBL process, fostering collaboration, critical thinking, and problem-solving skills development. The strategies identified by teachers for supporting student learning in PjBL reflect best practices recommended in the literature, emphasizing clear objectives, scaffolding tasks, and leveraging technology to enhance engagement and productivity. Despite the challenges encountered, teachers recognize the unique opportunities offered by PjBL for promoting authentic learning experiences and preparing students for success in the 21st century. The perceived benefits of PjBL, including increased student motivation and more profound learning outcomes, align with previous research findings, highlighting the potential of PjBL to transform teaching and learning practices. It is essential to address the challenges identified by teachers, such as time constraints, curriculum alignment, and access to resources, to enhance the implementation and effectiveness of PjBL initiatives. Additionally, further research is needed to explore the impact of PjBL on diverse student populations, the role of technology in PjBL implementation, and the scalability of PjBL across different educational contexts. In conclusion, this study underscores the importance of ongoing support and professional development for teachers to effectively implement PjBL and maximize its potential for promoting student engagement, collaboration, and deeper learning. By addressing the needs and perspectives of teachers, policymakers, educators, and researchers can work collaboratively to advance the field of project-based learning and improve educational outcomes for all students.

Several suggestions for teachers can enhance their practice by facilitating Project-Based Learning (PjBL). First, seeking professional development opportunities focused on PjBL can provide valuable insights, strategies, and resources. Collaboration with colleagues with experience with PjBL or other inquiry-based approaches is also beneficial. Teachers can build a supportive professional learning community by sharing best practices, lesson ideas, and resources and enhance PjBL implementation across grade levels and subject areas. Additionally, remaining flexible and adaptable in their approach to PjBL is crucial. Recognizing that each project and group of students may require different strategies and approaches allows teachers to be open to experimentation and iteration, leading to continuous improvement in PjBL practice. Regular reflection on PjBL experiences is also essential for teachers. Engaging in journaling, seeking peer feedback, and conducting self-assessment can facilitate ongoing professional learning and inform future instructional decisions. In future research, several avenues could further advance the understanding of PjBL and its impact. Longitudinal studies tracking students' progress over time can provide valuable insights into the sustained effects of PjBL on academic achievement, college and career readiness, and lifelong learning skills. Comparative studies exploring the effectiveness of different models and approaches to PjBL across diverse educational contexts can help identify best practices and inform policy decisions. Utilizing mixed-methods research designs can capture both the quantitative effects and the qualitative nuances of PjBL implementation, allowing for a more holistic analysis. Additionally, research focusing on pre-service and in-service teacher preparation for PjBL can inform the development of effective professional development

programs and support structures. Investigating the factors influencing teachers' adoption and sustainment of PjBL can help identify barriers and facilitators to successful implementation. By addressing these research areas, future studies can contribute to the growing knowledge on effective PjBL implementation and its impact on student learning outcomes.

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