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ABSTRACT

This study seeks to evaluate students' experiences with Project-Based Learning in the context of online education, recognizing the significance of understanding the effectiveness and challenges associated with this instructional method. The primary aim of this research is to assess the perceptions and experiences of students engaging in Project-Based Learning within online educational settings. A mixed-methods approach was employed, combining quantitative surveys and qualitative interviews to capture students' perspectives comprehensively. The study's main results reveal a nuanced understanding of students' experiences with Project-Based Learning in online educational contexts. Quantitative analysis indicates overall positive perceptions regarding the effectiveness of PjBL in enhancing learning outcomes and fostering student engagement. Qualitative findings further elucidate the multifaceted nature of students' experiences, highlighting both the benefits and challenges of implementing PjBL in online settings. In conclusion, this research underscores the potential of Project-Based Learning as a valuable instructional approach within online education, offering opportunities for meaningful learning experiences and skill development. However, it also identifies several considerations and areas for improvement, such as adequate technological support, clear guidelines, and enhanced facilitation to optimize the PjBL experience in online environments. This study contributes to the field of education by providing empirical insights into implementing Project-Based Learning in online educational contexts. The findings offer valuable implications for educators, curriculum designers, and policymakers seeking to effectively integrate innovative pedagogical approaches into online learning environments, ultimately enhancing the quality and efficacy of online education.

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1. INTRODUCTION

In contemporary educational discourse, the advent of online learning platforms has transformed the teaching and learning landscape, offering unprecedented opportunities for access, flexibility, and innovation (Hao et al., 2024; Mielikäinen & Viippola, 2023; Plews et al., 2024). Concurrently, educators have been exploring diverse pedagogical approaches to optimize the online learning experience, among which Project-Based Learning (PjBL) has emerged as a promising strategy. PjBL entails students engaging in authentic, collaborative projects to address real-world problems, fostering more profound understanding, critical thinking, and practical skills acquisition within a constructivist framework (Crawford et al., 2024; Cruz et al., 2023; Ismail et al., 2024; Plews et al., 2024).

However, while the potential benefits of Project-Based Learning in traditional classroom settings have been extensively studied and documented, its efficacy within online educational contexts remains relatively underexplored. The transition to online learning introduces unique challenges and opportunities, necessitating reevaluating instructional strategies to ensure meaningful and compelling learning experiences. Understanding how students perceive and engage with Project-Based Learning in online environments is crucial for informing instructional practices and enhancing educational outcomes in this rapidly evolving landscape.

Previous research has highlighted the potential of Project-Based Learning to promote student engagement, motivation, and more profound learning outcomes in traditional face-to-face settings. However, the applicability and effectiveness of PjBL within online educational contexts remain unclear, with limited empirical evidence available to guide practice. Furthermore, existing studies predominantly focus on either online learning or Project-Based Learning separately, overlooking the intersection of these two instructional paradigms. Thus, there is a notable gap in the literature regarding the nuanced experiences and perceptions of students participating in Project-Based Learning within online educational environments.

Online Project-Based Learning draws upon constructivist theories, emphasizing active engagement, social interaction, and authentic experiences as catalysts for knowledge construction and skill development (Chang et al., 2024; Plews et al., 2024; Wijnia et al., 2024). According to Ismail et al (2024), McLaughlin et al (2024), and Zhang et al (2024), PjBL aligns with constructivist principles by situating learning within real-world contexts, where students collaborate to solve complex problems, apply theoretical concepts, and construct meaning through hands-on experiences. Additionally, sociocultural theory underscores the importance of social interaction and collaborative learning in cognitive development, highlighting the role of peers, mentors, and community members in scaffolding learning experiences within online PjBL environments (Al-Bahadli et al., 2023; do Amaral et al., 2023; Mielikäinen & Viippola, 2023; Zhong & Lyu, 2022).

Several fundamental principles underpin the effective implementation of PjBL in online education. These include:

a. Authenticity: PjBL tasks should mirror real-world challenges, allowing students to engage in meaningful, purposeful learning experiences that resonate with their interests and future aspirations (Abuhmaid et al., 2020; Ismail et al., 2024).
b. Collaboration: Collaborative inquiry and teamwork are central to PjBL, enabling students to leverage diverse perspectives, skills, and resources to achieve shared goals (Lyu et al., 2023; Zhang et al., 2024).
c. Inquiry: PjBL encourages inquiry-driven exploration, where students pose questions, conduct research, and generate solutions through self-directed investigation (Guo et al., 2022; Plews et al., 2024)
d. Reflection: Reflective practices promote metacognition and deep understanding by encouraging students to critically evaluate their learning processes, outcomes, and areas for growth (do Amaral et al., 2023; Hao et al., 2024).

This study proposes a comprehensive investigation into students' experiences with Project-Based Learning in online educational contexts to address this gap. By employing a mixed-methods approach

encompassing quantitative surveys and qualitative interviews, this research aims to provide a holistic understanding of the challenges, benefits, and dynamics associated with implementing PjBL in online learning environments. By exploring students' perspectives, the study seeks to elucidate the factors influencing the effectiveness of Project-Based Learning in online settings, thereby informing the development of evidence-based instructional practices tailored to the digital learning landscape.

This research contributes to the existing body of knowledge by offering empirical insights into integrating Project-Based Learning within online educational contexts, addressing a significant gap in the literature. By examining students' perceptions and experiences, the study aims to generate actionable recommendations for educators, curriculum designers, and policymakers to enhance the quality and effectiveness of online education. Through its innovative approach combining quantitative and qualitative methods, this study endeavors to advance understanding and practice in the evolving field of online pedagogy, ultimately fostering more engaging, impactful, and inclusive learning environments.

2. METHOD

This study utilizes a mixed-methods research design to investigate students' experiences with Project-Based Learning (PjBL) in online educational contexts comprehensively. Integrating quantitative surveys and qualitative interviews allows for a multifaceted examination of the phenomenon, facilitating a deeper understanding of the challenges, benefits, and dynamics associated with PjBL in online learning environments. This mixed-methods approach enables triangulation of data sources, enhancing the validity and reliability of the findings by capturing both numerical trends and rich qualitative insights.

The research procedure begins with identifying and recruiting participants from diverse online courses across various disciplines. Participants are informed about the study's objectives, procedures, and rights as research subjects. Upon obtaining informed consent, participants are invited to complete a structured questionnaire to assess their perceptions and experiences with Project-Based Learning in online educational settings. Subsequently, a subset of participants is selected for semi-structured interviews to delve deeper into their experiences, attitudes, and recommendations regarding PjBL

3. FINDINGS AND DISCUSSION

Before presenting the detailed results of participants' perceptions, demographic characteristics, and views on the effectiveness of Project-Based Learning (PjBL) in online educational contexts, it is essential to provide a brief overview. Table 1 outlines the demographic characteristics of the study participants, including gender distribution, age groups, and academic disciplines. This information offers insights into the diversity of the sample and provides context for interpreting the subsequent findings.

Table 2 presents participants' perceptions of PjBL effectiveness using a 4-point scale, ranging from "Disagree Strongly" to "Agree Strongly." The statements assess various aspects of PjBL, including its impact on critical thinking skills, student collaboration, understanding of course material, and overall satisfaction with the instructional approach. The percentages in each category offer a quantitative representation of participants' attitudes toward PjBL in online educational settings.

Table 1. Overview of Participants' Demographic Characteristics

Demographic Variable	Sub Variable	Frequency	Percentage
Gender	- Male	85	45%
	- Female	103	55%
Age Group	- 18-24 years	62	33%
	- 25-34 years	95	51%

Demographic Variable	Sub Variable	Frequency	Percentage
	- 35+ years	31	16%
Academic Discipline	- STEM	110	59%
	- Humanities	45	24%
	- Social Sciences	33	17%

Table 2. Participants' Perceptions of Project-Based Learning Effectiveness

Statement	Disagree Strongly	Disagree	Agree	Agree Strongly
PjBL enhances critical thinking skills	13%	23%	61%	3%
PjBL fosters collaboration among students	8%	17%	70%	5%
PjBL promotes a deeper understanding of course material	11%	21%	63%	5%
Overall satisfaction with PjBL	6%	15%	69%	10%

Following Tables 1 and 2, this section provides a comprehensive interpretation of the demographic characteristics of the study participants and their perceptions of Project-Based Learning (PjBL) effectiveness in online educational contexts. Table 1 offers insights into the demographic composition of the participant sample. The distribution of participants based on gender, age groups, and academic disciplines provides valuable context for understanding the diversity of perspectives represented in the study. The balanced representation across gender and age groups and the varied academic disciplines ensures a comprehensive exploration of students' experiences with PjBL across different demographic segments. In Table 2, participants' perceptions of PjBL effectiveness are presented using a 4-point scale, ranging from "Disagree Strongly" to "Agree Strongly." The percentages indicate the proportion of participants who hold each perception regarding the impact of PjBL on critical thinking skills, collaboration, understanding of course material, and overall satisfaction. This quantitative representation offers insights into the extent to which students perceive PjBL as effective in online learning environments.

The findings of this study provide valuable insights into students' experiences with Project-Based Learning (PjBL) in online educational contexts. Participants positively perceived PjBL, recognizing its potential to enhance critical thinking, collaboration, and deeper understanding of course material. This aligns with previous research (Abuhmaid et al., 2020; Crawford et al., 2024; Cruz et al., 2023; Plews et al., 2024; Şahin & Kılıç, 2024; Suartama et al., 2023) highlighting the effectiveness of PjBL in promoting active learning and skill development in the classroom. However, the study also identified several challenges and areas for improvement in implementing PjBL in online courses. The issues related to time management, communication barriers, and technical difficulties underscore the importance of providing adequate support and resources to facilitate seamless collaboration and learning experiences in virtual environments (Han et al., 2024; Muloiwa-klenam & Sharpley, 2023; Preez & Marx, 2023). Additionally, the need for more precise guidelines and instructions reflects the importance of instructor facilitation and scaffolding to optimize the PjBL experience for online learners.

Integrating quantitative and qualitative findings offers a comprehensive understanding of the complexities and nuances of students' experiences with PjBL in online educational contexts. While quantitative data provide insights into overall perceptions and trends, qualitative narratives offer rich contextual details and deeper insights into students' attitudes, challenges, and suggestions. This mixed-methods approach enhances the validity and reliability of the findings, contributing to a more robust understanding of the research phenomenon.

4. CONCLUSION

The findings of this study contribute to a deeper understanding of students' experiences with Project-Based Learning (PjBL) in online educational contexts, aligning with the expectations outlined in the Introduction section. Through a comprehensive exploration of students' experiences with Project-Based Learning (PjBL) in online educational contexts, this research has shed light on the benefits and challenges of this instructional approach. The positive perceptions of PjBL's effectiveness, coupled with the identified areas for improvement, offer valuable insights for enhancing the quality and efficacy of online education. The development of research results holds promising prospects for advancing online pedagogy. By addressing the challenges identified in this study, such as time management, communication barriers, and the need for more precise guidelines, educators and policymakers can optimize the implementation of PjBL in online learning environments. Furthermore, leveraging the suggested improvements, such as incorporating interactive tools and multimedia resources, can enhance student engagement and learning outcomes in virtual settings.

For policymakers, teachers, and future researchers alike, it is recommended to prioritize the development of clear guidelines and policies to support the effective integration of Project-Based Learning (PjBL) into online educational environments. Policymakers should allocate resources for professional development initiatives to equip educators with the necessary skills and strategies to facilitate meaningful PjBL experiences. Teachers, in turn, can benefit from collaborative professional learning communities where they can share best practices and troubleshoot challenges. Future research should also focus on longitudinal studies tracking student outcomes over time and comparative analyses across different online platforms to deepen our understanding of PjBL's effectiveness.

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