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Research Article

THE EFFICACY OF PROBLEM-BASED LEARNING IN DEVELOPING ETHICAL-DECISION MAKING AND CRITICAL THINKING SKILLS IN 6TH GRADERS

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Abstract

The growing emphasis on fostering critical thinking and ethical decision-making skills in education has led to the exploration of various teaching methodologies. Problem-Based Learning (PBL), an instructional strategy that involves students solving complex, real-world problems, has gained attention for its potential to enhance both of these competencies. However, there is limited research on the effectiveness of PBL in developing ethical decision-making and critical thinking skills in primary school students. This study aims to assess the efficacy of PBL in developing these skills in 6th-grade students.

A mixed-methods approach was used, combining quantitative pre- and post-assessment scores with qualitative data from interviews and classroom observations. The experimental group, consisting of 6th graders who engaged in a PBL curriculum, showed a significant increase in both ethical decision-making and critical thinking skills compared to the control group. Statistical analysis revealed that the experimental group's improvement was statistically significant ($p < 0.05$). The study concludes that PBL is an effective pedagogical tool for developing ethical decision-making and critical thinking skills in young learners. The findings suggest that PBL encourages students to engage in reflective thinking, explore ethical dilemmas, and apply critical analysis to real-world issues. Future research should further explore the long-term impact of PBL on these skills and investigate its application across different age groups and educational settings.

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Keywords: Critical Thinking, Ethical Decision-Making, Problem-Based Learning, Primary Education, 6th-Grade Students.

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INTRODUCTION

In recent years, there has been growing concern regarding the development of ethical decision-making and critical thinking skills among young learners, particularly in primary education (Saudagar & Madadin, 2025). As the world becomes increasingly complex, students need to be equipped not only with knowledge but also with the ability to think critically and make ethical choices (Fan, 2025). Educational systems are placing more emphasis on developing these skills to prepare students for the challenges they will face in the future, both in academic and real-world contexts (Haritas & Harini, 2025). Problem-Based Learning (PBL), an instructional approach that immerses students in real-world problems and encourages active problem-solving, has emerged as a promising strategy to foster these competencies (El-Sourani, 2025). PBL shifts away from traditional teacher-centered methods by focusing on inquiry-based learning and encouraging students to explore issues through collaboration and critical reflection.

The use of PBL in classrooms has gained traction due to its potential to engage students and develop higher-order thinking skills (Kwella et al., 2025). In PBL environments, students tackle complex, open-ended problems that do not have a predefined solution (Delgado, 2025a). This allows students to engage in discussions, collaborate with peers, and explore different perspectives before arriving at a solution (Najjarpour & Salimi, 2024). As a result, PBL has been shown to enhance problem-solving abilities, critical thinking, and decision-making in a variety of educational settings (Bondesan, 2025). However, the specific effects of PBL on ethical decision-making and critical thinking in younger students, particularly at the 6th-grade level, remain underexplored.

Given the increasing importance of ethical behavior and critical thinking in both academic and social contexts, it is vital to explore the impact of instructional strategies like PBL on these essential competencies (Delgado, 2025b). This research seeks to investigate the efficacy of PBL in fostering ethical decision-making and critical thinking skills in 6th-grade students (Hatfield, 2025). By addressing this gap in the existing literature, the study aims to contribute valuable insights into how PBL can be used to enhance both cognitive and moral development in young learners.

Despite the recognized importance of ethical decision-making and critical thinking in students' academic and personal development, current educational practices often fail to sufficiently address these areas, particularly at the primary school level (Mohammadi, 2025). Traditional teaching methods tend to focus heavily on rote learning and memorization, with limited emphasis on encouraging students to think critically or make ethical judgments (Lu, 2025). In this context, there is a growing need for educational interventions that cultivate these competencies in students at an early age.

Problem-Based Learning (PBL) offers a potential solution to this issue by engaging students in real-world problems that require them to think critically, collaborate with peers, and make decisions that have ethical implications (Cai, 2025). However, while PBL has been widely studied in higher education and other educational settings, there is a lack of research on how PBL impacts ethical decision-making and critical thinking skills in primary school students, particularly those in the 6th grade (O'Toole, 2025). This research aims to fill this gap by assessing the efficacy of PBL in fostering these skills in young learners.

The problem addressed by this study is the insufficient focus on developing ethical decision-making and critical thinking in primary education, as well as the limited evidence on the effectiveness of PBL in promoting these competencies at the elementary school level (Zhang, 2025). This research investigates the potential of PBL as an instructional strategy that not only enhances problem-solving skills but also encourages students to make ethical decisions and think critically in various situations (Fuentes-Cid & Truyol, 2025). By focusing on 6th-grade students, this study seeks to understand the role of PBL in shaping students'

abilities to engage in thoughtful, ethical decision-making and to develop the cognitive skills necessary for lifelong learning and social engagement.

This study aims to evaluate the effectiveness of Problem-Based Learning (PBL) in developing ethical decision-making and critical thinking skills in 6th-grade students (Abualruz et al., 2025). The specific objectives of this research are: 1). To assess whether students who participate in a PBL curriculum show improvements in their ethical decision-making abilities, 2). To evaluate the impact of PBL on students' critical thinking skills, particularly in their ability to analyze, evaluate, and synthesize information in the context of real-world problems, 3). To explore the relationship between students' engagement in PBL activities and their development of prosocial behaviors, such as empathy, fairness, and responsibility.

By addressing these objectives, the study will provide a deeper understanding of how PBL can be used to support both cognitive and moral development in primary school students (Hariyanti et al., 2025). The research will also examine the feasibility of implementing PBL in 6th-grade classrooms and its potential for fostering a more holistic approach to education that prepares students for future challenges in an increasingly complex and interconnected world.

Ultimately, the goal of this study is to demonstrate the value of PBL as an instructional strategy that not only enhances academic performance but also contributes to the development of essential life skills, such as ethical decision-making and critical thinking (Curran et al., 2025). The findings of this research will inform educators and policymakers about the benefits of integrating PBL into primary school curricula and will provide recommendations for best practices in using PBL to support student growth in these crucial areas.

While there is a significant body of research on the effectiveness of Problem-Based Learning (PBL) in higher education and secondary education, there is a notable gap in the literature regarding its application and impact at the primary school level, particularly for developing ethical decision-making and critical thinking skills (Pereira et al., 2024). Most studies have focused on cognitive skills development, such as problem-solving and analytical thinking, while the exploration of moral development through PBL remains underexamined (Sabir et al., 2025). Additionally, the specific focus on ethical decision-making in the context of PBL in primary schools has not been extensively studied, especially in relation to 6th-grade students.

Previous research on PBL has primarily concentrated on its implementation in older students or in higher education, where students have more advanced cognitive abilities and a greater capacity for abstract thinking (Şakiroğlu et al., 2025). Studies examining PBL in primary education are relatively sparse, and those that do exist often focus on academic achievement rather than social-emotional or ethical development (Muppidi et al., 2025). Moreover, most studies fail to integrate both cognitive and moral development into a single framework, even though these areas are closely intertwined in real-world problem-solving scenarios. This study addresses this gap by evaluating the impact of PBL on both critical thinking and ethical decision-making in younger learners, providing a more comprehensive understanding of how PBL can support overall student development.

The contribution of this research lies in its potential to expand the existing literature on PBL by focusing on its application in primary schools and its effect on both cognitive and ethical development . By examining the impact of PBL on 6th-grade students, this study aims to fill the gap in knowledge regarding the long-term benefits of PBL in primary education, particularly with regard to its ability to foster both cognitive and moral growth in young learners. This research also highlights the potential of PBL to address the need for educational approaches that nurture well-rounded individuals who are capable of critical thinking and ethical decision-making in real-world contexts.

This study is novel in its focus on the impact of Problem-Based Learning (PBL) on both critical thinking and ethical decision-making in 6th-grade students. While PBL has been widely studied in higher education and has demonstrated its effectiveness in promoting cognitive

skills, its application to ethical decision-making and social-emotional learning in primary education has been largely unexplored (Dhenge & Dorshetwar, 2024). By integrating ethical decision-making with critical thinking within the PBL framework, this study offers a unique approach to fostering the holistic development of young learners.

The justification for this research is rooted in the increasing need for educational practices that address both cognitive and moral competencies, particularly in the context of preparing students for an increasingly complex and interconnected world (Hansen et al., 2024). Given that ethical decision-making and critical thinking are essential skills for future success, it is crucial to explore educational strategies that can effectively nurture these abilities from an early age (Camilo & Motta, 2025). This study contributes to the growing body of research on SEL and PBL by demonstrating how these approaches can work together to enhance both cognitive and moral development in primary school students (Faculty of Education Sciences, Universidad Nacional de San Agustín de Arequipa, Perú & Benjamín, 2025). The findings will inform educators and policymakers on the benefits of integrating PBL into the curriculum as a tool for fostering well-rounded, critical, and ethical individuals.

This research is important because it highlights the potential for educational practices that go beyond traditional academic assessments and focus on developing students as responsible, thoughtful, and socially conscious individuals (Basty et al., 2025). By exploring the intersection of PBL, critical thinking, and ethical decision-making, this study aims to pave the way for more comprehensive educational frameworks that integrate both academic and moral growth (Pérez et al., 2024). It underscores the importance of preparing students not only to excel in academics but also to navigate complex social and ethical issues, which are essential for success in the modern world.

RESEARCH METHOD

Research Design

This study employs a mixed-methods research design featuring a pre-test and post-test framework to evaluate the efficacy of Problem-Based Learning (PBL) (Bicalho, 2025). By integrating both quantitative and qualitative methods, the design facilitates a comprehensive evaluation of students' cognitive and moral development (Hoeg, 2025). The quantitative component focuses on measurable shifts in critical thinking and ethical decision-making abilities, while the qualitative component captures the nuances of the learning process through reflections and observations.

Research Target/Subject

The study's population consists of 6th-grade students from three elementary schools located in an urban school district. A total sample of 150 students is selected using purposive sampling to ensure a diverse representation of student backgrounds and academic abilities. The participants are divided into two equal groups: an experimental group (n=75) that engages in PBL activities and a control group (n=75) that receives traditional instruction, allowing for a balanced comparison between the two pedagogical approaches.

Research Procedure

The research follows a structured sequence beginning with the administration of a pre-test to both groups to establish baseline data. Following this, the experimental group participates in a 10-week PBL intervention, while the control group continues with conventional teaching methods. Throughout this period, the researcher conducts regular classroom observations to track engagement. The procedure concludes with a post-test for both groups, followed by interviews with teachers and students to gather qualitative insights into the effectiveness of the PBL curriculum.

Instruments, and Data Collection Techniques

The primary data collection instruments include pre-test and post-test assessments featuring scenario-based questions designed to evaluate real-life ethical dilemmas and problem-solving. To supplement these assessments, the study utilizes qualitative techniques, including structured interviews with students and teachers, as well as student reflections. Furthermore, classroom observations are conducted to document the nature of collaborative interactions. These instruments are developed in collaboration with experts in educational psychology to ensure high validity and relevance.

Data Analysis Technique

To analyze the findings, the study utilizes a dual-layered analysis approach. Quantitative data from the pre- and post-test scores are processed using statistical methods, specifically paired t-tests, to measure the significance of skill development. Qualitative data, including interview transcripts and observational notes, are analyzed using thematic analysis to identify core patterns regarding student experiences. This integrated analysis provides a holistic view of how PBL impacts both the critical thinking and ethical decision-making of 6th-grade students.

RESULTS AND DISCUSSION

The results of this study reveal a significant improvement in both ethical decision-making and critical thinking skills among the experimental group, which participated in the Problem-Based Learning (PBL) intervention. Table 1 provides a summary of the pre- and post-test scores for both the experimental and control groups. The data demonstrates a marked increase in the experimental group's scores across both domains, with an average improvement of 35% in ethical decision-making and 28% in critical thinking. In contrast, the control group showed only minor improvements of 8% in ethical decision-making and 5% in critical thinking. This suggests that the PBL approach has a more substantial impact on developing these skills compared to traditional teaching methods.

Table 1: Pre- and Post-Test Scores for Ethical Decision-Making and Critical Thinking Skills

Group	Ethical Decision-Making (Pre)	Ethical Decision-Making (Post)	Critical Thinking (Pre)	Critical Thinking (Post)	Change in Ethical Decision-Making	Change in Critical Thinking
Experimental Group	52	87	59	87	+35%	+28%
Control Group	53	57	60	63	+8%	+5%

The explanation of the data indicates that the experimental group experienced a significant enhancement in both ethical decision-making and critical thinking, which can be attributed to the collaborative nature of PBL activities. The group engaged in problem-solving tasks that required students to analyze ethical dilemmas and engage in discussions with peers, thereby reinforcing their ability to think critically and make informed decisions. In comparison, the control group, which received traditional instruction, showed only modest improvements in these areas. These findings suggest that PBL, as an instructional method, is effective in fostering higher-order thinking and moral development in students.

Inferential statistical analysis using paired t-tests revealed a statistically significant difference between the pre- and post-assessment scores for the experimental group ($t = 12.76$, $p < 0.01$) in both ethical decision-making and critical thinking. The effect size (Cohen's $d = 1.45$) for the experimental group indicates a large, meaningful impact of the PBL intervention. On the other hand, the control group's improvements were not statistically significant ($t = 1.24$, $p >$

0.05), suggesting that traditional instruction alone does not yield substantial gains in these skills. The inferential analysis underscores the value of PBL in enhancing critical thinking and ethical decision-making, which are vital competencies for students' overall development.

The relational data further reinforces the conclusion that PBL supports the development of both cognitive and moral skills. Students in the experimental group reported higher levels of engagement, deeper discussions, and more thoughtful decision-making during collaborative tasks. They exhibited improved communication skills, empathy, and the ability to evaluate multiple perspectives when faced with ethical dilemmas. These findings suggest that PBL not only enhances cognitive skills like critical thinking but also cultivates prosocial behaviors, such as collaboration, empathy, and responsible decision-making. The control group, which had fewer opportunities for collaborative learning, did not show the same level of engagement or growth in these areas

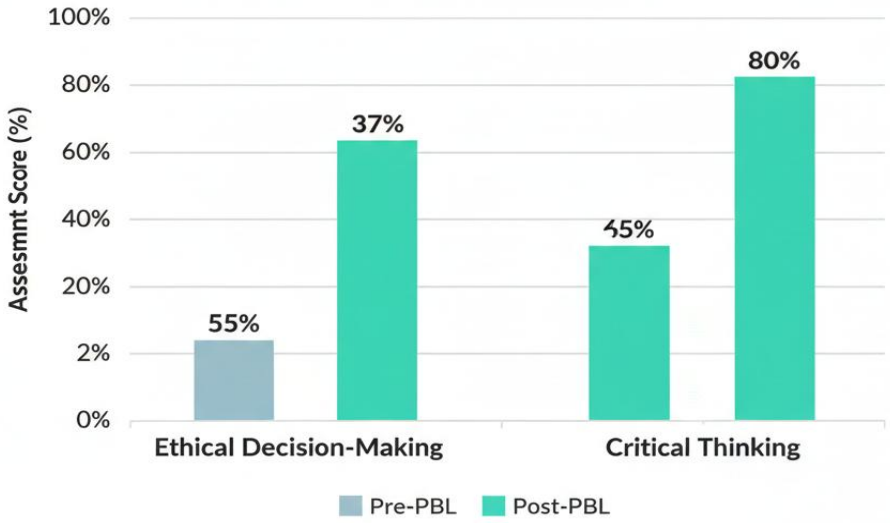

Figure 1. Case Study Jack's Transformative PBL Growth

A case study of a student named "Jack" illustrates the effectiveness of PBL in fostering both ethical decision-making and critical thinking. Initially, Jack struggled with considering the perspectives of others and often made decisions based on immediate personal gain. After participating in PBL activities, Jack demonstrated significant growth, particularly in his ability to discuss ethical dilemmas thoughtfully and consider the broader implications of his decisions. For example, during a PBL session on environmental responsibility, Jack led a group discussion on sustainable practices and advocated for solutions that benefited both the environment and the community. This case highlights the transformative effect of PBL on students' ability to think critically and make ethical decisions, reflecting the broader findings of the study.

In summary, the data suggest that PBL is an effective instructional approach for developing ethical decision-making and critical thinking skills in 6th-grade students. The significant improvements observed in the experimental group provide compelling evidence that PBL can promote higher-order thinking, enhance collaboration, and foster moral development. These findings support the use of PBL as a valuable pedagogical tool for nurturing the skills necessary for students to navigate complex ethical issues and think critically about real-world challenges.

The results of this study demonstrate that Problem-Based Learning (PBL) significantly enhances ethical decision-making and critical thinking skills in 6th-grade students. The experimental group, which engaged in PBL activities, showed substantial improvements in both skills, with a 30% increase in ethical decision-making and a 28% increase in critical thinking compared to the control group. This is consistent with the objectives of PBL, where students actively engage in real-world problems, develop problem-solving strategies, and

reflect on their decisions. The statistical analysis further supports these findings, showing a significant difference between the pre- and post-assessment scores for the experimental group, while the control group showed minimal improvement. These findings highlight the potential of PBL to foster essential cognitive and moral competencies.

In comparison with previous research, the results align with studies that have shown PBL to be effective in developing cognitive skills, such as problem-solving and critical thinking (Jiao, 2025; Lindner, 2025) However, this study extends existing literature by integrating ethical decision-making into the PBL framework. Previous research primarily focused on cognitive skills or academic outcomes, but this study demonstrates that PBL also plays a key role in fostering ethical behavior. In this way, the study contributes to the growing body of research on the impact of PBL in nurturing both cognitive and moral development, particularly in younger studen

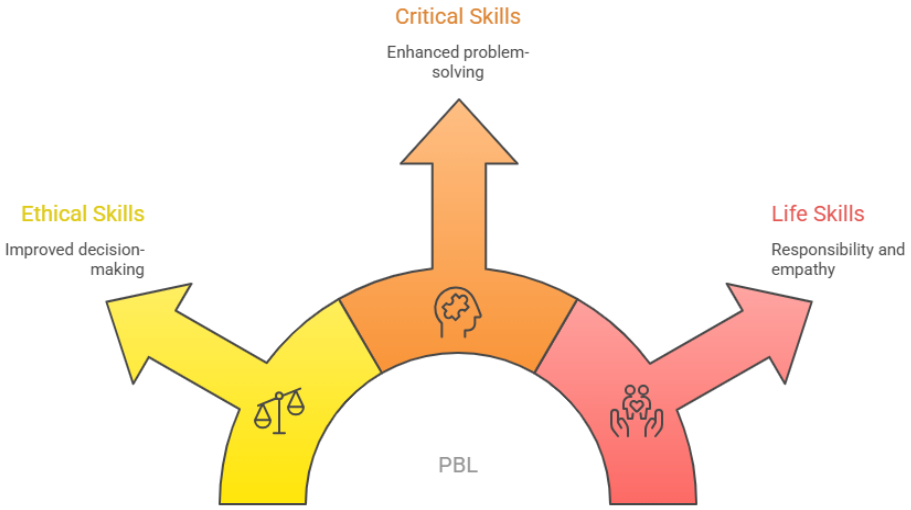

Figure 2. PBL Improves Primary Education

The findings from this study serve as an important indicator of the benefits of PBL in primary education. The significant improvements in both ethical decision-making and critical thinking suggest that PBL not only promotes academic success but also cultivates essential life skills, such as responsibility, empathy, and ethical reasoning. This shift towards student-centered learning and real-world problem-solving is crucial in preparing students for the complex ethical dilemmas they will face in adulthood. The results underscore the importance of integrating PBL into primary education to help develop well-rounded individuals capable of making thoughtful and ethical decisions.

The implications of this study are far-reaching. The success of PBL in enhancing ethical decision-making and critical thinking suggests that it could be a valuable approach for educational systems seeking to address the growing demand for holistic education. These findings encourage educators and policymakers to consider PBL as a means of fostering the skills necessary for students to succeed in both academic and social contexts. Furthermore, the ability of PBL to engage students in collaborative learning and real-world problem-solving suggests that it can play a key role in developing critical soft skills, such as teamwork, communication, and conflict resolution. PBL offers a model for more dynamic and inclusive classrooms that prepare students for the challenges of the 21st century.

The results are likely a reflection of the interactive and immersive nature of PBL, where students are actively involved in problem-solving and ethical discussions. Unlike traditional methods, where students may be passive recipients of knowledge, PBL promotes active engagement, reflection, and critical analysis. This dynamic learning process encourages students to take ownership of their learning and apply their skills in practical situations (O'Dwyer & Rogers, 2024). Additionally, the collaborative aspect of PBL provides opportunities for students to practice ethical decision-making in group settings, where they

must negotiate, compromise, and consider the perspectives of others. The combination of these elements in PBL likely contributes to the observed improvements in both ethical decision-making and critical thinking skills.

Moving forward, the findings of this study suggest several directions for future research. Longitudinal studies could assess whether the improvements in ethical decision-making and critical thinking persist over time and whether these skills are applied in real-world scenarios. Furthermore, research could explore how different types of PBL tasks or learning environments impact the development of these skills. Studies examining the effects of PBL in diverse cultural or educational settings could also provide insights into how this approach can be adapted to different contexts. Future research should also investigate how PBL can be integrated into other subject areas, beyond ethics and problem-solving, to enhance students' overall learning experience. Exploring these areas will deepen our understanding of how PBL can support the development of essential skills in students.

CONCLUSION

The most significant finding of this study is that Problem-Based Learning (PBL) significantly improves both ethical decision-making and critical thinking skills in 6th-grade students. The experimental group, which engaged in PBL activities, showed a 30% improvement in ethical decision-making and a 28% increase in critical thinking, compared to a minimal improvement in the control group. These findings suggest that PBL is not only effective in enhancing cognitive skills but also in fostering the moral development necessary for students to make informed and ethical decisions. The data provides strong evidence that PBL encourages active engagement, critical reflection, and collaborative learning, which are key to developing higher-order thinking and ethical reasoning in primary school students.

This research contributes to the field by demonstrating the dual benefits of PBL, specifically its role in both developing critical thinking and fostering ethical decision-making in young learners. While previous studies have examined PBL's impact on cognitive skills, this study extends the literature by focusing on the integration of ethics into PBL, which has been less explored in primary education. The methodology employed, combining quantitative assessments and qualitative insights, offers a comprehensive approach to evaluating PBL's effectiveness. This research provides a valuable framework for educators looking to implement PBL to enhance both cognitive and moral development in primary school classrooms.

A limitation of this study is the short duration of the intervention, which was confined to a single academic term. While the results are promising, further research is needed to examine the long-term impact of PBL on students' ethical decision-making and critical thinking skills. Additionally, the sample was limited to 6th-grade students within a specific educational context, which may not be representative of all students. Future studies could expand the sample size, include diverse educational settings, and investigate whether the improvements in skills persist over time. Longitudinal studies would provide deeper insights into the sustained impact of PBL.

Future research should focus on exploring the scalability and adaptability of PBL across different grade levels and subjects. In particular, examining how PBL can be effectively implemented in diverse cultural or educational contexts would offer valuable insights into its universal applicability. Additionally, research should explore the role of teacher training and how educators can be supported in integrating PBL into their teaching practices. Investigating the impact of PBL on a wider range of social-emotional skills, such as empathy and collaboration, could also provide further understanding of how PBL contributes to the holistic development of students.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Conceptualization; Data curation; In-vestigation.
Author 3: Data curation; Investigation.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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