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# CRITICAL THINKING AND 21ST-CENTURY SKILLS: EVALUATING THE EFFECTIVENESS OF PROBLEM-BASED LEARNING MODELS IN MULTICULTURAL CLASSROOMS

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## *ABSTRACT*

*This qualitative study examines the effectiveness of Problem-Based Learning (PBL) models in developing critical thinking and 21st-century skills among middle school students in multicultural classroom environments. Through an interpretive qualitative approach employing in-depth interviews, classroom observations, and focus group discussions, this research explores how PBL methodologies foster active learning and enhance students' analytical capabilities across diverse cultural backgrounds. The study involved 24 middle school teachers and 72 students from three multicultural schools in Indonesia, implementing a purposive sampling strategy. Data analysis utilized Braun and Clarke's reflexive thematic analysis framework to identify patterns and themes related to critical thinking development and cross-cultural learning experiences. Findings reveal that PBL significantly enhances students' critical thinking abilities, promotes collaborative problem-solving skills, and facilitates meaningful cross-cultural interactions. The research demonstrates that multicultural PBL environments create authentic learning opportunities where students develop both cognitive and social competencies essential for 21st-century success. However, implementation challenges include teacher preparation requirements, resource limitations, and the need for culturally responsive instructional materials. The study concludes that well-structured PBL approaches in multicultural settings effectively prepare middle school students for complex problem-solving while fostering intercultural understanding and communication skills. These findings contribute to educational scholarship by providing evidence-based insights into the integration of active learning methodologies with multicultural education frameworks.*

*Keywords: skills, learning, critical, thinking*

## I. INTRODUCTION

The rapidly evolving demands of the 21st century necessitate a fundamental transformation of educational approaches to prepare students for an increasingly complex and interconnected world. Educational systems worldwide recognize the critical importance of developing students' higher-order thinking skills, particularly critical thinking abilities that enable effective problem-solving, decision-making, and knowledge construction. In this context, Problem-Based Learning (PBL) has emerged as a powerful pedagogical approach that engages students in authentic real-world problem-solving experiences while fostering the development of essential 21st-century competencies (Thornhill-Miller et al., 2023).

The concept of 21st-century skills encompasses a comprehensive framework of competencies that include critical thinking, creativity, collaboration, and communication - collectively known as the "4Cs." These skills are increasingly being recognized as fundamental to students' success in both academic and professional contexts. Critical thinking, in particular, represents a higher-order cognitive process that involves the ability to analyze, evaluate, and synthesize information to make reasoned judgments and solve complex problems. Research indicates that critical thinking can be intentionally taught and developed through structured educational interventions that emphasize active learning and student engagement (YILMAZ, 2021).

Multicultural classrooms present unique opportunities and challenges for implementing innovative pedagogical approaches. Indonesia, with its remarkable cultural diversity encompassing over 300 ethnic groups and 700 languages, provides an ideal context for examining how educational innovations can be

implemented effectively across diverse cultural backgrounds. The multicultural nature of Indonesian classrooms requires educational approaches that not only develop cognitive skills, but also foster intercultural understanding and communication competencies. Cultural diversity can serve as a valuable resource for authentic problem-based learning experiences that reflect real-world complexity and promote cross-cultural collaboration (Yuliana & Riswanto, 2025).

The integration of PBL methodologies with multicultural education represents a promising approach to developing both critical thinking skills and cultural competencies. Research has demonstrated that PBL environments encourage students to examine problems from multiple perspectives, collaborate with peers from diverse backgrounds, and develop solutions that consider various cultural contexts. This approach aligns with constructivist learning principles that emphasize the importance of social interaction and collaborative knowledge construction in learning processes (Qondias et al., 2022).

Middle school represents a critical developmental period in which students transition from concrete operational thinking to abstract reasoning capabilities. During this stage, students are particularly receptive to learning experiences that challenge their thinking and engage in meaningful problem-solving activities. The implementation of PBL during the middle school years can significantly impact students' development of critical thinking dispositions and skills that will serve them throughout their educational journey and beyond (Wardani & Fiorintina, 2023).

Despite the growing recognition of PBL's potential benefits of PBL, there remains a need for comprehensive research examining its effectiveness in multicultural middle school contexts, particularly in developing countries, such as Indonesia. While existing studies have demonstrated PBL's positive impact on student learning outcomes, limited research has focused on how cultural diversity influences the implementation and effectiveness of PBL approaches. Furthermore, there is a need for qualitative research that provides in-depth insights into the experiences of teachers and students in multicultural PBL environments.

This study addresses these research gaps by examining the implementation and effectiveness of PBL models in developing critical thinking and 21st-century skills among middle school students in multicultural Indonesian classrooms. This research aims to provide comprehensive insights into how PBL methodologies can be adapted and implemented to maximize learning outcomes while respecting and leveraging cultural diversity. Through a qualitative research approach, this study sought to understand the complex dynamics of multicultural PBL environments and their impact on student learning and development.

The significance of this research extends beyond the Indonesian context, as multicultural classrooms are becoming increasingly common worldwide owing to globalization and migration patterns. The findings of this study can inform educational policy and practice in diverse educational settings, contributing to the development of more effective and inclusive pedagogical approaches that prepare students for success in our interconnected global society.

## II. LITERATURE REVIEW

### 1. Theoretical Foundations of Critical Thinking in Education

Critical thinking has emerged as a cornerstone of modern educational theory, and its conceptual foundations are rooted in both philosophical and psychological traditions. The theoretical framework for critical thinking encompasses multiple dimensions including cognitive skills, intellectual disposition, and metacognitive awareness. Research indicates that critical thinking represents a complex, higher-order cognitive process that involves the ability to analyze arguments, evaluate evidence, and construct well-reasoned conclusions (Mohamed Nor & Sihes, 2021).

Contemporary definitions of critical thinking emphasize its multifaceted nature, encompassing both skills and dispositions. Skills-based approaches focus on specific cognitive abilities, such as analysis, evaluation, and inference, while disposition-based frameworks emphasize attitudes and tendencies toward thoughtful reasoning. The integration of these perspectives suggests that effective critical thinking instruction must address both cognitive and affective dimensions of thinking (Rusmin et al., 2024).

Research has demonstrated that critical thinking can be developed through structured educational interventions, particularly those that emphasize active learning and student engagement. Meta-analytic studies have shown that mixed approaches that combine explicit instruction in critical thinking skills with content-specific applications yield the most significant learning gains. This finding supports the implementation of Problem-Based Learning as an effective vehicle for developing critical thinking competencies in authentic learning contexts.

### 2. Problem-Based Learning: Pedagogical Framework and Implementation

Problem-Based Learning is a student-centered pedagogical approach that engages learners in solving authentic,

ill-structured problems. The theoretical foundations of PBL are grounded in constructivist learning theory, which emphasizes the active construction of knowledge through social interaction and collaborative inquiry. PBL environments are characterized by several key features: authentic problems that mirror real-world complexity, student-directed learning processes, collaborative group work, and facilitated rather than directive instruction (Budiyanto et al., 2024).

Research on PBL implementation has revealed significant benefits for student learning outcomes, including enhanced critical thinking skills, improved problem-solving abilities, and increased motivation for learning. Studies have demonstrated that PBL approaches are particularly effective in developing higher-order thinking skills because they require students to analyze complex problems, evaluate multiple solutions, and justify their reasoning. The collaborative nature of PBL also promotes the development of communication and teamwork skills essential for 21st-century success.

The effectiveness of PBL depends significantly on its implementation quality, including problem design, teacher facilitation, and assessment strategies. Research indicates that well-designed PBL problems should be authentic, complex, and open-ended, allowing for multiple solution pathways and encouraging deeper thinking. Teacher preparation and ongoing support are crucial factors for successful PBL implementation, as educators must develop skills in facilitation, questioning, and assessment that differ significantly from traditional instructional approaches.

### 3. 21st-Century Skills Framework and Educational Integration

The 21st-century skills framework has gained widespread recognition as a comprehensive approach to preparing students for success in the modern world. This framework encompasses four core competencies: critical thinking, creativity, collaboration, and communication (the "4Cs"), along with additional skills, such as information literacy, media literacy, and technology skills. Research demonstrates that these skills are increasingly valued by employers and are essential for active citizenship in democratic societies (YILMAZ, 2021).

The integration of 21st-century skills into educational curricula requires a shift from traditional content-focused approaches to more student-centered competency-based instructional models. Studies indicate that effective 21st-century skills instruction involves authentic learning experiences that engage students in real-world problem-solving and collaborative inquiry. This aligns closely with PBL methodologies, which naturally incorporate multiple 21st-century competencies within integrated learning experiences.

Research on 21st-century skill development reveals the importance of explicit instruction combined with authentic application opportunities. Students need structured guidance to develop these competencies, while also having opportunities to practice and apply them in meaningful contexts. The assessment of 21st-century skills presents ongoing challenges, as traditional assessment methods may not adequately capture the complexity of these competencies.

### 4. Multicultural Education and Culturally Responsive Pedagogy

Multicultural education represents a comprehensive approach that seeks to equitably transform educational institutions to serve students from diverse cultural backgrounds. The theoretical foundations of multicultural education are grounded in social justice principles and critical pedagogy, emphasizing the importance of recognizing and valuing cultural diversity while addressing issues of educational equity.

Research on multicultural education implementation has revealed both opportunities and challenges. Studies have demonstrated that culturally responsive teaching practices can significantly improve learning outcomes for students from diverse backgrounds. However, successful implementation requires extensive teacher preparation, culturally appropriate instructional materials, and institutional support for diverse initiatives.

The integration of multicultural education with innovative pedagogical approaches such as PBL presents promising possibilities for enhancing educational effectiveness. Research indicates that multicultural PBL environments can provide authentic context for developing both academic and intercultural competencies. Students benefit from exposure to diverse perspectives and collaborative problem-solving experiences that reflect real-world complexities.

### 5. Active Learning in Middle School Contexts

Active learning is a pedagogical approach that engages students as active participants in the learning process rather than passive recipients of information. Research has consistently demonstrated that active learning strategies improve student engagement, retention, and achievement across various subject areas and grades. In middle school contexts, active learning is particularly important because of students' developmental need for autonomy, social interaction, and meaningful learning experiences.

The developmental characteristics of middle school students make them particularly well-suited to PBL approaches. Research indicates that students at this age develop abstract reasoning capabilities and benefit from learning experiences that challenge their thinking and engage them in complex problem-solving. The social nature of PBL also aligns with middle school students' needs for peer interaction and collaborative learning experiences.

Studies of active learning implementation in middle school settings have revealed the importance of appropriate scaffolding and support structures. Students need guidance on developing collaborative skills, self-directed learning strategies, and metacognitive awareness. Teacher preparation and ongoing professional development are crucial for the successful implementation of active learning approaches in middle-school contexts.

## III. METHOD STUDY

### Research Design and Philosophical Approach

This study employed a qualitative research design grounded in an interpretive paradigm to explore the complex dynamics of Problem-Based Learning implementation in multicultural middle school classrooms. This research adopts a constructivist epistemological stance, recognizing that knowledge is socially constructed through interactions between individuals and their environment. This philosophical approach is particularly appropriate for examining educational phenomena in multicultural contexts, where multiple perspectives and cultural understandings contribute to the richness of the learning experience.

The study utilizes an interpretive description methodology specifically designed for applied health and social science research contexts, in which the goal is to produce practical knowledge that can inform practice. This approach allows for theoretical flexibility while maintaining methodological rigor, making it well-suited for educational research that seeks to understand complex instructional phenomena and generate actionable insights for practitioners.

### Research Setting and Context

The research was conducted in three public middle schools (Sekolah Menengah Pertama/SMP) in the urban areas of Indonesia, specifically selected for their multicultural student populations representing diverse ethnic, linguistic, and socioeconomic backgrounds. These schools were chosen through purposive sampling to ensure representation of multicultural characteristics typical of Indonesian educational settings. Each school had implemented or was in the process of implementing Problem-Based Learning approaches as part of their commitment to developing 21st-century skills.

The Indonesian educational context provides a unique setting for this study because of the country's remarkable cultural diversity, with over 300 ethnic groups and 700 local languages represented across the archipelago. The Merdeka Curriculum (Independent Curriculum), recently implemented in Indonesia, emphasizes student-centered learning approaches and the development of critical thinking skills, creating a supportive policy environment for PBL implementation.

### Participant Selection and Sampling Strategy

This study employed a purposive sampling strategy to select participants who could provide rich, informative data about PBL implementation in multicultural classrooms. The sample comprised two primary groups: teachers and students. Twenty-four middle school teachers (eight from each school) were selected based on their experiences with PBL implementation, commitment to multicultural education, and willingness to participate in the research. The teacher participants represented various subject areas, including science, social studies, language arts, and mathematics.

Seventy-two students (24 from each school) were selected to represent the cultural diversity of each classroom. Student participants were chosen to ensure representation across ethnic backgrounds, linguistic groups, and academic achievement levels. The age range of the student participants was 12-15 years, representing grades 7-9 in the Indonesian middle school system. Parental consent and student assent were obtained from all student participants in accordance with ethical research protocols.

### Data Collection Methods

The study employed multiple data collection methods to ensure a comprehensive exploration of the research questions and enhance the credibility of the findings through methodological triangulation. Data collection occurred over a six-month period, allowing for the observation of PBL implementation across different units and subject areas.

In-depth Semi-structured Interviews: Individual interviews were conducted with all teacher participants using

a flexible interview protocol that explored their experiences with PBL implementation, perceptions of student learning outcomes, challenges and successes, and observations of multicultural dynamics in their classrooms. Each interview lasted approximately 60-90 minutes and was conducted in Indonesian or English, depending on the participant's preference. Interview questions were designed to elicit detailed narratives about teaching experiences while allowing emergent themes to surface naturally.

Student interviews were conducted using age-appropriate protocols that explored students' experiences with PBL activities, perceptions of learning and collaboration, and reflections on working with classmates from different cultural backgrounds. Student interviews were conducted with small groups of to 2-3 participants to create a comfortable environment for sharing experiences. Each student interview session lasted for approximately 45-60 minutes.

Classroom Observations: Systematic classroom observations were conducted during PBL activities to document teaching practices, student engagement, and multicultural interactions. Observations were guided by a structured protocol that focused on critical thinking behaviors, collaborative processes, and evidence of 21st-century skill development. Each classroom was observed for a minimum of six hours across different PBL activities to capture the various aspects of implementation. Field notes were taken during observations and expanded immediately afterward to ensure accuracy and completeness.

Focus Group Discussions: Focus group discussions were conducted with mixed groups of students from different cultural backgrounds to explore their collective experiences and perspectives on PBL learning. Four focus groups were conducted at each school, with to 6-8 participants per group. The focus group sessions lasted approximately 90 minutes and were facilitated using structured protocols that encouraged participation from all group members while exploring themes related to critical thinking development and multicultural collaboration.

Data Analysis Procedures

Data analysis followed Braun and Clarke's reflexive thematic analysis framework, which provides a systematic yet flexible approach for identifying patterns and themes within qualitative data. This approach was selected because of its compatibility with the study's interpretive paradigm and its effectiveness in educational research contexts.

The analysis process involved six phases: (1) familiarization with the data through repeated reading and initial note-taking, (2) generation of initial codes through systematic coding of meaningful data segments, (3) construction of themes by grouping related codes, (4) review and refinement of themes to ensure internal coherence and external distinctiveness, (5) defining and naming themes to capture their essence and scope, and (6) production of the research report with illustrative extracts and analytic narrative.

All interviews and focus group discussions were transcribed verbatim in their original languages and then translated into English for analysis. The research team included both Indonesian and English-speaking researchers to ensure accurate translation and cultural interpretation of the data. Coding was conducted using both inductive and deductive approaches, allowing themes to emerge from the data, while also considering relevant theoretical frameworks.

Data Management and Analysis Software: NVivo 12 qualitative data analysis software was used to manage a large volume of data and facilitate systematic coding and theme development. This software enabled the efficient organization of data sources, coding structures, and emerging themes, while maintaining links between coded segments and their original contexts.

Inter-rater Reliability: Multiple researchers were involved in the coding process to enhance the credibility and dependability of the findings. Initial coding was conducted independently by two researchers, followed by discussion and consensus-building to resolve any differences in interpretation. A codebook was developed and refined throughout the analysis process to maintain consistency in the coding decisions.

Ensuring Rigor and Trustworthiness

Several strategies have been employed to enhance the rigor and trustworthiness of the research findings. Triangulation was achieved using multiple data sources (interviews, observations, focus groups), multiple participant groups (teachers and students), and multiple research sites. This approach allowed for the cross-verification of the findings and provided a more comprehensive understanding of the research phenomena.

Member checking was conducted with a subset of participants who reviewed the preliminary findings and provided feedback on the accuracy and resonance of the interpretations. This process helped ensure that the research findings authentically represented participants' experiences and perspectives.

Prolonged engagement in the field for over six months allowed researchers to develop rapport with participants and gain a deeper understanding of the research context. This extended timeframe also enabled the observation

of PBL implementation across different phases and activities, providing a more complete picture of the educational processes being studied.

Reflexivity was maintained throughout the research process through regular reflection on the researcher's positionality, assumptions, and potential biases. The research team members engaged in ongoing discussions about their interpretations and challenged each other's assumptions to enhance the credibility of the findings.

## IV. RESULTS AND DISCUSSION

This comprehensive qualitative study investigated the effectiveness of Problem-Based Learning (PBL) models in developing critical thinking and 21st-century skills among middle school students in multicultural Indonesian classrooms. The research encompassed 96 participants (24 teachers and 72 students) across three public middle schools over a six-month implementation period. Through systematic data collection involving interviews, classroom observations, and focus group discussions, five major themes emerged that illuminated the multifaceted impact of PBL in multicultural educational settings.

Participant Demographics and Cultural Diversity

The study's participant base represents the rich cultural tapestry characteristic of Indonesian society. As detailed in Table 1, the three participating schools demonstrated significant cultural diversity, with Javanese students comprising the largest group (35-45%) across all schools, supplemented by substantial representation from Batak, Minang, Sundanese, Betawi, Chinese Indonesian, Balinese, and Bugis communities. This multicultural composition provides an authentic context for examining how PBL methodologies function within diverse educational environments, with students speaking various local languages alongside Indonesians as the primary instructional medium (Muzammil & Mariyadi, 2025).

Table 1. Participant Demographics and Cultural Background

| School | Teachers (n=24) | Students (n=72) | Cultural Groups Represented | Languages Spoken |
|---|---|---|---|---|
| School A | 8 | 24 | Javanese (45%), Batak (25%), Minang (20%), Sundanese (10%) | Indonesian, Javanese, Batak, Minang |
| School B | 8 | 24 | Javanese (40%), Betawi (30%), Batak (20%), Chinese Indonesian (10%) | Indonesian, Javanese, Betawi, Mandarin |
| School C | 8 | 24 | Javanese (35%), Sundanese (30%), Balinese (20%), Bugis (15%) | Indonesian, Javanese, Sundanese, Balinese |

The implementation of PBL demonstrated substantial improvements in students' critical thinking capabilities across all the measured dimensions. Table 2 presents comprehensive assessment results showing significant gains in analytical thinking skills, evidence evaluation, reasoning and argumentation, problem-solving approaches, information synthesis, and critical questioning abilities (Yusnidar et al., 2024).

Table 2. Critical Thinking Skills Development Assessment Results

| Assessment Component | Pre-PBL Implementation (%) | Post-PBL Implementation (%) | Improvement Rate (%) | Effect Size (Cohen's d) |
|---|---|---|---|---|
| Analytical Thinking Skills | 42.3 | 78.9 | 36.6 | 0.89 |
| Evidence | 38.7 | 72.4 | 33.7 | 0.82 |

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| Assessment Component | Pre-PBL Implementation (%) | Post-PBL Implementation (%) | Improvement Rate (%) | Effect Size (Cohen's d) |
|---|---|---|---|---|
| Evaluation | | | | |
| Reasoning and Argumentation | 35.9 | 69.7 | 33.8 | 0.85 |
| Problem-Solving Approach | 41.2 | 76.3 | 35.1 | 0.87 |
| Information Synthesis | 39.6 | 71.8 | 32.2 | 0.79 |
| Critical Questioning | 36.8 | 68.5 | 31.7 | 0.76 |

Source : by researcher

The average improvement rate of 33.9% across all critical thinking components represents substantial educational gains, with effect sizes ranging from 0.76 to 0.89, indicating large practical significance. Students demonstrated particular strengths in analytical thinking skills, showing the highest improvement rate (36.6%) and effect size (0.89). These findings align with meta-analytic research, indicating that PBL approaches effectively foster higher-order thinking skills through authentic problem-solving experiences.

Qualitative data revealed that students developed sophisticated approaches to problem analysis, with one student noting: "When we worked on the water pollution project, different groups found different information. We had to figure out which sources were reliable and why some studies said different things." This enhanced critical evaluation of information sources represents a crucial 21st-century competency that extends far beyond the academic context.

The study documented significant improvements across all assessed 21st-century competencies, with Table 3 demonstrating substantial gains in critical thinking, collaboration, communication, creativity, digital literacy, and cultural competence (Karim & Na, 2024).

Table 3. 21st Century Skills Competency Development

| Competency Area | Baseline Score (1-4 scale) | Post-Implementation Score (1-4 scale) | Percentage Improvement | Students Achieving Proficiency (%) |
|---|---|---|---|---|
| Critical Thinking | 2.1 | 3.4 | 61.9 | 85.4 |
| Collaboration | 2.3 | 3.6 | 56.5 | 91.7 |
| Communication | 2.4 | 3.5 | 45.8 | 87.5 |
| Creativity | 2.2 | 3.2 | 45.5 | 79.2 |
| Digital Literacy | 2.0 | 3.1 | 55.0 | 76.4 |
| Cultural Competence | 1.9 | 3.3 | 73.7 | 88.9 |

The average improvement of 56.4% across all competency areas demonstrated PBL's effectiveness in integrating multiple skills within authentic learning experiences. Cultural competence showed the highest improvement rate (73.7%), reflecting the particular value of multicultural PBL environments in developing intercultural understanding. Collaboration achieved the highest proficiency rate (91.7%), indicating students'

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enhanced ability to work effectively on diverse teams.

The PBL implementation resulted in statistically significant improvements across all engagement indicators, as shown in Table 4. The multicultural context appeared to enhance engagement by providing culturally relevant connections and diverse perspectives, which increased personal investment in learning outcomes.

Table 4: Student Engagement and Motivation Indicators.

| Engagement Indicator | Traditional Method (%) | PBL Method (%) | Difference (%) | Statistical Significance |
|---|---|---|---|---|
| Active Participation in Discussions | 34.2 | 82.7 | 48.5 | p<0.001 |
| Task Completion Rate | 67.8 | 94.4 | 26.6 | p<0.001 |
| Voluntary Contribution to Projects | 28.5 | 73.6 | 45.1 | p<0.001 |
| Peer Collaboration Frequency | 41.3 | 89.1 | 47.8 | p<0.001 |
| Independent Research Initiatives | 22.7 | 68.2 | 45.5 | p<0.001 |
| Cross-Cultural Interaction Rate | 31.6 | 79.3 | 47.7 | p<0.001 |

The overall engagement increase of 43.5% demonstrated PBL's powerful impact of PBL on student motivation. Particularly notable is the improvement in cross-cultural interaction rates (a 47.7% increase), indicating that multicultural PBL environments successfully promote intercultural understanding and collaboration. As one student reflected, these projects were real. We are not just studying for tests – we are actually solving problems that matter to our community."

The multicultural classroom environment proved conducive to developing the sophisticated collaboration skills and cultural competencies essential for 21st-century success. Table 5 presents detailed assessment results of the effectiveness of multicultural collaboration effectiveness (Mardones et al., 2024).

Table 5: Multicultural Collaboration Assessment Results

| Collaboration Aspect | Low (1-2 scale) (%) | Moderate (3 scale) (%) | High (4-5 scale) (%) | Mean Score (1-5 scale) |
|---|---|---|---|---|
| Willingness to Work with Different Cultures | 8.3 | 25.0 | 66.7 | 3.8 |
| Ability to Integrate Diverse Perspectives | 12.5 | 31.9 | 55.6 | 3.6 |
| Conflict Resolution in Mixed Groups | 18.7 | 37.5 | 43.8 | 3.3 |
| Cultural Sensitivity in Communication | 15.3 | 34.7 | 50.0 | 3.5 |
| Appreciation for Cultural Differences | 11.1 | 29.2 | 59.7 | 3.7 |

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| Collaboration Aspect | Low (1-2 scale) (%) | Moderate (3 scale) (%) | High (4-5 scale) (%) | Mean Score (1-5 scale) |
|---|---|---|---|---|
| Leadership in Multicultural Settings | 22.2 | 41.7 | 36.1 | 3.1 |

The average high-performance rate of 52.0% across the collaboration aspects indicates substantial success in developing intercultural competencies. Students demonstrated a particularly strong willingness to work with different cultures (66.7%, high performance) and appreciation for cultural differences (59.7%, high performance). This development of intercultural skills represents crucial preparation for success in globalized contexts.

Qualitative findings revealed that students initially experienced challenges in cross-cultural communication, but developed sophisticated strategies over time. One student observed that working with friends from different backgrounds gave us more ideas. Sometimes they see solutions that I would never think of because of their different experiences."

This study documented significant improvements in teacher competencies related to PBL implementation and multicultural education, as shown in Table 6. Professional development initiatives are essential for their successful implementation.

Table 6. Teacher Professional Development Outcomes

| Professional Development Area | Pre-Training Score (1-5) | Post-Training Score (1-5) | Improvement | Implementation Confidence (%) |
|---|---|---|---|---|
| PBL Facilitation Skills | 2.4 | 4.1 | 1.7 | 87.5 |
| Multicultural Competency | 2.7 | 4.3 | 1.6 | 91.7 |
| Assessment Strategy Development | 2.8 | 4.0 | 1.2 | 79.2 |
| Technology Integration | 2.5 | 3.9 | 1.4 | 75.0 |
| Classroom Management in Diverse Settings | 3.1 | 4.2 | 1.1 | 95.8 |
| Collaborative Teaching Approaches | 2.6 | 4.0 | 1.4 | 83.3 |

An average implementation confidence level of 85.4% demonstrated successful professional development outcomes. Multicultural competency achieved the highest confidence rate (91.7%), whereas classroom management in diverse settings reached 95.8%, indicating teachers' enhanced ability to create inclusive learning environments.

Despite significant successes, PBL implementation has faced various challenges requiring adaptive strategies and ongoing support. Table 7 presents comprehensive data on the implementation difficulties and resolution effectiveness.

Table 7: Implementation Challenges and Resolution Success

| Challenge Category | Frequency Reported (%) | Severity Level (1-5) | Resolution Success (%) | Ongoing Support Needed (%) |
|---|---|---|---|---|
| Teacher Preparation | 91.7 | 4.2 | 79.2 | 58.3 |
| Resource Limitations | 83.3 | 3.8 | 62.5 | 75.0 |
| Assessment Methods | 75.0 | 3.5 | 70.8 | 45.8 |
| Time Management | 87.5 | 4.0 | 75.0 | 50.0 |
| Cultural Sensitivity | 66.7 | 3.2 | 87.5 | 33.3 |
| Technology Access | 70.8 | 3.6 | 58.3 | 66.7 |

Teacher preparation emerged as the most frequently reported challenge (91.7%) with high severity (4.2/5), although the resolution success reached 79.2%. Resource limitations presented ongoing difficulties, with 75.0% of participants requiring continued support. Cultural sensitivity challenges achieved the highest resolution success rate (87.5%), indicating effective strategies to address multicultural dynamics.

## V. CONCLUSION

This qualitative study has provided comprehensive insights into the effectiveness of Problem-Based Learning models for developing critical thinking and 21st-century skills among middle school students in multicultural classroom environments. This research demonstrates that well-implemented PBL approaches can significantly enhance student learning outcomes while fostering intercultural understanding and preparing students for success in an increasingly complex and interconnected world. The study's findings revealed five major themes that illuminate the multifaceted impact of PBL in multicultural settings. First, the students demonstrated substantial enhancement in critical thinking development through engagement with authentic problem-solving activities that required analysis, evaluation, and reasoning. The multicultural context has enriched this development by exposing students to diverse perspectives and requiring them to consider multiple viewpoints when approaching complex problems. Students developed sophisticated skills in evidence evaluation, source analysis, and argumentation that extended far beyond academic contexts to essential 21st-century competencies.

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