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Project-Based Education in Primary Schools: A Systematic Review of Practices and Learning Outcomes

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Abstract

Project-Based Learning (PBL) has become an increasingly popular approach in primary education, especially in Makassar City. This article presents a systematic review of practices and learning outcomes related to the implementation of project-based education in primary schools. Through a comprehensive literature analysis, this study identifies various methods used in the implementation of project-based education, as well as their impacts on students' skills and learning outcomes. The findings indicate that project-based education not only increases students' motivation and engagement, but also contributes to the development of critical thinking and collaboration skills. However, challenges in implementing this method, such as limited resources and teacher training, are also identified. This article is expected to provide insights for educators and policy makers in optimizing project-based education practices in primary schools.

Keywords: project-based education; learning outcomes; critical thinking skills; student motivation; educational challenges

INTRODUCTION

The increasing demand for innovative and student-centered approaches in education, amidst rapid

technological and societal changes, has prompted growing interest in Project-Based Learning (PBL). This pedagogical model promotes active student engagement, real-world problem-solving, and interdisciplinary collaboration, making it particularly suited for the transition towards 21st-century learning paradigms. In Indonesia, particularly within urban contexts like Makassar City, the adoption of PBL in primary schools signifies a shift towards modern educational practices, aligning with global trends aimed at enhancing educational outcomes and fostering skills crucial for contemporary society (Yanti et al., 2024; Fitriani et al., 2023; Halimah et al., 2020).

Despite the extensive global discourse surrounding PBL, there remains a notable scarcity of localized studies focusing on its implementation within Indonesian primary schools, particularly in urban environments such as Makassar. The existing literature indicates that PBL enhances educational engagement and outcomes by emphasizing collaborative inquiry and hands-on projects that relate directly to students' contexts and experiences. This method not only improves learning outcomes—evidenced through higher creativity and critical thinking skills—but also prepares students to effectively address real-world challenges (Venegas, 2019; Wahidin & Wiji, 2020)Meganingtyas & Aryani, 2023). However, the exploration of specific outcomes associated with PBL in Indonesia's primary education, including Makassar, remains under-researched (Venegas, 2019; Wahidin & Wiji, 2020).

The methodology for analyzing PBL within Indonesian primary schools will benefit from systematic reviews of recent studies to uncover its applicability, effects, and the obstacles educators face in this context. PBL's potential to democratize education by engaging students, teachers, and communities in meaningful learning processes suggests that a thorough

understanding of its implementation could lead to substantial improvements. For instance, the evidence from Fitriani et al. indicates that students engaged in PBL experience richer and more engaging learning environments compared to traditional instructional models (Fitriani et al., 2023; Halimah et al., 2020). The findings, therefore, indicate that embracing PBL could transform teaching practices and significantly enhance educational outcomes for Indonesian students, shaping them into independent and critical thinkers (Amin et al., 2022; Kristiawan et al., 2021).

In conclusion, while PBL holds substantial promise as a transformative educational strategy in Indonesia, particularly in urban areas like Makassar, further exploration is essential to uncover the comprehensive dynamics at play. This research would navigate the multifaceted dimensions of PBL—from its pedagogical methodologies to its tangible impacts on student learning—offering vital insights for educators aiming to adapt to the evolving demands of 21st-century education (Serin, 2023; Setiawan et al., 2023). Addressing this gap could diminish barriers to effectively implementing PBL and subsequently lead to a more innovative and effective educational landscape in Indonesia.

METHODS

This study used a qualitative approach with a systematic literature review design to evaluate the practices, outcomes and challenges of Project-Based Learning (PBL) implementation in primary schools, particularly in Makassar City. This approach was chosen to gain an in-depth understanding of the trends, findings and research gaps related to PBL implementation in the local primary education context.

Data were collected through a systematic search of journal articles, research reports, proceedings and other

relevant documents published between 2015 and 2024. Data sources were obtained from various scientific databases, such as Google Scholar, ScienceDirect, DOAJ, Garuda, and SINTA. The keywords used in the search included: “Project-Based Learning”, ‘PBL’, “primary education”, “school in Makassar”, “student learning motivation”, and “21st century skills”.

The analysis was conducted using a thematic analysis approach on selected articles. Each article was carefully reviewed to identify PBL implementation methods, student learning outcomes and skills affected, constraints and challenges faced by teachers or schools, policy implications or recommendations for improving PBL practices. The analysis process was conducted in layers to ensure validity and reliability of data interpretation, including through cross-checking techniques between sources and systematic categorization of findings.

As a literature study, this research did not involve human subjects directly, so it did not require formal ethical approval. However, academic principles such as transparency, traceability of sources, and objectivity of analysis were strictly maintained.

RESULTS AND DISCUSSION

Implementation Strategies

The investigation conducted by Junaeda et al. (2023) underscores a pivotal shift in pedagogical methodologies at SD Negeri 4 Amarang, Maros, as evidenced by the implementation of contextualized, theme-based projects that serve to enhance student learning outcomes. This innovative strategy is characterized by the design of interdisciplinary projects wherein multiple subject areas specifically science, language, and social studies are woven together to create a cohesive curricular experience. Such an integrative approach not only fosters a deeper understanding of subject matter but also

encourages students to make connections across disciplines, ultimately promoting what is known as holistic learning. The thematic projects were developed to reflect real-world applications and contexts, thus engaging students in meaningful learning experiences that transcend rote memorization and cling to practical applications of knowledge. These findings resonate with contemporary educational paradigms that advocate for project-based learning (PBL) as an effective methodology for fostering active participation and critical engagement among learners.

The active participation of teachers was crucial in the design and execution of these projects, as they required a careful balancing of curriculum standards with innovative teaching practices. Teachers involved in this initiative were guided through a process of collaborative planning, which was instrumental in enriching their capacity to deliver interdisciplinary lessons. The collaborative nature of project planning also fostered professional development among educators, as they shared resources, strategies, and reflections on their teaching practices in an iterative feedback loop. By employing a community-of-practice model, teachers were able to continuously refine their approaches, thereby enhancing the effectiveness of the learning environment that they created for their students. Ultimately, the successful implementation of contextualized, theme-based projects not only elevated academic performance but also positioned these educators as facilitators of integrated learning.

Moreover, this interdisciplinary approach is not merely an additive strategy but a transformational one, where the integration of subject matter facilitates an immersive learning environment that captivates students' interests and fosters a holistic instructional practice. This trend demonstrates alignment with global initiatives that

advocate for a more interconnected curricular experience, where students are not compartmentalized into subject silos but are encouraged to explore the rich interconnections that exist within various domains of knowledge. The success of the project at SD Negeri 4 Amarang thus not only serves as a case study but embodies a model through which other educational institutions may strive for similar outcomes.

To better illustrate variations in implementation, the following table presents a comparison of PBL practices across several elementary schools:

Table 1. Comparison of PBL Implementation in Several Elementary Schools in South Sulawesi

Elementary School	Type of Project Implemented	Teacher Collaboration	Impact on Students	Main Challenges
SDN 4 Amarang	Environmental Project: School Garden	High	Increased sense of responsibility & teamwork	Limited availability of practical tools
SDN 111 Barru	Science Project: Making Simple Tools	Medium	Improved critical thinking skills	Limited implementation time
SDN Kompleks Maccini	Cultural Project: Mini Angngaru Festival	High	Growth in cultural literacy & nationalism	Lack of external mentorship

Elementary School	Type of Project Implemented	Teacher Collaboration	Impact on Students	Main Challenges
SD Inklusi Cendra wasih	Social Project: Anti-Bullying Campaign	Medium	Increased empathy and social skills	Difficulty in project-based assessment

Impact on Student Motivation and Critical Thinking

Project-Based Learning has had a notable impact on student motivation, engagement, and cognitive development. The study by Ridwan et al. (2022) revealed significant improvements in the critical thinking abilities of Grade 5 students at SD 111 Barru, where PBL was employed in science instruction. Students demonstrated increased capacity for questioning assumptions, evaluating evidence, and generating original solutions—skills that are crucial for success in both academic and real-life contexts.

This enhancement in higher-order thinking is consistent with **Bloom's Taxonomy**, particularly its revised version which places “creating,” “evaluating,” and “analyzing” at the apex of cognitive skills. PBL activities inherently challenge students to operate within these upper levels by engaging them in problem-solving tasks, investigative learning, and reflective discussions.

Moreover, the affective dimension of learning was significantly influenced. The findings by Pangestu et al. (2023) in Surabaya offer valuable insights into how PBL fosters intrinsic motivation. Unlike extrinsically motivated learning—which is driven by grades or external approval—*intrinsic motivation* stems from genuine curiosity and interest. PBL promotes this by offering students voice and

choice in their learning journey, allowing them to pursue topics that resonate with their interests and backgrounds.

When students are granted autonomy in choosing project themes, setting goals, and evaluating their own progress, they become active agents in the learning process. This shift from passive reception to active construction of knowledge aligns with **constructivist learning theory**. According to Piaget (1952) and Vygotsky (1978), meaningful learning occurs when learners interact with their environment and co-construct knowledge through social interaction and scaffolding.

The collaborative nature of PBL also enhances socio-emotional learning (SEL) by fostering empathy, cooperation, and conflict resolution. Group-based projects compel students to negotiate roles, manage disagreements, and practice leadership—all of which are critical life skills. In the context of Makassar, where diverse ethnic and cultural identities coexist, PBL can also serve as a vehicle for promoting intercultural understanding and tolerance among young learners.

Research by Thomas (2000) and Hmelo-Silver (2004) further supports the assertion that PBL leads to deeper learning, increased retention, and improved problem-solving skills. These cognitive benefits are not isolated outcomes but are interconnected with affective and behavioral changes, resulting in more holistic learner development.

Challenges in Implementation

While the pedagogical benefits of PBL are extensively supported in literature, its implementation in Indonesian primary schools, particularly in Makassar, reveals persistent structural and contextual barriers. A primary challenge involves insufficient and inconsistent professional development. Aisyah and Novita (2025) highlight that many educators remain unfamiliar with how

to initiate, facilitate, and evaluate PBL effectively. This aligns with findings from Xu et al. (2022), who emphasize that interdisciplinary learning initiatives often fail when educators lack conceptual clarity and pedagogical support.

Indonesian teacher training programs continue to emphasize subject-specific content mastery rather than interdisciplinary pedagogies (Pascual et al., 2020). Consequently, teachers struggle to shift from didactic roles to facilitators of inquiry-based, student-centered learning. As Kokotsaki, Menzies, and Wiggins (2016) argue, successful PBL implementation depends on a deep understanding of scaffolding, group facilitation, and formative assessment—skills often overlooked in traditional training programs.

Material and infrastructural limitations further complicate implementation. While urban schools may access digital tools and flexible learning environments, many institutions, including some in Makassar's peripheral zones, face a scarcity of learning materials, internet access, and appropriate physical spaces for collaborative projects (Kovalevskaia et al., 2021). Such disparities risk entrenching educational inequality, as students in under-resourced schools are less likely to benefit from PBL's holistic promise.

Time constraints also pose significant hurdles. Teachers are often constrained by rigid schedules and curriculum mandates that prioritize content coverage over deep engagement. As Bell (2010) asserts, authentic PBL requires extended cycles of inquiry, iteration, and reflection—elements difficult to accommodate within a performance-driven system dominated by standardized assessments.

Furthermore, the misalignment between project-based pedagogy and summative assessment frameworks undermines implementation. National exams remain

heavily focused on rote learning and factual recall, which discourages educators from prioritizing open-ended, experiential learning models (Serin, 2023). This is corroborated by Wahidin and Wiji (2020), who found that many schools revert to traditional methods due to pressure to meet quantifiable learning targets.

Lastly, school leadership plays a pivotal role. Research by Thomas (2000) and Yang et al. (2023) emphasizes that innovative teaching practices thrive in schools with visionary, risk-tolerant leadership. However, in practice, many Indonesian school leaders remain hesitant to endorse approaches that diverge from standardized routines. Without proactive administrative support, even well-intentioned PBL efforts often stall.

Policy and Practice Implications

To effectively institutionalize Project-Based Learning in primary education, a multipronged policy and practice approach is necessary. First, teacher capacity-building must shift from short-term workshops to sustained professional learning communities. As recommended by Hmelo-Silver (2004), ongoing mentorship, co-teaching, and reflective practice are essential to foster pedagogical fluency in PBL. Partnerships with teacher education institutions can provide theoretical grounding and contextualized support.

Second, curriculum design must explicitly accommodate interdisciplinary and project-based structures. The Ministry of Education should revise the *Kurikulum Merdeka* to include modular, theme-based units that integrate core competencies and provide flexibility for schools to contextualize learning. Bell (2010) argues that curriculum coherence across subjects is crucial for meaningful PBL, especially when aligned with local community issues and students' lived realities.

Assessment reform is equally critical. Performance-based assessments such as digital portfolios, process journals, and rubrics must be recognized as valid indicators of learning, especially for competencies like creativity, collaboration, and critical thinking. Ryan and Deci's (2000) theory of intrinsic motivation supports this shift, arguing that student engagement is heightened when evaluations reflect personal growth and authentic performance rather than external rewards.

Equitable resource distribution must be prioritized. Policy incentives can encourage local government units and private stakeholders to invest in school innovation hubs. Models such as *Sekolah Penggerak* (Driving Schools) under the Merdeka Belajar initiative may be expanded to include project innovation grants and mobile resource units for remote areas (Setiawan et al., 2023). International collaboration could also be explored, leveraging SDG-4 goals and global education networks to support marginalized schools.

Importantly, school leadership must be empowered as change agents. Transformational leadership training, as proposed by Kristiawan et al. (2021), can equip principals to cultivate collaborative school cultures that prioritize inquiry, experimentation, and reflective practices. Incentivizing leadership that supports pedagogical innovation is key to ensuring that PBL becomes embedded in school identity and not treated as a temporary intervention.

Finally, PBL must be situated within broader educational goals, such as character education, digital literacy, and environmental awareness. When aligned with global competencies and national character values (e.g., Pancasila), PBL can become a lever for systemic transformation—preparing learners not only for academic success, but also for civic responsibility and global citizenship (Meganingtyas & Aryani, 2023).

CONCLUSION

This systematic review of PBL practices in Makassar City underscores the transformative potential of project-based learning in primary education. The integration of interdisciplinary, student-centered projects has demonstrated positive impacts on academic performance, critical thinking, motivation, and social-emotional development. However, realizing the full benefits of PBL requires addressing persistent barriers related to teacher preparation, resource provision, assessment practices, and institutional support.

Through coordinated policy reform, investment in professional development, and meaningful school-community partnerships, educational stakeholders can create enabling environments for PBL. These efforts must be sustained and adaptive, recognizing the diversity of school contexts and the evolving needs of learners in the 21st century.

In sum, PBL is not merely a pedagogical strategy but a vision for education that is relevant, participatory, and future-oriented. As Makassar schools continue to explore and refine this model, they contribute to a broader movement toward more responsive, inclusive, and empowering forms of education in Indonesia and beyond.

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