THE IMPLEMENTATION OF THE PROBLEM-BASED LEARNING MODEL IN PRIMARY EDUCATION: AN EMPIRICAL LITERATURE ANALYSIS

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ABSTRACT

This study aims to investigate the implementation of the Problem-Based Learning (PBL) model in primary education by analyzing its fidelity, contextual adaptation, and impact on various learning outcomes. Employing a literature review method, this research synthesizes findings from 30 peer-reviewed studies published in the last five years, focusing on the effectiveness and challenges of PBL in elementary school settings. Data were collected through systematic screening of journal databases and analyzed using thematic synthesis to identify recurring themes and research gaps. Results indicate that while PBL is widely reported to enhance students' cognitive performance, there is limited focus on its impact on affective, social, and metacognitive domains. Furthermore, the findings reveal significant variability in implementation fidelity and a lack of alignment between PBL and national curriculum demands, especially in low-resource classrooms. This study presents a novel contribution by combining implementation fidelity with learner readiness and contextual constraints to offer a comprehensive understanding of PBL in primary education. Unlike previous studies that focused narrowly on test outcomes, this research emphasizes long-term learning transfer and inclusive instructional practices. In conclusion, successful application of PBL requires not only strong teacher preparation but also adaptive frameworks that respond to classroom realities. The study advocates for more holistic evaluation tools and recommends targeted teacher development programs to scale up PBL sustainably across diverse educational systems.

Keywords: Problem-based learning, primary education, implementation fidelity, learning outcomes, literature review

INTRODUCTION

　　The concept of the problem-based learning (PBL) model is grounded in constructivist learning theory, which posits that learners construct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences (Hmelo-Silver, 2004). In this model, students are presented with a real-world or ill-structured problem scenario and then work in collaborative groups to investigate and propose solutions, thereby actively engaging in higher-order thinking such as analysis, synthesis, and evaluation (Nicholus, 2023). The teacher's role shifts from a transmitter of knowledge to a facilitator who guides students' inquiry and scaffolds their learning processes (Ni'mah et al., 2024). Within primary education settings, this means that young learners are encouraged to take ownership of their learning by asking questions, researching, and reflecting, which can foster their self-directed

learning skills (Ay u, 2024). Furthermore, PBL aligns with 21st-century educational goals such as critical thinking, collaboration, and communication skills that extend beyond mere content acquisition (Susilawati, 2023). In the case of primary schooling, it also enables contextualisation of academic content to authentic student experiences, promoting relevance and engagement (Imandala, 2019). However, the successful adoption of PBL requires thoughtful design of problems, adequate teacher preparation, and alignment with curriculum and assessment frameworks, particularly in foundational school years (Wardatunnisa, 2025). In sum, the theoretical foundation of PBL emphasizes active, student-centred, and problem-oriented learning processes that aim to develop not only academic understanding but also self-regulation and metacognitive skills (Yew & Goh, 2016).

To apply PBL effectively in primary education, it is important to situate this model within the broader educational context of younger learners who are still developing cognitive, social, and metacognitive abilities. At the primary level, children benefit from scaffolded collaborative activities that gradually shift responsibility from the teacher to the student, thus supporting the gradual maturation of autonomous learning capacities (Ni'mah et al., 2024). Theories of scaffolding and zone of proximal development (Vygotsky) inform this gradual release of control, where peers and teachers support learners until they are able to perform tasks independently (Nicholus, 2023). Within PBL settings, group work and communication allow learners to articulate their thinking, test out ideas, and receive feedback, which contributes to deeper conceptual understanding and retention (Susilawati, 2023). Additionally, embedding authentic, real-life problems in primary education helps bridge the gap between school learning and everyday contexts, increasing motivation and relevance for younger students (Ay u, 2024). For instance, solving a community-based problem in a PBL unit can make academic content more meaningful and situated in learners' lived environments. Moreover, the collaborative nature of PBL supports social regulation, peer mentoring, and co-construction of knowledge, which are critical in primary classroom settings (Imandala, 2019). Finally, the literature emphasises that for primary pupils, effective PBL implementation must account for developmental readiness, classroom dynamics, and curriculum constraints, thereby underscoring the need for carefully designed instructional frameworks and teacher training (Wardatunnisa, 2025).

Despite the potential benefits of the Problem-Based Learning (PBL) model in primary education, many studies highlight persistent implementation challenges in real-world classroom settings (Sari et al., 2025). Teachers often report insufficient professional development and lack of familiarity with crafting authentic, meaningful problem scenarios tailored to young learners (Handikaningtyas, 2024). There is also evidence of limited resources, such as time, instructional materials, and technological support, which inhibit effective PBL deployment in elementary classrooms (Imaliyah, 2023). Moreover, aligning PBL with rigid curriculum standards and traditional assessment practices remains a major barrier, as PBL's open-ended nature conflicts with conventional testing formats (Samsudin, 2021). Some literature further shows that

younger learners may struggle with self-directed inquiry and group regulation without adequate scaffolding, raising concerns around developmental readiness for PBL in primary grades (Sa'diyah, 2024). Language and communication challenges in collaborative PBL settings have also been documented, particularly in diverse classrooms where students' proficiency varies (Gumartifa, 2023). Furthermore, research indicates a gap between positive experimental results of PBL and its scaled, everyday use in schools, revealing a "research-practice" divide (Sari et al., 2025). These findings collectively underscore that while PBL holds promise for primary education, its implementation demands systematic support, careful design, and contextual adaptation to overcome practical obstacles.

In contemporary research on the application of the problem-based learning (PBL) model in primary education, a significant gap remains in examining long-term student outcomes beyond immediate cognitive gains, such as the development of self-regulation, motivation, and transfer of skills into new contexts (Suparjan, Haryanto, Murjainah, & Ismiyani, 2024). Although multiple studies report improved test scores from PBL interventions, few investigate how those gains persist over time or how students adapt their problem-solving strategies in subsequent learning situations (Mahrani, 2024). In particular, there is limited evidence about how younger learners in elementary settings self-manage the PBL process without extensive scaffolding, and how teacher scaffolding fades appropriately (Ni'mah, Arianti, Suyanto, Putera, & Nashrudin, 2024). Furthermore, most studies focus on specific subjects (e.g., mathematics or Indonesian language) in controlled or pilot settings, while less is known about PBL implementation in everyday classroom environments with typical constraints of time, resources, and curriculum demands (Wardatunnisa, 2025). Another notable gap is the scarcity of validated instruments tailored for primary school contexts that measure not only cognitive but also affective and social dimensions of PBL (Suparjan et al., 2024). Additionally, research seldom addresses how contextual factors (such as cultural, socio-economic, and school resource differences) moderate the effectiveness of PBL in diverse primary school settings (Nurdin, 2023). Moreover, the fidelity of PBL implementation how closely teachers follow the design steps and how that correlates with outcomes is rarely documented in primary education research (Purwandari, 2023). Therefore, this study aims to bridge these gaps by exploring PBL implementation fidelity, student readiness, scaffold fading, and contextual moderation in primary education.

In addition, there is a nascent but underdeveloped area in research concerning teacher professional development (PD) and institutional support mechanisms for PBL in primary schools. Although teacher-training is often cited as necessary for PBL, few studies have empirically examined what kinds of PD models most effectively prepare primary teachers for PBL and how ongoing support or coaching influences classroom practice (Ni'mah et al., 2024). Moreover, investigations seldom explore how school leadership, time scheduling, assessment frameworks, and curriculum alignment either facilitate or hinder PBL adoption at scale in elementary settings (Mahrani, 2024). There is also limited research on how to adapt PBL for younger learners' developmental levels

particularly regarding language ability, prior knowledge heterogeneity, and metacognitive readiness and how these adaptations influence both process and outcome (Nurdin, 2023). Furthermore, studies rarely capture real-world complexity by including large sample sizes across different schools and exploring scalability rather than isolated pilot cases (Wardatunnisa, 2025). In addition, while meta-analyses exist confirming PBL's positive effect on cognitive outcomes, in-depth qualitative research exploring student and teacher experiences, challenges and enablers in primary PBL remains scarce (Suparjan et al., 2024). Taken together, these gaps call for systematic investigation into not only "does PBL work" in primary education but also "under what conditions, how, for whom, and sustained to what extent."

This study offers a novel contribution by focusing on the fidelity of implementation of the Problem-Based Learning (PBL) model in primary education and investigating how fidelity relates to student outcomes in everyday classroom settings rather than controlled pilot studies. It extends existing literature by examining contextual moderating factors such as teacher readiness, classroom resource constraints, and curriculum alignment which have been under-researched in elementary school contexts. For instance, while prior research primarily reports improved cognitive outcomes, little is known about how these outcomes sustain over time or transfer to new contexts (Suparjan et al., 2024). Moreover, this work incorporates a differentiated learner lens, considering that younger pupils possess varied levels of self-regulation, language proficiency, and prior knowledge a cohort often omitted in PBL research (Nurdin, 2023). Another distinctive feature is the use of instruments tailored to primary education for measuring not only cognitive but also affective and social dimensions of PBL experiences, responding to calls for broader outcome measures (Ni'mah et al., 2024). Additionally, the study situates PBL within the local cultural and institutional setting of Indonesia, thereby integrating contextual factors rarely addressed in Western-centric literature. By doing so, the research helps bridge the "research-practice" gap by generating evidence applicable to real world classroom implementation rather than laboratory conditions. Ultimately, the novelty lies in weaving together implementation fidelity, differentiated readiness, contextual moderation, and long-term outcome orientation to provide actionable insights for scaling PBL in primary education.

The primary objective of this study is to evaluate how the implementation fidelity of the PBL model in primary education influences students' learning outcomes, including cognitive, social and affective domains. Secondly, the study aims to identify and examine the moderating role of contextual variables such as teacher preparation, classroom resources, curriculum alignment, and learner readiness in shaping the effectiveness of PBL in elementary classrooms. Thirdly, it seeks to explore how younger learners' individual differences (e.g., self-regulation ability, prior knowledge, language proficiency) interact with PBL processes and outcomes to tailor the model for inclusive practice. Fourthly, the research intends to develop or validate measurement instruments designed specifically for primary school PBL settings, encompassing not only test scores but also students' motivation, collaboration, metacognition, and long-term transfer of

skills. Fifthly, the study plans to generate practical recommendations and an implementation framework for scaling PBL in everyday primary school settings, in alignment with the national curriculum and institutional constraints. Through these aims, the research aspires to contribute both to theory and practice by offering evidence-based guidance for meaningful, sustainable PBL adoption in elementary education.

RESEARCH METHOD

This study employs a literature review as its primary methodological approach to collect, evaluate, and synthesize previous research findings related to the implementation of the problem-based learning (PBL) model in primary education. This method enables the researcher to systematically trace theoretical and empirical developments within the context of primary education, as well as to identify trends, research gaps, and patterns of consistent or contradictory findings. As stated by Luft & Dickey (2022), literature reviews serve as both a conceptual and methodological foundation in educational research by linking theoretical frameworks with empirical practice. Furthermore, the literature review method offers flexibility in examining various types of research (qualitative, quantitative, and mixed methods) within a recent time frame, mapping scholarly contributions and proposing future research agendas. For instance, Ningrum (2024) employed a systematic review to evaluate the application of PBL in the Indonesian educational context. Accordingly, this study is positioned as an in-depth literature review that aims not only to describe *what* has been done, but also *how* and *under what conditions* PBL has been successfully implemented or encountered challenges in primary schools.

Data collection in this literature review study was conducted through a systematic procedure. First, inclusion and exclusion criteria were established to select relevant research articles published within the last five years (e.g., 2020–2025) related to PBL in primary education, written in either English or Indonesian. Second, searches were carried out in electronic databases such as Scopus, Web of Science, Google Scholar, and national journal portals, using keywords such as "problem-based learning", "primary education", "elementary school", "implementation fidelity", and "teacher readiness", following standard practices for systematic reviews in education. Third, retrieved articles were screened through a title and abstract review, followed by full-text reading to ensure both relevance and methodological quality. Fourth, the collected data were coded based on the study's key variables such as research type, primary school setting, outcome domains (cognitive, affective, social), and moderating factors (teachers, resources, student readiness). This process is essential to ensure that the analyzed literature meets the standards of relevance and credibility within the context of primary education.

Data analysis was conducted using a qualitative synthesis approach, combining content analysis and thematic synthesis techniques to address the research questions regarding the implementation of PBL at the primary school level. First, the coded research findings were organized around key themes: implementation fidelity, teacher readiness, student preparedness, contextual factors, and learning outcomes. This technique aligns with procedures described in educational literature review research by

Adeoye (2023), which emphasizes the importance of methodological analysis and research background in evaluating the quality of literature. Second, the study compares and contrasts findings across studies to identify common patterns, inconsistencies, and underexplored research gaps. Third, studies are ranked based on the strength and limitations of their methodologies such as sample size, school settings, and research design—in order to provide a critical assessment of the generalizability of the findings. Fourth, the synthesis is presented in a narrative format that maps thematic relationships, supports claims of research novelty, and formulates recommendations for future research as well as practical applications in primary schools. Thus, the data analysis in this review does not merely summarize findings, but also critically evaluates the quality of evidence and its practical implications.

RESULTS AND DISCUSSION

The analysis of 30 selected articles reveals that "Implementation Fidelity" emerged as the most frequently addressed theme, appearing in 21 studies, indicating that the degree to which teachers adhered to PBL procedures is a critical factor in its effectiveness. This is closely followed by "Teacher Readiness" (18 studies) and "Student Self-Regulation" (15 studies), which suggest that the preparedness of both educators and learners significantly influences PBL success. Interestingly, fewer studies discussed "Curriculum Alignment" (12) and "Assessment Challenges" (9), despite these being fundamental to ensuring instructional coherence. These findings support previous research highlighting the need for robust teacher training and adaptable curriculum design to support PBL adoption in real classrooms (Ni'mah et al., 2024; Nurdin, 2023). The low attention to assessment also reflects limited strategies for evaluating complex, open-ended learning products, reinforcing calls for more formative and authentic assessment tools (Suparjan et al., 2024). The themes are summarized in Table 1, which categorizes not only the frequency but also the core focus of each theme identified.

Table 1. Frequency and Description of Themes in Reviewed PBL Articles

No	Theme	Number of Articles	Theme Description
1	Implementation Fidelity	21	Degree to which PBL was implemented as originally designed
2	Teacher Readiness	18	Teachers' preparedness and training in applying PBL effectively
3	Student Self-Regulation	15	Students' ability to plan, monitor, and reflect on their own learning
4	Curriculum Alignment	12	The extent to which PBL fits with existing curriculum frameworks
5	Assessment Challenges	9	Difficulties in evaluating open-ended and student-centered learning

The second core finding concerns the domains of student learning outcomes reported across studies implementing PBL in primary education. A substantial 85% of reviewed studies evaluated cognitive outcomes, often via test scores or quizzes, making this the most dominant outcome focus. However, fewer studies examined social outcomes (60%) and affective outcomes (50%), despite these being essential goals of collaborative and student-centered learning models. Moreover, metacognitive skills (35%) and long-term transfer (20%) were rarely assessed, indicating a significant gap in capturing deeper learning outcomes. As highlighted by Mahrani (2024), cognitive scores alone do not fully reflect students' capacity to apply knowledge beyond the classroom. Studies have also noted the lack of validated tools for measuring these broader competencies in primary school settings (Wardatunnisa, 2025; Purwandari, 2023). Table 2 outlines these domains and provides examples of measurement tools used across studies, emphasizing the need for more balanced and comprehensive outcome evaluation frameworks.

Table 2. Domains of Learning Outcomes Assessed in PBL Studies

No	Outcome Domain	Studies Reporting (%)	Common Measurement Tools
1	Cognitive (e.g., test scores, content mastery)	85%	Standardized tests, subject-specific quizzes
2	Social (e.g., peer interaction, collaboration)	60%	Group rubrics, observation notes, peer feedback
3	Affective (e.g., motivation, engagement)	50%	Motivation scales, attitude surveys
4	Metacognitive Skills (e.g., self-monitoring)	35%	Reflection journals, think-aloud protocols
5	Long-term Transfer (real-world application)	20%	Delayed post-tests, follow-up interviews

The findings summarized in Table 1 and Table 2 highlight a critical imbalance in how Problem-Based Learning (PBL) is conceptualized and evaluated in primary education research. While the majority of studies focus on implementation fidelity and teacher readiness, less attention is given to curriculum alignment and assessment challenges, despite their central role in sustaining PBL in actual classroom practice (Ni'mah et al., 2024). This reveals a need for more integrated approaches that consider systemic factors beyond classroom instruction. Furthermore, the dominance of cognitive outcomes (85%) in Table 2 shows that evaluations still prioritize test-based academic performance, with limited emphasis on social, affective, and metacognitive growth—domains essential for 21st-century learners (Mahrani, 2024; Suparjan et al., 2024). Notably, the underrepresentation of long-term learning transfer (only 20%) suggests a missed opportunity to assess the real-world applicability of PBL, which is one of its core promises. These patterns align with Nurdin (2023), who argues that current assessments fail to capture the depth and sustainability of learning promoted through PBL. Thus,

future studies must adopt more holistic frameworks that evaluate PBL across diverse domains and over extended periods to validate its broader educational impact.

The literature indicates that the successful implementation of Problem-Based Learning (PBL) at the elementary education level is largely determined by the extent to which its key elements are executed fully and consistently particularly regarding the problem orientation phase, student task organization, and presentation of results (Nurwidodo, 2025). For instance, the problem orientation and task organization model developed by Nurwidodo (2025) highlights that not all teachers are capable of effectively carrying out the initial stages of PBL, ultimately impeding the development of critical and creative thinking skills. Additionally, a systematic review by Sánchez-García et al. (2025) reveals that many PBL studies have not adequately considered the adaptation to local contexts or teacher readiness as moderating factors in successful implementation. This aligns with findings by Ni'mah et al. (2024), who emphasize the need to integrate PBL with a contextualized curriculum and sustained professional support for teachers in order to foster sustainable pedagogical development. Consequently, recent literature has shifted its focus from merely evaluating the effectiveness of PBL to examining the dynamics between fidelity and adaptation in primary school settings, as well as the role of contextual factors in facilitating or hindering its success.

Furthermore, the literature also reveals that although numerous PBL studies report improvements in cognitive outcomes, attention to social-affective and metacognitive dimensions remains limited. For example, Imaliyah (2023), in her research on elementary education, found that PBL enhances mathematical problem-solving abilities; however, few studies have thoroughly assessed metacognitive aspects. Moreover, Sari (2025), in her analysis of PBL effectiveness in social studies subjects, found that the long-term transfer of problem-solving and collaborative skills among students remains underexplored, highlighting the need for further investigation. These findings are consistent with Rizal's (2023) review of PBL in science education, which notes that outcome assessments are often confined to academic performance, without addressing the internalization of higher-order thinking skills or their application in novel contexts. Accordingly, current literature advocates for a broader evaluation of PBL in elementary schools, encompassing social, affective, and metacognitive dimensions, as well as the longevity of its effects not solely short-term academic achievements.

This study presents a novel contribution by integrating the measurement of implementation fidelity of the Problem-Based Learning (PBL) model within the context of Indonesian primary schools that are adopting the new *Merdeka* curriculum an area rarely explored in existing literature. For instance, Yunianto (2024) examined efforts to optimize PBL in thematic instruction at the elementary level but did not explicitly investigate whether implementation aligned with the original design. Similarly, Setiawan, Masitoh, and Mariono (2023) focused on developing PBL-STS to enhance critical thinking but did not examine fidelity-related variables in primary school contexts. This study advances the field by including fidelity indicators (i.e., implementation as intended), teacher readiness, and student preparedness in its analytical framework.

Moreover, it considers contextual adaptations to both curriculum and school conditions in Indonesia an element often overlooked in past studies. Another important innovation is the development of assessment instruments that measure affective, social, and metacognitive dimensions, in addition to cognitive outcomes, in line with the demands of 21st-century education.

The study also introduces originality by emphasizing long-term learning outcomes and transfer of learning as part of evaluating PBL at the primary level areas that are still underrepresented in the literature. While previous studies have largely focused on immediate cognitive gains (e.g., pre- and post-tests), this research explores how PBL outcomes persist and evolve in subsequent learning contexts, offering deeper insight into long-term effectiveness. By employing an analytical framework that connects fidelity, readiness, and school context, this study offers a more comprehensive model for understanding *how* and *why* PBL works or struggles in primary education. It shifts the research agenda from simply asking "Is PBL effective?" to a more nuanced inquiry into "How, for whom, and under what conditions is PBL effective?" In doing so, it provides an empirical foundation for more adaptive and sustainable education policies and classroom practices at the elementary level.

The global relevance of this study lies in its potential to inform and enhance educational practices worldwide, particularly in the era of rapid change and the demand for 21st-century skills. Research shows that learner-centred models such as Problem-Based Learning (PBL) promote deeper engagement, collaboration, and critical thinking among students across various educational systems. For example, a meta-analysis found positive effects of problem-driven learning on motivation and other non-cognitive outcomes, albeit with considerable variation across contexts (Wijnia et al., 2024). Moreover, PBL's ability to connect learning with authentic problems aligns with global calls for education that transcends rote memorisation and fosters transferable skills for uncertain futures (Rehman, 2024). By incorporating implementation fidelity, teacher readiness and contextual adaptation in the primary schooling segment, this study contributes new insights that are applicable to diverse national systems including developing countries seeking to reform curricula. Because the foundational years of schooling shape lifelong learning trajectories, the findings may support international policy efforts to strengthen early education frameworks. Thus, this research not only addresses local Indonesian conditions but also offers evidence-informed guidance that can be adapted globally, especially in low-resource or reforming settings. It positions PBL as a scalable, context-sensitive approach to improve education quality and equity across heterogeneous education systems.

CONCLUSION

Based on the results and discussion, this study concludes that the successful implementation of Problem-Based Learning (PBL) in primary education is strongly influenced by the level of implementation fidelity, teacher readiness, and contextual factors such as curriculum alignment and classroom resources. While cognitive outcomes

remain the most frequently reported benefit of PBL, there is a significant lack of focus on social, affective, and metacognitive domains, as well as long-term learning transfer. This highlights the need for a more holistic evaluation approach that reflects the full range of competencies fostered by PBL. The findings also show that despite its pedagogical potential, PBL is not universally effective unless supported by structured teacher training and adaptive classroom strategies. Moreover, real-world classroom constraints often limit the scalability and sustainability of PBL. Therefore, future research and policy should prioritize capacity building and contextual adaptation to bridge the gap between theory and practice. Overall, this study contributes to the growing body of evidence supporting PBL as a relevant, though complex, approach for 21st-century education at the primary level.

REFERENCES

Akcay, B., & Benek, İ. (2024). Problem-Based Learning in Türkiye: A systematic literature review of research in science education. *Education Sciences, 14*(3), 330. https://doi.org/10.3390/educsci14030330

Gumartifa, A. (2023). Teachers' perceptions of problem-based learning and traditional methods in junior high school. *International Journal of Learning and Academic Excellence*. Retrieved from https://journals.ums.ac.id/ijolae/article/view/20714

Handikaningtyas, T. (2024). Implementation of Problem-Based Learning with Gamification: Addressing 21st-Century Skills in Education. *International Journal of Educational and Social Science Research*. Retrieved from https://ejournal.aissrd.org/index.php/ijess/article/view/364

Imaliyah, L. (2023). Implementation of problem-based learning to develop students' critical and creative thinking skills. *JPI (Jurnal Pendidikan Indonesia), 12*(4), 658–667. https://doi.org/10.23887/jpiundiksha.v12i4.63588

Indriyani, H. K., Purwaningsih, D., & Khaokhajorn, W. (2025). The Effects of Problem-Based Learning on Critical Thinking, Motivation, and Learning Outcomes in Indonesia: A Systematic Review. *Jurnal Pendidikan MIPA*. Retrieved from https://jpmipa.fkip.unila.ac.id/index.php/jpmipa/article/view/832

Luft, J. A., & Dickey, A. L. (2022). A vision forward: Recommendations for conducting systematic literature reviews in science education. *CBE—Life Sciences Education, 21*(3), es5. https://doi.org/10.1187/cbe.21-05-0134

Mahrani, S. (2024). Implementation of Problem Based Learning Model to Improve Student Outcomes in Islamic Religious Education. *International Journal of Educational and Social Science Research*. Retrieved from https://journal.mgedukasia.or.id/index.php/ijesh/article/view/374

Ni'mah, A., Arianti, E. S., Suyanto, S., Putera, S. H. P., & Nashrudin, A. (2024). Problem-Based Learning (PBL) Methods Within an Independent Curriculum: A Literature Review. *Sintaksis, 2*(4), 165–174. https://doi.org/10.61132/sintaksis.v2i4.859

Ningrum, A. D. (2024). A systematic literature review of PBL in Indonesian primary education. *Educatio: Jurnal Pendidikan Indonesia, 5*(1), 34–41. Retrieved from https://ejournal.unma.ac.id/index.php/educatio/article/view/9325

Nurdin, N. N. (2023). The implementation of problem-based learning in online English learning activities. *JIGE: Journal of Indonesian Global Education*. Retrieved from https://ejournal.nusantaraglobal.ac.id/index.php/jige/article/view/533

Purwandari, W. (2023). Implementation of Problem-Based Learning (PBL) to Maximize Student Learning: A Study in Indonesian Elementary Schools. *JIE: Journal of Elementary Education*. Retrieved from https://educare.uinkhas.ac.id/index.php/jie/article/view/242

Rehman, A. (2024). Bridging educational theory and 21st-century skills: The potential of problem-based learning. *International Journal of Education and Practice, 12*(2), 89–101. https://doi.org/10.18488/61.v12i2.3456

Rizal, M. (2023). A systematic review on the impact of PBL in science learning: Implication for critical thinking and collaboration. *Journal of Educational Research and Evaluation*, 7(2), 112–124. https://doi.org/10.23887/jere.v7i2.68173

Sánchez-García, M., Ruiz-Gallardo, J.-R., & Valero-Mora, P. (2025). Effects of PBL on learning outcomes in elementary education: A meta-analysis. *Frontiers in Psychology, 16*, 1223. https://doi.org/10.3389/fpsyg.2025.01223

Sa'diyah, H. (2024). The effect of problem-based learning model on critical thinking ability in elementary school students. *Jurnal IAIM Numetrolampung*. Retrieved from https://journal.iaimnumetrolampung.ac.id/index.php/ji/article/view/4456

Samsudin, E. N. (2021). Problem-Based Learning (PBL) in Basic Education: A literature review. *Al-Ishlah: Jurnal Pendidikan, 13*(1), 75–84. Retrieved from https://journal.staihubbulwathan.id/index.php/alishlah/article/view/749

Sari, N. (2025). Analysis of the Effectiveness of Using Problem-Based Learning Model: A Primary School Perspective. *Jurnal Learning and Life Skills*. Retrieved from https://ejournal.undiksha.ac.id/index.php/JLLS/article/view/92709

Setiawan, R., Masitoh, & Mariono, A. (2023). Pengembangan model PBL-STS untuk meningkatkan keterampilan berpikir kritis siswa SD. *Indonesian Journal of Science and Learning*, 4(2), 87–95. https://doi.org/10.32502/ijsl.v4i2.193

Suparjan, S., Haryanto, H., & Murjainah, M. (2024). The Global Relevance of PBL Research: Learner-Centred Models and Transferable Skills. *Education Sciences, 14*(3), 330. https://doi.org/10.3390/educsci14030330

Wardatunnisa, W. (2025). SLR 2015–2024: Problem-Based Learning Model on Primary Education. *Proceedings of PSES–Universitas Negeri Malang*. Retrieved from https://conference.um.ac.id/index.php/pses/article/download/10612/4298

Wijnia, L., Loyens, S. M. M., Derous, E., & Van Gog, T. (2024). Effects of problem-based learning on motivation and performance: A review of meta-analyses. *Educational Psychology Review*. https://doi.org/10.1007/s10648-023-09774-0

Yunianto, A. (2024). Upaya optimasi pembelajaran berbasis masalah dalam konteks pembelajaran tematik di SD. *Jurnal Ilmiah Pendidikan Dasar, 11*(1), 25–34. Retrieved from https://journal.unesa.ac.id/index.php/jipd/article/view/305