Analysis of the Implementation of Differentiated Learning in Elementary Schools: A Literature-Based Qualitative Study

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Abstrack

This study aims to analyze the implementation of differentiated learning in elementary schools through a qualitative literature review approach and to offer a conceptual contribution to existing scholarship on differentiated instruction (DI) within the Indonesian educational context. Using thematic analysis, the study systematically reviewed national and international articles published between 2020 and 2025, focusing on coding, categorizing, and synthesizing recurring patterns related to content, process, and product differentiation. Synthesising the literature led to the development of a conceptual framework illustrating the interaction among teacher readiness, instructional design, school support systems, and digital resource integration as core components shaping the effective implementation of DI. The findings highlight several novel insights, including the identification of digital-supported differentiation as an emerging practice and the articulation of collaborative teacher learning communities as a structural enabler for sustainable DI practices. This study provides practical implications for educators, policymakers, and school leaders, particularly in strengthening professional development programs, designing supportive school policies, and integrating adaptive learning resources to optimise student-centred learning in the Merdeka Curriculum era.

Keywords: differentiated learning, elementary school, independent curriculum, literature study, adaptive learning strategies

Abstrak

Penelitian ini bertujuan untuk menganalisis implementasi pembelajaran diferensiasi di sekolah dasar melalui pendekatan tinjauan literatur kualitatif dan untuk menawarkan kontribusi konseptual terhadap keilmuan yang ada tentang pengajaran diferensiasi (DI) dalam konteks pendidikan Indonesia. Dengan menggunakan analisis tematik, penelitian ini secara sistematis meninjau artikel nasional dan internasional yang diterbitkan antara tahun 2020 dan 2025, dengan fokus pada pengkodean, pengkategorian, dan sintesis pola berulang yang terkait dengan konten, proses, dan diferensiasi produk. Sintesis literatur mengarah pada pengembangan kerangka konseptual yang menggambarkan interaksi antara kesiapan guru, desain instruksional, sistem pendukung sekolah, dan integrasi sumber daya digital sebagai komponen inti yang membentuk implementasi DI yang efektif. Temuan ini menyoroti beberapa wawasan baru, termasuk identifikasi diferensiasi yang didukung digital sebagai praktik yang muncul dan artikulasi komunitas belajar guru kolaboratif sebagai pendorong struktural untuk praktik DI berkelanjutan. Penelitian ini memberikan implikasi praktis bagi pendidik, pembuat kebijakan, dan pimpinan sekolah, khususnya dalam memperkuat program pengembangan profesional, merancang kebijakan sekolah yang mendukung, dan mengintegrasikan sumber belajar adaptif untuk mengoptimalkan pembelajaran yang berpusat pada siswa di era Kurikulum Merdeka.

Kata kunci: *pembelajaran yang berbeda, sekolah dasar, kurikulum mandiri, studi literatur, strategi pembelajaran adaptif*

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INTRODUCTION

Basic education plays a crucial role in shaping students' cognitive abilities, character, and social competence. Within this stage, teachers are expected to create learning environments that recognize and respond to the natural diversity of student readiness, interests, and learning profiles. Differentiated Instruction (DI), as conceptualized by Tomlinson (2021), positions diversity as a pedagogical asset that requires teachers to adjust learning content, processes, and products. Meanwhile, Vygotsky's (1978) framework of the Zone of Proximal Development (ZPD) provides a theoretical basis for structured scaffolding that enables students to progress through targeted support. Although both theories are frequently cited in contemporary educational discourse, their integration into the Indonesian Merdeka Curriculum remains underexplored.

Existing studies on DI in Indonesian elementary schools have largely focused on describing classroom-level implementation practices or identifying superficial challenges, such as limited teacher readiness and time constraints. For example, research by Suryati et al., (2023) shows that teachers experience a number of obstacles in developing and implementing varied learning activities, particularly in relation to planning and time management. On the other hand, Panandu (2024) asserts that only a few teachers truly have a deep conceptual understanding of DI. Other studies (Rosita, 2022; Abidin & Fadhillah, 2023) emphasize improvements in student motivation and learning outcomes but tend to overlook deeper pedagogical and systemic mechanisms that support sustainability. These findings indicate that previous research is fragmented and often limited to partial analyses of DI, without presenting an integrated model that connects theoretical foundations, practical strategies, and systemic school-level factors.

A significant gap also exists in the form of a limited comprehensive synthesis that systematically integrates Tomlinson's differentiation principles with Vygotsky's sociocultural theory in the specific framework of the Merdeka Curriculum. While both frameworks offer complementary insights, Tomlinson emphasizes adaptive instructional design, and Vygotsky focuses on scaffolded learning within social contexts. Research has yet to articulate how these theories interact to shape DI implementation in Indonesian elementary schools. Moreover, studies rarely examine systemic determinants such as school leadership, collaborative teacher culture, resource allocation, and policy alignment that influence the sustainability of DI practices. Consequently, the absence of a structured conceptual model limits educators' and policymakers' ability to design long-term, contextually grounded DI strategies.

This study seeks to address these gaps through a qualitative literature-based analysis that synthesizes empirical findings from national and international publications between 2020 and 2025. By employing thematic analysis, this research constructs a comprehensive conceptual framework that illustrates the interplay between theoretical foundations, classroom strategies, and systemic support structures in DI implementation. The framework is expected to contribute to the development of more coherent theoretical understandings of DI within the Merdeka Curriculum and to offer practical insights for educators, school leaders, and policymakers. Ultimately, this study aims to offer a more integrative and sustainable perspective on implementing differentiated learning in elementary schools, advancing both academic discourse and pedagogical practice.

METHOD

This study employs a qualitative approach through the Systematic Literature Review (SLR) method to obtain an in-depth picture of the implementation of differentiated learning at the primary school level. The literature search procedure follows the framework developed by Snyder (2019) and integrates the PRISMA 2020 guidelines to ensure that the identification, screening, eligibility assessment, and inclusion determination processes are systematic, transparent, and replicable.The data sources used included various national and international scientific publications, including peer-reviewed journal articles, conference proceedings in the field of education, and official policy documents such as the Merdeka Curriculum Guidelines published by the Ministry of Education, Culture, Research, and Technology (2022).

Literature searches were conducted using the Google Scholar, ERIC, and Garuda Kemdikbud databases with the keywords 'differentiated learning', 'differentiated teaching', 'implementation of the Merdeka Curriculum', 'adaptive learning strategies', and 'primary schools'. To ensure that the selected publications are truly relevant and of high quality, this study applies clearly formulated inclusion and exclusion criteria. The inclusion criteria are as follows: (1) publications classified as scientific works, such as journal articles, proceedings, or policy documents; (2) published between 2020 and 2025; (3) directly related to differentiated learning in primary schools; (4) written in Indonesian or English; and (5) available in full text. Publications with clear methodology, strong conceptual relevance, and adequate reference support were given priority. On the other hand, exclusion criteria include: (1) opinion pieces or editorials, (2) publications prior to 2020, (3) research not focused on primary education, (4) duplicate data, and (5) articles that only mention differentiated learning in passing without in-depth discussion.

The entire article selection process followed the PRISMA 2020 flow. In the initial identification stage, 36 records were obtained from various databases. After screening based on titles and abstracts, 14 articles were eliminated because they did not meet the criteria, leaving 22 articles for full review. At the eligibility assessment stage, seven additional articles were excluded for methodological inaccuracies or lack of relevance to the research focus, leaving 15 articles that met the inclusion criteria and were included in the final analysis. The selected articles were analysed using thematic analysis, following the six stages proposed by Braun and Clarke (2006).

The initial stage involved familiarising oneself with the data by repeatedly reading each study to understand its context, objectives, and results. After that, systematic coding was conducted to identify recurring concepts related to differentiated learning strategies, implementation principles, supporting factors, and obstacles in primary school environments. The codes were then grouped into initial themes, reviewed to ensure consistency, refined, and given clearer definitions. The final themes were then compiled into a narrative describing the main patterns, key findings, and theoretical trends that emerged from the analysed literature. The validity of the analysis results was strengthened through source triangulation, comparing findings across publications and aligning them with official education policy documents.

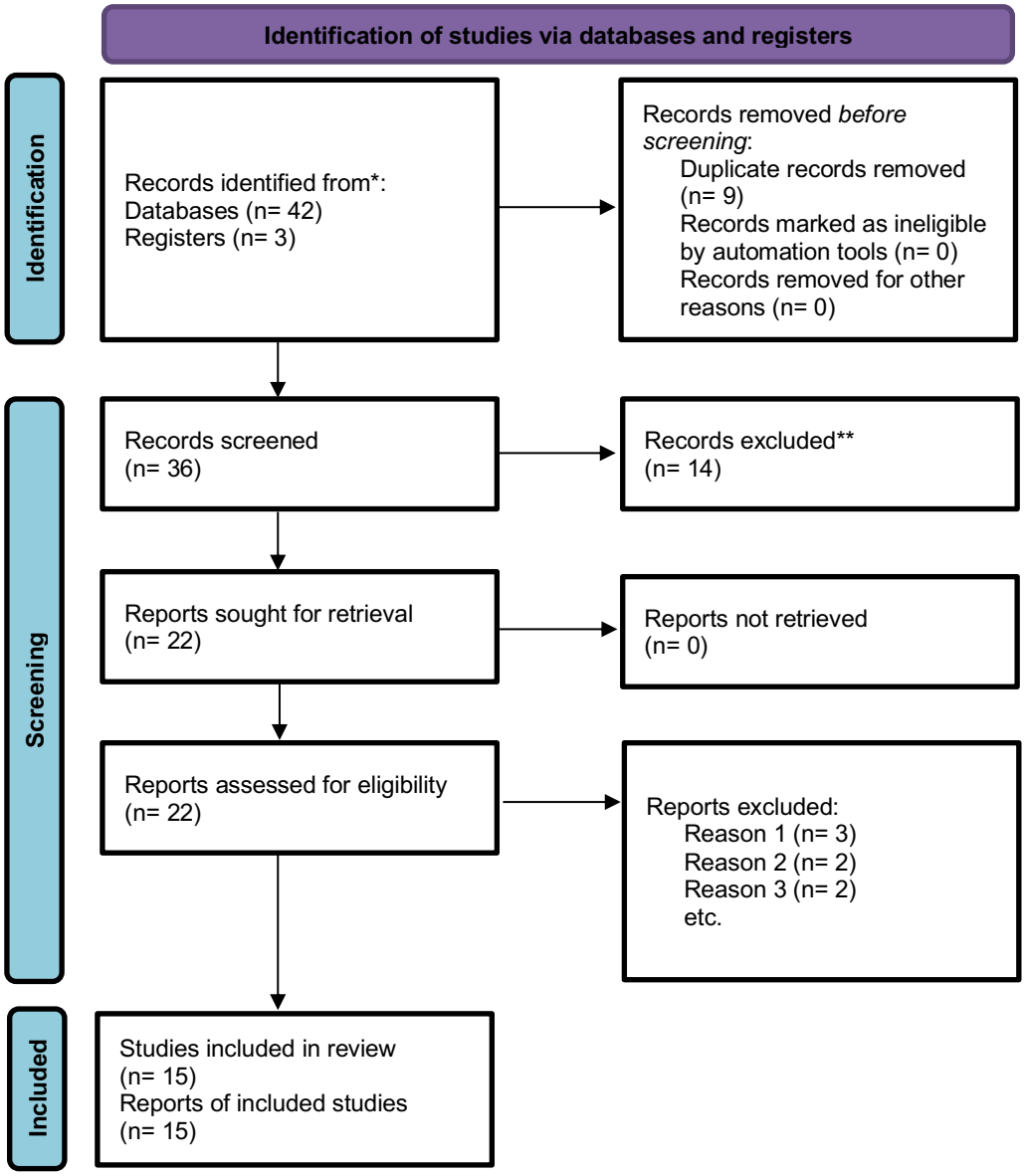

Figure 1. Prisma 2020 Flow Diagram of the Literature Selection Process

This systematic literature review approach provides a comprehensive overview of the practices, opportunities, and challenges in implementing differentiated learning in primary schools. Although the use of secondary data has limitations, mainly due to its reliance on the quality of available publications, using the latest scientific literature (2020–2025) and credible policy documents ensures that the analysis remains relevant, evidence-based, and aligned with the latest developments in Indonesian education.

RESULTS AND DISCUSSION

RESULTS

The following figure presents a conceptual framework for the implementation of differentiated instruction in elementary schools, integrating the three core elements content, process, and product differentiation as the foundation of responsive teaching

practices that address diverse student needs. The framework also incorporates key supporting factors, including teacher competency and institutional support, which play a crucial role in ensuring effective implementation at both the classroom and school levels. In addition, it highlights common barriers, such as limited time and insufficient resources, that often hinder the optimal use of differentiation. Overall, this framework provides a comprehensive overview of how various components interact and collectively influence student learning outcomes.

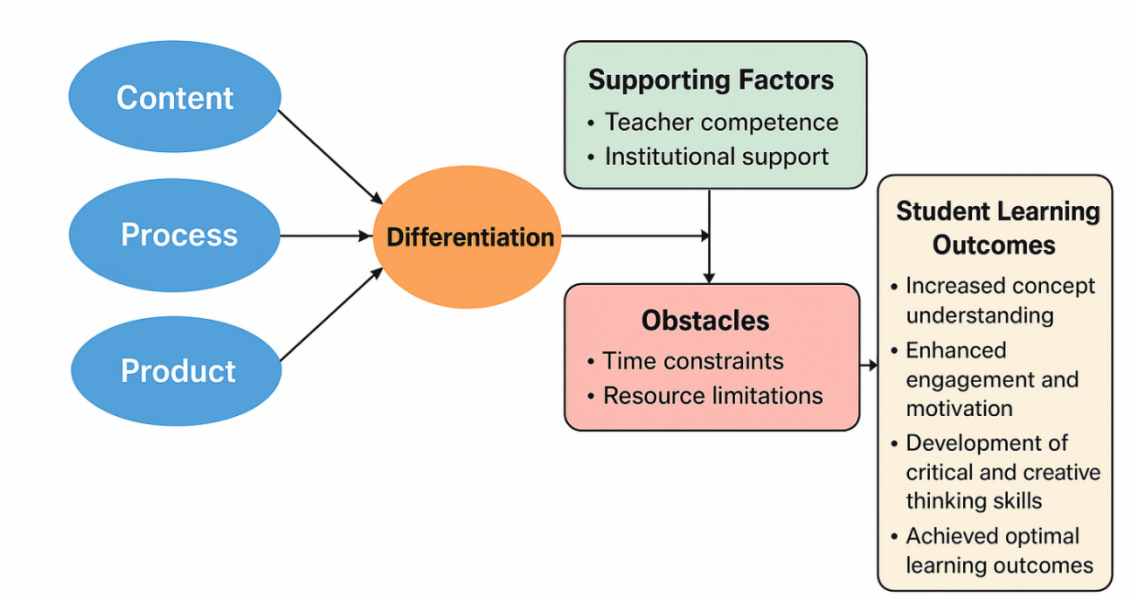

Figure 2. Conceptual Framework of Differentiated Instruction Implementation

The figure shows the systematic relationship between differentiation elements and the supporting and inhibiting conditions that affect the effectiveness of their implementation. The three differentiation elements serve as the core of learning adaptation, while teacher competence and institutional support strengthen the quality of implementation. On the other hand, structural barriers such as limited teaching time and a lack of resources can reduce the optimization of the differentiation process. This overall interaction ultimately improves the quality of student learning outcomes, including increased conceptual understanding, active engagement, and individual competency development. Thus, this conceptual framework provides a clear analytical basis for understanding how differentiated learning works and the factors to consider in its implementation.

The following table presents a mapped distribution of the reviewed studies by geographical context and research methodology. This classification aims to clarify how differentiated instruction practices have been explored across regions and through various research designs. By organizing the studies in this way, the table enables readers to identify patterns in implementation, contextual variations, and methodological tendencies within the existing body of literature.

Table 1.
Distribution of Reviewed Studies by Geographical Context and Research Methodology

Geographical Context	Number of Studies	Research Methodologies Identified	Key Findings Related to Differentiated Instruction
Indonesia	6	Qualitative case study, descriptive study	Implementation aligned with Kurikulum Merdeka; challenges in resources and teacher workload.
Southeast Asia (excl. Indonesia)	3	Mixed methods, classroom action research	Positive effects on student engagement; need for institutional support.
East Asia	2	Experimental design, quasi-experimental	DI improves literacy and numeracy outcomes significantly.
Europe	2	Qualitative thematic studies	Strong emphasis on teacher professional development and flexible grouping.
North America	2	Mixed methods, large-scale survey	DI widely practiced; key barriers include time constraints and assessment complexity.
Other Regions	0–1	Varied	Highlighted DI adaptability across diverse learning needs.

Overall, the distribution of studies shows that research on differentiated instruction is concentrated primarily in Indonesia and the United States, with methodological approaches varying by regional research tradition and educational priorities. Qualitative case studies dominate in Southeast Asia, reflecting the region's focus on classroom-based exploration of DI practices, whereas Western contexts tend to employ more experimental or survey-based designs to measure instructional impacts. This variation highlights the importance of considering both geographic and methodological diversity when interpreting the broader landscape of differentiated-instruction research.

DISCUSSION

The synthesis of the reviewed literature demonstrates that differentiated instruction (DI) through content, process, and product differentiation consistently improves student motivation, engagement, and learning outcomes (Erdiana, 2023). When examined comparatively across national and international studies, however, important distinctions emerge, positioning these findings within a broader global context. International studies tend to highlight the role of digital technologies and adaptive platforms as enablers of large-scale differentiation, whereas studies in the Indonesian context emphasize human and institutional factors such as teacher competence, collaborative planning (e.g., lesson study), and school-level resource limitations (Patras et al., 2024). This contrast indicates that while technology accelerates differentiation in

digitally advanced contexts, the sustainability of DI in developing contexts remains heavily dependent on teachers' professional capacity and institutional support systems.

Universal constraints, including limited instructional time, administrative burdens, and challenges in assessing diverse learning products, appear across both contexts but manifest differently. International studies often mitigate time-related constraints through the use of ready-made digital content and automated formative assessment tools (Weerasinghe et al., 2022), whereas Indonesian studies tend to recommend organizational solutions such as structured collaborative planning time and pedagogical mentoring (Patras et al., 2024). These differences reinforce the conclusion that scaling DI requires context-sensitive strategies: technology alone does not guarantee effectiveness, and meaningful differentiation cannot be sustained without strong institutional ecosystems and teacher readiness.

DI aligns strongly with constructivist principles, which emphasize active sense-making, prior knowledge, and student agency in building understanding (Smith & Nguyen, 2021). The finding that students benefit from choice, multimodal tasks, and meaningful learning pathways supports the constructivist view that learning is most effective when students actively construct meaning through authentic, engaging experiences. Differentiated content and tasks allow learners to integrate new concepts with their existing cognitive structures, reinforcing constructivist claims about individualized learning trajectories.

The prominence of flexible grouping, scaffolding, and peer interaction in the reviewed studies reflects Vygotsky's concept of the Zone of Proximal Development (ZPD), in which optimal learning occurs when learners receive gradually released guided support (Zuo et al., 2023). Collaborative planning structures such as lesson study reinforce Bandura's social learning theory by enabling teachers to learn from modeling, observation, and shared reflection (Rahimi & Karkami, 2022). These findings highlight that DI is not merely an instructional strategy but also a social practice that thrives in communities of learning among both teachers and students.

Findings related to technology use indicate that effective integration of DI and digital tools requires strong TPACK competencies. International studies show that teachers with balanced technological, pedagogical, and content knowledge can leverage digital resources to diversify instructional pathways, provide timely feedback, and manage complex differentiation processes at scale (Koh & Chai, 2021). Conversely, studies from contexts with limited digital literacy show that poor TPACK can hinder DI implementation by creating additional workload or leading to pedagogically superficial uses of technology. Thus, strengthening TPACK is essential for enabling meaningful and sustainable techno-pedagogical differentiation.

Synthesizing both the empirical evidence and foundational theories, this study argues that the integration of DI with digital technology can form a hybrid pedagogical model suited to the demands of 21st-century learning. This model is characterized by several key features:

1. Scalable Personalization
   Adaptive platforms and data-driven tools enable granular personalization that would be difficult to achieve solely through manual instruction. When aligned with pedagogical goals, such personalization supports the development of learner autonomy, self-regulation, and mastery-based progression.

2. Structured Collaborative Profesional Culture
   Digital collaboration platforms allow teachers to share learning materials, co-design differentiated lessons, and analyze student data collectively. This reduces planning burdens and strengthens professional learning communities as catalysts for sustainable DI.
3. Authentic, Multimodal Assessment
   Digital tools broaden assessment possibilities by supporting multimedia outputs, automated analytics, and continuous formative feedback. This enhances the assessment of creativity, critical thinking, and collaboration skills central to 21st-century learning competencies.
4. Flexible, Multimodal Learning Environments
   The combination of multimedia resources, interactive simulations, peer collaboration, and project-based tasks aligns with diverse learning profiles. This multimodality resonates with constructivist principles and prepares learners to navigate complex, technology-rich environments.

However, the hybrid model is not automatically effective. It requires strong teacher capacity (TPACK), sufficient digital infrastructure, supportive leadership, and policies that prioritize instructional innovation. Without these enabling factors, technology risks amplifying existing inequities rather than reducing them.

Several implications emerge from this analysis:

1. Professional development should prioritize TPACK-oriented training, integrating pedagogical reasoning with digital tool mastery.
2. Schools should institutionalize structured collaborative time to support differentiated lesson planning and reflective practice.
3. Policy-makers should invest in adaptive, pedagogically aligned digital platforms rather than in general-purpose technology with limited educational value.
4. Implementation should occur through phased, context-aware strategies, beginning with pilot programs that document best practices for broader replication.

This review is limited by the predominance of qualitative research in certain regions and variation in methodological rigour across studies (Valiandes et al, 2021, 2021). Future research should include large-scale quantitative or mixed-method studies to evaluate the effectiveness of hybrid DI models across diverse contexts. Longitudinal research is also needed to assess sustained impacts on both cognitive and non-cognitive learner outcomes.

CONCLUSION

This systematic literature review produced a comprehensive conceptual framework of Differentiated Instruction (DI) in elementary education by synthesizing national and international studies published between 2020 and 2025. The framework integrates content, process, and product differentiation with enabling factors and systemic barriers that collectively shape student motivation, engagement, and learning outcomes. The study advances theoretical discourse by situating DI within constructivist, sociocultural, and TPACK perspectives that illuminate its hybrid and adaptive pedagogical nature. It also emphasizes that effective differentiation requires scaffolded learning, informed pedagogical decision-making, and strategic technology integration. In practice, the findings highlight the need for TPACK-oriented professional development, supportive institutional conditions, and context-sensitive adoption of technology. Future

research is encouraged to employ mixed-methods and longitudinal designs to validate and extend the proposed framework across diverse educational settings. Overall, this study enriches the understanding of adaptive learning strategies and offers actionable guidance for fostering inclusive, student-centred, and future-ready educational ecosystems.

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