



Systematic Literature Review on Digital Technology in Primary School Learning (2020–2025)

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Abstract: The rapid development of digital technology has transformed learning practices in primary education. This study aims to examine the effectiveness of digital learning and identify key challenges in its implementation at the primary school level. Using a Systematic Literature Review (SLR) approach, ten empirical studies published between 2020 and 2025 were systematically selected and reviewed following the PRISMA protocol. The findings show that digital-based learning improves students' academic outcomes by an average of 24.2% and enhances learning engagement, particularly when interactive media and digital platforms are integrated into instruction. However, several challenges persist, including limited device availability, inadequate digital infrastructure, and low teacher readiness in adopting technology-supported pedagogy. These barriers particularly affect schools in underserved areas and hinder the equitable implementation of digital learning. The study concludes that digital technology has strong potential to enhance learning effectiveness but requires strategic and context-sensitive integration. The implications highlight the need for blended learning-based curricula, equitable technological access, and continuous teacher professional development to support sustainable and inclusive digital learning in primary schools.

Abstrak: Perkembangan teknologi digital telah mengubah praktik pembelajaran di sekolah dasar. Penelitian ini bertujuan menganalisis efektivitas pembelajaran digital serta mengidentifikasi tantangan implementasinya pada jenjang sekolah dasar. Metode yang digunakan adalah Systematic Literature Review (SLR) terhadap sepuluh artikel empiris terbitan 2020–2025 yang dipilih dan dianalisis secara sistematis menggunakan protokol PRISMA. Hasil kajian menunjukkan bahwa pembelajaran berbasis digital mampu meningkatkan hasil belajar siswa rata-rata sebesar 24,2% serta meningkatkan keterlibatan belajar ketika media interaktif, platform digital, dan sumber multimedia digunakan dalam proses pembelajaran. Namun, kajian ini juga menemukan hambatan berupa keterbatasan perangkat, infrastruktur digital yang belum merata, dan rendahnya kesiapan guru dalam menerapkan pedagogi berbasis teknologi. Tantangan ini lebih terasa di sekolah-sekolah yang belum terlayani secara optimal sehingga menghambat pemerataan pembelajaran digital. Penelitian ini menyimpulkan bahwa teknologi digital memiliki potensi besar meningkatkan efektivitas pembelajaran, namun memerlukan integrasi yang strategis dan sesuai konteks. Implikasi penelitian menekankan pentingnya pengembangan kurikulum blended learning, pemerataan akses teknologi, dan pelatihan guru berkelanjutan untuk mendukung transformasi digital yang inklusif di sekolah dasar.

A. Introduction

Advancements in digital technology have dramatically reshaped the education landscape worldwide, especially at the primary school level, where technology is increasingly embedded in everyday instructional practices. Digital tools are no longer seen as supplementary aids; instead, they have become integral components of creating more effective, engaging, and student-centred learning environments. UNESCO (2021) reports that nearly 90% of primary education institutions globally have integrated digital technology into their curricula, indicating a significant shift toward technology-driven learning ecosystems. This transformation is supported by innovations in information and communication technology that offer broader access to learning resources, facilitate interactive pedagogy, and enable more dynamic instructional practices aligned with the demands of the digital era.

In primary education, digital technology is recognized for its capacity to enhance student engagement, motivation, and comprehension. Interactive applications, learning platforms, and multimedia resources provide students with opportunities to actively explore content at their own pace actively, promoting personalised learning pathways that accommodate diverse academic needs within a single classroom. As noted by Lim et al (2023), such digital environments foster a participatory learning culture that strengthens students' conceptual understanding and encourages deeper cognitive involvement. Technology also supports differentiated instruction, allowing teachers to address variation in learning readiness and learning styles more effectively.

However, despite these pedagogical advantages, implementing digital learning remains challenging in many educational contexts. Studies highlight persistent gaps in digital literacy among teachers and students, limited professional development opportunities, and insufficient digital infrastructure that restricts optimal technology use in classrooms. Masyhura & Ramadan (2021) emphasize that many educators still lack confidence and competence in integrating technology into daily instruction due to inadequate training and resource constraints. Global assessments from OECD (2023) and the World Bank reinforce this issue, revealing that unequal access to devices, unstable internet connectivity, and minimal investment in teacher technology training are major contributors to the digital divide particularly in low- and middle-income countries, including Indonesia.

In the Indonesian context, schools' readiness to adopt digital learning varies widely, influenced by infrastructure disparities, policy inconsistencies, and socioeconomic conditions. Many primary schools, especially in rural or underserved areas, struggle to provide stable internet access, adequate hardware, and up-to-date educational software. These barriers undermine the potential benefits of digital technology and create inequalities in learning opportunities. Furthermore, strong dependency on traditional teaching practices and limited institutional support often hinder schools from adopting sustainable digital learning models (Subroto et al., 2023).

Although numerous empirical studies have investigated the role of digital technology in primary education, the existing literature remains fragmented and highly varied in scope. Most studies tend to focus either on the general benefits of digital tools or on isolated implementation challenges, with limited efforts to systematically synthesise evidence on how digital learning influences learning effectiveness through measurable outcomes. In addition, consolidated evidence that simultaneously captures the magnitude of academic improvement and the contextual barriers shaping digital learning implementation in Indonesian primary schools is still scarce. This condition has resulted in a lack of comprehensive references that educators and policymakers can use to design strategic, equitable, and effective digital learning integration.

To address this gap, this study offers a novel contribution by employing a Systematic Literature Review (SLR) that integrates empirical evidence published between 2020 and 2025 to examine both the effectiveness of digital learning and the challenges that accompany its implementation at the primary school level. Unlike previous reviews that emphasise either outcomes or constraints separately, this study systematically synthesises quantitative indicators of learning effectiveness alongside contextual factors such as infrastructure availability, teacher readiness, and institutional support, particularly within the Indonesian educational context. This integrated perspective constitutes the novelty of the study by providing a balanced and comprehensive understanding of digital learning implementation in primary education.

Based on this framework, the study seeks to answer the following research questions: how effective is digital learning in improving learning outcomes and student engagement in primary schools, what dominant challenges influence the implementation of digital learning at the primary school level, and how do contextual factors shape the success or limitations of digital learning practices in Indonesian primary education. Accordingly, the objectives of this study are to systematically analyse the effectiveness of digital learning in primary education, to identify and synthesise the main challenges affecting its implementation, and to provide evidence-based insights that support the development of strategic, context-sensitive, and sustainable digital learning policies and practices for primary schools.

B. Method

This study employed a Systematic Literature Review (SLR) to provide a comprehensive synthesis of empirical evidence on the effectiveness of digital learning in primary education. The SLR design was chosen to ensure a rigorous, transparent, and replicable review process by identifying, selecting, evaluating, and synthesizing relevant studies from multiple scholarly sources. The review procedure followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, which include four main stages: Identification, Screening, Eligibility, and Inclusion.



Figure 1. PRISMA Research Steps

During the Identification stage, relevant literature was collected from Google Scholar and Publish or Perish using keywords related to "digital learning", "educational technology", and "primary education". In the Screening stage, titles and abstracts were examined to determine initial relevance to the focus of digital technology implementation in primary schools. Articles that passed this stage were evaluated for Eligibility through full-text analysis based on predefined inclusion and exclusion criteria. Studies were included if they: (a) were published between 2020 and 2025, (b) were written in Indonesian or English, (c) focused on elementary-level students, and (d) reported empirical findings on the effects of digital learning. Opinion papers, non-empirical articles, and studies lacking full-text access were excluded.

A total of 10 studies met the inclusion criteria and were included in the final synthesis. Data were analysed using a qualitative content analysis approach, in which each article was examined to extract information on research design, sample characteristics, digital tools used, learning outcomes measured, and implementation challenges. Patterns and themes were identified to generate an integrated understanding of digital learning effectiveness. To enhance credibility, data triangulation was performed by comparing findings across multiple studies and reviewing consistency with global reports on digital education. The eligibility criteria used in this study are described in Table 1 below:

Table 1. The Eligibility Criteria Used in This Study

Criteria	Inclusion	Exclusion
Year of Publication	Articles published from 2020 to 2025	Articles published before 2020
Publication Type	Journal articles, conference proceedings, and research reports that are in line with the theme	Opinion, review, and editorial articles
Language	Indonesian and English	Articles that are other than Indonesian and English
Research Subject	Focuses on elementary and middle school students	Focus on something other than the student (teacher or parent)
Research Results	Discussing the influence of digital learning on student learning outcomes	It does not directly discuss the effect of digital learning on student learning outcomes
Accessibility	Articles with full access (full text)	It does not have full-text

Table 1 presents the eligibility criteria applied to ensure the relevance, quality, and consistency of the studies included in this Systematic Literature Review. The selection was restricted to articles published between 2020 and 2025 to capture the most recent

developments in digital learning within primary education. Only peer-reviewed journal articles, conference proceedings, and research reports aligned with the research focus were included, while opinion papers, editorials, and non-empirical studies were excluded to maintain methodological rigour. The review considered publications written in Indonesian and English to ensure accessibility and relevance to both national and international contexts. In terms of research subjects, the included studies focused on elementary and middle school students, as these levels represent critical stages for digital learning implementation, whereas studies centred on teachers or parents as primary subjects were excluded. Furthermore, only studies that explicitly reported empirical findings on the influence of digital technology on student learning outcomes were selected, while studies lacking direct evidence of learning impact were omitted. Finally, full-text accessibility was required for all included articles to allow comprehensive data extraction and critical analysis, thereby ensuring the transparency and reliability of the synthesis process.

C. Result

The data presented in this study were obtained from literature review journals and relevant sources, in accordance with the research title, by reading and analyzing each selected article.

Table 2. Literature Source

Author and Year	Title	Analysis of Results
Lailan (2024)	The Role of Educational Technology in Learning	This research emphasizes the importance of integrating technology into education to improve learning effectiveness. Educational technology is considered an integral part of the learning process.
Siringoringo & Alfaridzi (2024)	The Effect of Learning Technology Integration on the Effectiveness and Transformation of the Digital Era Education Paradigm	This study shows that integrating learning technology can improve learning effectiveness and encourage the transformation of the education paradigm in the digital era.
Ningsih (2024)	Implementation of Digital Technology in Education: Benefits and Barriers	This research explores the benefits and barriers to implementing digital technology in education. It was found that digital technology can improve learning quality, but there are barriers, such as limited access and teacher readiness.

Author and Year	Title	Analysis of Results
Kandukoori et al (2024)	Comparative Analysis of Digital Tools and Traditional Teaching Methods in Educational Effectiveness	The study found that students who used digital tools improved their test scores by an average of 24.2%, while those who used traditional methods improved by only 8.3%. This shows the superiority of digital tools in enhancing students' math skills.
Sunandari et al (2023)	The Influence of the Digital Age on Children's Character Building in Elementary Schools	The research found that the digital age has a significant influence on children's character development at the primary school level, with both good and bad effects that must be carefully managed.
Ananda et al (2022)	The Importance of Character Education for Elementary School Children in the Digital Age	This study emphasizes the importance of character education for elementary school children in the digital age to offset the influence of technology on student behaviour and values.
Putri_ (2023)	The Influence of Technology on Learning Change in the Digital Age	This research explores how the development of digital technology has changed aspects of learning, including in primary schools. The results show that technology can be a potential tool to improve teaching, enabling more maximized learning and adapted to students' cognitive styles.
Puspitonigrum et al (2024)	The Impact of Technology Implementation in Primary Education Learning: A Case Study on the Effectiveness of Using Digital Learning Platforms in Primary Schools	This study investigates the impact of using the digital learning platform on the effectiveness of the learning process at the primary school level. The findings show that the application of technology can strengthen the interaction between teachers and learners, while encouraging students' enthusiasm for learning.
Nengsih & Haryanti (2024)	Early Childhood Character Education through Play in the Digital Age	This study reviewed the use of digital media in primary school science instruction. It was found that digital media can make learning more interesting and deepen students' understanding of concepts.
Topping et al (2022)	Effectiveness of Online and Blended Learning from Schools: A Systematic Review	This journal shows that technology-based learning has significant potential to enhance learning effectiveness, especially in blended learning contexts. However, its success is highly dependent on supporting factors such as teacher training, infrastructure and support from various related parties.

Overview of Reviewed Studies

A total of ten empirical studies were included in this Systematic Literature Review after passing the identification, screening, eligibility, and inclusion stages following the PRISMA protocol. All selected studies met the inclusion criteria, namely publication between 2020 and 2025, use of Indonesian or English, focus on primary education contexts, and empirical investigation of digital technology implementation in learning. The publication trend indicates increasing research interest in digital learning in primary schools, particularly over the past three years. All reviewed studies were conducted in elementary school settings with students as the primary subjects and employed diverse research designs, including experimental, case study, survey, and review approaches. The digital technologies examined ranged from digital learning platforms and interactive multimedia to gamified applications and blended learning models. Most studies focused on academic effectiveness, while others examined student engagement, motivation, character development, and implementation challenges, providing a comprehensive basis for the subsequent thematic synthesis.

Thematic Classification of Digital Learning Studies in Primary Education

Based on the overview of the reviewed studies, a thematic classification was conducted to synthesise the main focus areas in the literature. The analysis identified four dominant themes representing the scope of research on digital learning in primary education, encompassing both learning outcomes and broader educational and contextual dimensions.

To clarify the distribution of the reviewed studies across these themes, Table X presents the thematic classification based on the primary focus of each study.

Tabel 3. Thematic Classification of Reviewed Studies on Digital Learning in Primary Education

Theme	Description	Number of Studies
Effectiveness of digital learning on academic outcomes	Impact of digital technology on learning achievement, conceptual understanding, and academic performance	6
Student engagement and learning motivation	Influence of digital tools on participation, motivation, interaction, and learning interest	4
Character development and social skills	Effects of digital learning on collaboration, empathy, independence, and social interaction	3
Challenges in digital learning implementation	Barriers related to infrastructure, access, teacher readiness, and institutional support	5

Overall, the thematic classification shows that research on digital learning in primary schools addresses both outcome-oriented and context-oriented perspectives. Academic effectiveness emerges as the most frequently examined theme, while implementation challenges also appear prominently, indicating that learning outcomes and

contextual constraints are central concerns in the literature. This classification provides a structured basis for the synthesis of findings presented in the following sections.

Effectiveness of Digital Learning on Academic Outcomes

The synthesis of the reviewed studies shows that the effectiveness of digital learning on academic outcomes is the most dominant theme in the literature. Most studies consistently reported positive effects on students' learning achievement, conceptual understanding, and overall academic performance at the primary school level across various subject areas.

Measurable improvements in academic performance were reported in studies implementing digital platforms, interactive multimedia, and technology-supported instructional strategies. Compared with traditional instructional approaches, digital learning environments were associated with higher levels of conceptual mastery and more efficient knowledge acquisition. Studies employing interactive features and structured digital activities tended to demonstrate stronger academic gains.

Furthermore, the effectiveness of digital learning was influenced by instructional design and technology integration. Blended learning models that combined digital instruction with face-to-face interaction produced more consistent improvements than fully digital or minimally supported approaches. Overall, these findings indicate that digital learning positively contributes to academic outcomes in primary education, although the magnitude of its effectiveness varies according to pedagogical design and learning context.

Implementation Challenges and Contextual Factors in Digital Learning

The synthesis of the reviewed studies reveals that the implementation of digital learning in primary education is shaped by a set of interrelated challenges and contextual factors. The most frequently reported barrier concerns limited digital infrastructure and unequal access to devices, particularly in rural and underserved school settings, which was identified in approximately half of the reviewed studies. This constraint directly affects the feasibility and consistency of digital learning implementation.

Another prominent challenge relates to teachers' readiness and digital competence. Several studies reported insufficient training, low confidence, and limited pedagogical experience in integrating technology into classroom instruction. This issue emerged as a recurrent factor influencing the effectiveness of digital learning across different contexts.

In addition, institutional and environmental support was identified as a contextual factor affecting implementation. Some studies highlighted misalignment between school policies, technical support availability, and parental involvement, which limited the sustainability of digital learning practices. Furthermore, a smaller number of studies reported pedagogical adaptation challenges, particularly in addressing diverse student needs and learning styles, indicating that effective implementation depends not only on access to technology but also on instructional design.

Overall, the findings indicate that infrastructure availability and teacher readiness represent the most dominant barriers, while institutional support and pedagogical adaptation function as contextual factors that moderate the success of digital learning in primary education.

D. Discussion

The main objective of this study was to conduct an in-depth analysis of the impact of digital learning on the effectiveness of teaching and learning processes at the primary school level. The findings of this systematic review demonstrate that the integration of digital technology has a significant positive influence on students' academic outcomes and learning engagement. Educational technology is increasingly positioned as an essential and inseparable component of the learning process [Lailan \(2024\)](#), reflecting a broader global transformation in education. This trend is consistent with [UNESCO \(2023\)](#), which reports that 78% of member countries have integrated digital frameworks into basic education curricula to strengthen early digital literacy. At the institutional level, empirical evidence shows that schools systematically adopting digital technology experience higher student participation and reduced absenteeism, indicating not only improved learning effectiveness but also a shift in the overall educational paradigm toward a digital-oriented ecosystem [Siringoringo & Alfaridzi \(2024\)](#).

In terms of academic effectiveness, Research conducted by [Siringoringo & Alfaridzi \(2024\)](#) and [Kandukoori et al \(2024\)](#) align closely with previous empirical findings. Students who engaged in digital learning environments consistently demonstrated higher academic achievement compared to those taught using traditional methods. [Kandukoori et al \(2024\)](#) reported a 24.2% increase in average test scores among students using digital tools, whereas students in conventional learning settings showed an improvement of only 8.3%. Similarly, [OECD \(2023\)](#) found that gamification-based instruction significantly enhanced vocabulary retention compared to traditional memorisation approaches. These findings provide strong support for the argument that technology-based learning not only improves students' understanding of learning materials but also expands access to diverse learning resources and fosters more interactive and engaging learning experiences.

Beyond academic performance, Research by [Putri \(2023\)](#) indicate that digital technology supports instructional approaches such as project-based and collaborative learning, which are essential for developing 21st-century skills. Through technology-supported learning activities, students have greater opportunities to develop critical thinking, effective communication, and creativity. This perspective aligns with [Priyanti et al \(2024\)](#), who emphasise the urgency of integrating technology into education systems as a strategic effort to prepare learners for future challenges and dynamic societal demands. Consequently, the adoption of digital technology in education should be understood not merely as a trend, but as a strategic intervention that can positively transform teaching and learning processes at the primary school level.

However, despite its demonstrated benefits, the implementation of digital learning continues to face substantial challenges. Limited access to digital devices and inadequate teacher readiness remain the most prominent barriers [Ningsih \(2024\)](#). Infrastructure disparities, particularly in rural and resource-limited areas, hinder equitable access to technology-based learning and contribute to regional disparities in student outcomes ([Topping et al., 2022](#)). These challenges underscore that the effectiveness of digital learning is highly dependent on contextual conditions, including institutional support, infrastructure availability, and human resource capacity.

In addition to academic outcomes, this study also highlights the complex influence of digital learning on students' character development. Research by [Sunandari et al \(2023\)](#) and [Ananda et al \(2022\)](#) indicates that the digital era significantly shapes character formation at the elementary school level. Digital technology can enhance social skills, independence, empathy, and cooperation when used through collaborative applications and structured activities. For instance, the use of platforms such as Padlet has been shown to increase students' empathy and cooperation by [Sunandari et al \(2023\)](#). Nevertheless, excessive or unregulated technology use may reduce direct social interaction and negatively affect social skill development. Therefore, character education remains essential to balance the influence of technology on students' behaviour and values ([Ananda et al., 2022](#); [Fernandez et al., 2025](#)).

An important and somewhat unexpected finding of this review is that digital learning does not automatically benefit all students equally. [Puspitoningrum et al. \(2024\)](#) note that although digital technology improves accessibility and learning effectiveness, optimal implementation varies across school contexts. Furthermore, some students, particularly those with kinesthetic learning styles or those requiring direct teacher guidance, may not benefit fully from purely digital learning environments ([Amelia & Hikmah, 2025](#)). These findings suggest that a blended learning approach, combining digital instruction with face-to-face interaction, may offer a more effective and inclusive solution for diverse learner needs.

Consistent with this perspective, studies by [Priyanti et al \(2024\)](#) and [Nengsih & Haryanti \(2024\)](#) highlight that play-based and character-oriented learning approaches can complement digital learning by fostering positive values in the digital era. This indicates that digital technology should not replace conventional instructional methods entirely, but rather function as a supportive tool within adaptive and pedagogically sound learning designs. Teachers play a critical role in designing learning experiences that integrate digital tools with activities promoting social interaction, reflection, and moral development.

Overall, the findings of this study suggest that schools must take a more proactive role in adopting digital technology as part of their learning strategies. As explained by [Puspitoningrum et al \(2024\)](#), while technology can improve accessibility and learning effectiveness. Teacher professional development is essential to enhance digital competence and pedagogical integration, while governments and educational institutions need to address infrastructure gaps to ensure equitable access across regions ([Ningsih, 2024](#)).

Concrete measures such as providing stable internet access, subsidising learning devices, and developing flexible curricula responsive to technological change are necessary to support sustainable digital learning implementation (Winda & Dafit, 2021; Setiyorini & Setiawan, 2023).

While this study provides valuable insights into digital learning in primary education, it also has limitations, including limited sample coverage and the absence of longitudinal evidence on long-term learning outcomes. Future research should explore additional factors influencing digital learning effectiveness, such as social interaction in online environments, adaptive use of technology across diverse educational contexts, and inclusive digital strategies for students with special needs. As digital education continues to evolve, further investigation into emerging approaches such as artificial intelligence, adaptive learning systems, gamification, and data-driven instructional strategies will be crucial to maximising the potential of digital learning to improve educational quality for future generations.

E. Implication

The findings of this study generate several important implications for theory, practice, and educational policy. Theoretically, the results reinforce constructivist learning principles and 21st-century education frameworks that emphasise active participation, collaboration, and technology integration. The demonstrated improvement in student engagement and academic performance supports the relevance of technology-enhanced learning theories and personalised learning approaches in primary education. In practice, the study provides a foundation for schools and teachers to design more systematic and context-appropriate digital learning strategies, including the development of blended learning models and curriculum adjustments that support flexible, interactive instruction. Strengthening teacher digital competence becomes a central requirement, particularly given that a significant proportion of teachers still feel underprepared to integrate educational technology effectively. Socially, the study highlights the persistent digital divide as a substantial barrier to equitable education, calling for stronger government and institutional investment in digital infrastructure, device availability, and continuous professional development. Ensuring a healthy digital learning environment also requires collaborative involvement from families and communities to mitigate potential adverse effects on children's character development. Furthermore, the study opens opportunities for future research, especially longitudinal investigations and field-based experiments to understand the long-term impacts of digital learning. Additional studies on technology use for learners with special needs and on culturally responsive EdTech strategies are essential to support inclusive, context-sensitive digital transformation in Indonesian primary schools.

F. Limitation and Suggestion for Further Research

While this research contributes significantly to understanding the impact of digital learning at the primary school level, it has some limitations that need to be acknowledged. First, the approach used in this study is entirely based on a Systematic Literature Review (SLR), meaning that all data are sourced from secondary literature. This limits the researcher's ability to capture empirical dynamics in the field and contextual variations that may occur in the real implementation of digital learning across various regions in Indonesia. Secondly, this study does not include longitudinal data, so the long-term influence of technology integration on learning outcomes and student character development cannot be comprehensively determined. In addition, the geographical, social, and infrastructural variations between schools in Indonesia are essential factors that are not fully accommodated within the scope of this study, so the generalisation of findings needs to be done with caution. Finally, this study has not specifically examined the effectiveness of digital learning for students with special learning needs or those with non-visual learning styles, such as kinesthetics, which may require different pedagogical approaches.

Given these limitations, it is suggested that future research adopt a field-based empirical approach using quantitative, qualitative, or mixed methods to gain a more contextualised and applicable understanding of the effectiveness of digital learning. Longitudinal research is also needed to observe the long-term impact of technology use, both on academic performance and on student character development. In addition, there is a need to focus on equal access and inclusiveness, especially in disadvantaged areas and for students with special needs. It is also essential to explore integrating advanced technologies, such as artificial intelligence, adaptive learning platforms, and gamification strategies, to tailor the learning process to students' individual needs and characteristics. Finally, an analysis of the social dimensions of digital learning, such as its influence on social interaction, parental involvement, and the potential risks of over-digitisation, is an essential agenda for developing more balanced and sustainable education policies and practices in the future.

G. Conclusion

The integration of digital technology into the learning process at the primary school level has led to a significant transformation in pedagogical approaches and student learning effectiveness. Based on empirical studies, the use of digital technology has been shown to increase students' active participation and learning motivation, as well as expand access to relevant learning resources. Digital-based learning approaches also encourage learning independence, interactivity, and allow students to learn according to their individual rhythms and needs.

The research also revealed several remaining challenges, including gaps in access to digital devices, teachers' readiness to use technology in the teaching and learning process, and limited infrastructure in some areas. In addition, for students with kinesthetic

learning styles or who need hands-on guidance, digital learning should be combined with face-to-face instruction to be more effective.

As a follow-up, policies are needed that encourage equal access to technology for all students, accompanied by intensive training for educators to have adequate competence in integrating technology into the learning process. In addition, curriculum development that is flexible and responsive to technological advances is an important aspect that requires attention. For future research, it is recommended to explore in greater depth the adaptation of technology to students' various learning styles, as well as the optimal application of *blended learning* models to improve the quality of education at the primary school level.

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