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# ENHANCING ELEMENTARY STUDENTS' READING LITERACY THROUGH ARTIFICIAL INTELLIGENCE-BASED LEARNING MEDIA

# MENINGKATKAN LITERASI MEMBACA SISWA SEKOLAH DASAR MELALUI MEDIA PEMBELAJARAN BERBASIS KECERDASAN BUATAN

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**Abstract**

This study aims to investigate the integration of Artificial Intelligence (AI)-based learning media to enhance reading literacy among elementary school students. Using a descriptive qualitative approach through case study and literature analysis, the research was conducted at SDN No. 100311 Palsabolas, involving teachers and students who utilized adaptive reading applications, text-to-speech tools, and intelligent learning platforms. Data were collected through observation, semi-structured interviews, and document analysis, and validated by triangulation techniques. The findings reveal that AI-assisted media significantly improve students' reading motivation, comprehension, and fluency. Quantitative comparison between pretest and posttest results showed notable progress, with the average literacy score increasing by 16–27 points across different indicators. Students demonstrated greater engagement and independence, while teachers benefited from automated performance analytics and personalized feedback tools. However, challenges emerged related to device limitations, technical competence, and overreliance on automated features. The study concludes that AI-based learning media serve not only as technological tools but also as pedagogical instruments that personalize instruction, foster digital literacy, and transform reading classrooms into more adaptive, interactive, and student-centered environments.

**Keywords :** Artificial Intelligence, reading literacy, elementary education, digital learning, AI-based media.

**Abstrak**

Penelitian ini bertujuan untuk meneliti integrasi media pembelajaran berbasis kecerdasan buatan (AI) dalam meningkatkan literasi membaca siswa sekolah dasar. Pendekatan yang digunakan adalah kualitatif deskriptif melalui studi kasus dan analisis literatur. Penelitian dilaksanakan di SDN No. 100311 Palsabolas dengan melibatkan guru dan siswa yang memanfaatkan aplikasi membaca adaptif, alat text-to-speech, serta platform pembelajaran cerdas. Data dikumpulkan melalui observasi, wawancara semi terstruktur, dan analisis dokumen, kemudian divalidasi dengan teknik triangulasi. Hasil penelitian menunjukkan bahwa media berbasis AI secara signifikan meningkatkan motivasi,

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pemahaman, dan kelancaran membaca siswa. Perbandingan nilai pretest dan posttest memperlihatkan peningkatan rata-rata 16–27 poin pada berbagai indikator literasi. Siswa menunjukkan keterlibatan dan kemandirian belajar yang lebih tinggi, sementara guru memperoleh manfaat dari fitur analitik otomatis dan umpan balik yang dipersonalisasi. Namun, tantangan masih ditemui, seperti keterbatasan perangkat, kompetensi teknis guru, dan ketergantungan siswa terhadap fitur otomatis. Penelitian ini menyimpulkan bahwa media pembelajaran berbasis AI tidak hanya berfungsi sebagai alat teknologi, tetapi juga sebagai instrumen pedagogis yang mampu mempersonalisasi pembelajaran, memperkuat literasi digital, serta menciptakan kelas membaca yang lebih adaptif, interaktif, dan berpusat pada siswa.

**Kata Kunci :** Kecerdasan buatan, literasi membaca, pendidikan dasar, pembelajaran digital, media berbasis AI.

## 1. INTRODUCTION

The acceleration of technological innovation in the era of the Fourth Industrial Revolution and Society 5.0 has fundamentally reshaped educational paradigms, particularly at the elementary school level where foundational competencies are established. Digital transformation in education is no longer limited to the use of devices but extends to intelligent systems capable of analyzing learners' behavior and adapting instructional content accordingly. Artificial Intelligence (AI) has emerged as a transformative force in instructional media, enabling personalized learning pathways, real-time feedback, and interactive learning experiences that were previously unattainable through conventional teaching methods (Ismaya et al., 2025). In this context, AI-based learning media represent a strategic innovation for strengthening reading literacy as a core competency in basic education.

Reading literacy plays a critical role in shaping students' cognitive development, language mastery, and higher-order thinking skills. It functions not only as a tool for academic achievement but also as a gateway to lifelong learning and informed participation in society. Nevertheless, empirical evidence indicates that a substantial proportion of elementary students in developing countries encounter persistent difficulties in achieving expected reading proficiency levels. These challenges are often associated with limited access to engaging learning resources, insufficient differentiation in instruction, and minimal exposure to digital literacy practices (Achmad et al., 2025). Traditional literacy instruction, which frequently relies on teacher-centered approaches and uniform learning materials, tends to overlook individual differences in students' reading abilities, motivation, and learning pace.

In response to these limitations, AI-based learning media have gained increasing attention as innovative solutions for addressing literacy gaps in elementary education. Adaptive reading applications, text-to-speech technologies, and automated pronunciation and comprehension feedback systems enable students to interact with texts in more dynamic and supportive ways. These tools adjust text difficulty, provide immediate corrective feedback, and offer multimodal learning experiences that cater to diverse learning styles (Yani et al., 2025). Such features align with constructivist learning principles, emphasizing active engagement, learner autonomy, and continuous scaffolding in the reading process.

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Recent empirical studies further demonstrate that AI-supported educational media significantly enhance students' motivation, engagement, and reading comprehension. By leveraging data-driven algorithms, AI systems can monitor learners' progress and modify instructional content based on performance patterns, thereby fostering more effective and individualized learning experiences (Yu, 2025). Additionally, AI-powered learning analytics provide teachers with actionable insights into students' strengths and weaknesses, enabling targeted interventions and informed instructional decision-making (Ambretti et al., 2025). In the Indonesian educational context, the integration of AI into literacy instruction is consistent with national education reform agendas that prioritize digital literacy, personalized learning, and technology-enhanced pedagogy in elementary schools (Hatima, 2025).

Despite the pedagogical potential of AI-based learning media, their implementation at the elementary level is not without challenges. Teachers frequently encounter obstacles related to limited digital competence, inadequate technological infrastructure, and insufficient professional development opportunities focused on AI integration (Savitri & Rokhmawati, 2025). Moreover, concerns have been raised regarding the overreliance on automated instructional features, which may reduce students' opportunities to develop independent reading strategies and critical engagement with texts if not balanced with effective teacher guidance (Li et al., 2025). These challenges underscore the importance of examining not only the effectiveness of AI-based media but also the conditions under which they can be optimally integrated into literacy instruction.

Accordingly, this study seeks to analyze the implementation of Artificial Intelligence-based learning media in enhancing reading literacy among elementary school students. The research focuses on how AI-driven tools, through adaptive, interactive, and data-informed mechanisms, contribute to improving students' reading motivation, comprehension, and fluency. By synthesizing field-based findings and relevant scholarly literature, this study aims to elucidate the pedagogical role of AI in fostering more inclusive, responsive, and future-oriented literacy learning environments in elementary education.

## 2. RESEARCH METHOD

This study employed a qualitative descriptive methodology with a case study approach to examine the implementation of Artificial Intelligence (AI)-based learning media in improving reading literacy among elementary school students. The research was conducted at SDN No. 100311 Palsabolas and involved 23 students from grades IV and V, along with two literacy teachers selected through purposive sampling. The study was guided by a design-based research (DBR) framework, which enabled iterative implementation and evaluation of AI-supported learning media within authentic classroom contexts to ensure pedagogical relevance and contextual validity (Ismaya et al., 2025). In conclusion, the implementation of AI-based learning media within a design-based research framework demonstrates meaningful potential to enhance elementary students' reading literacy in authentic classroom settings.

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Data were collected through systematic classroom observations, semi-structured interviews, and document analysis, including pretest–posttest literacy assessments and AI-generated learning analytics. Observational data captured students' engagement, reading fluency, and interaction patterns with AI-based media, while interviews explored instructional experiences and perceived learning outcomes. Data analysis followed an interactive qualitative model consisting of data condensation, data display, and conclusion drawing to ensure analytical rigor and transparency (Miles, M. B., Huberman, A. M., & Saldaña, 2014). Ethical standards were upheld through informed consent procedures and strict protection of participants' data confidentiality throughout the research process.

## 3. RESULT AND DISCUSSION

### a. Results

The findings of this field study indicate a substantial improvement in students' reading literacy following the implementation of Artificial Intelligence (AI)-based learning media. Quantitative analysis of literacy assessment data revealed that the average student score increased by 21.3 points, rising from a pretest mean of 57.6 to a posttest mean of 78.9. Improvements were consistently observed across three core literacy domains: reading comprehension, reading fluency, and critical response to texts. The most notable gains occurred in reading comprehension, where students demonstrated enhanced ability to identify main ideas, infer meanings, and respond to contextual questions generated by AI-assisted reading platforms.

Classroom observations further revealed a marked shift in students' learning behavior during AI-supported literacy sessions. Students engaged more actively with reading materials, frequently utilizing text-to-speech functions, interactive quizzes, and adaptive prompts to clarify pronunciation and meaning. The availability of immediate feedback enabled learners to self-correct reading errors in real time, fostering greater independence and metacognitive awareness. Teachers reported that approximately 87% of students voluntarily extended their reading activities beyond scheduled instructional time, indicating increased intrinsic motivation and sustained engagement with texts.

These findings are consistent with (Heidarian et al., 2025), who emphasized that AI-based instructional media can establish "smart learning ecosystems" that promote learner autonomy, adaptive skill development, and continuous feedback. Similarly, (Yenti et al., 2025) highlighted that immersive digital technologies, including AI-supported reading agents, significantly enhance children's interest in reading and strengthen narrative comprehension. The convergence of quantitative improvements and qualitative behavioral changes in this study underscores the effectiveness of AI-based media in supporting foundational literacy development at the elementary level.

### b. Discussion

The integration of AI-based learning media into elementary literacy instruction yielded multifaceted pedagogical benefits. One of the most prominent contributions was adaptive

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personalization, whereby reading materials were dynamically adjusted to match individual students' proficiency levels. This feature enabled struggling readers to progress gradually without experiencing cognitive overload, while more advanced learners were challenged with higher-level comprehension tasks. Such differentiated instruction aligns with constructivist learning principles, which emphasize knowledge construction through individualized learning experiences and active engagement (Klaassen et al., 2025). Consequently, the use of AI-based adaptive learning media supports equitable and effective literacy development by accommodating diverse reading abilities within a constructivist-oriented instructional framework.

Another significant outcome was the enhancement of teachers' instructional decision-making through AI-driven analytics and feedback systems. Automated dashboards visualized students' reading fluency, comprehension patterns, and progress trajectories, allowing teachers to identify learning gaps and implement timely interventions. This data-informed approach contributed to more precise and responsive instruction, reinforcing the role of AI as a pedagogical support tool rather than a replacement for teachers. These findings corroborate the results reported by (Abdillah & Anggraeni, 2025), who found that AI-supported visual media improved students' reading retention and higher-order thinking skills in elementary classrooms. Therefore, AI-driven analytics function as an effective pedagogical aid that strengthens teachers' instructional responsiveness and substantiates the role of AI as a complementary tool in enhancing elementary literacy learning outcomes.

Beyond cognitive and instructional dimensions, the qualitative data revealed an affective impact of AI-assisted reading environments. Students expressed increased enjoyment, confidence, and emotional comfort when interacting with AI-based tools, perceiving them as supportive learning companions rather than evaluative authorities. This positive emotional engagement contributed to students' persistence in reading tasks and willingness to explore more complex texts. Such outcomes are in line with (Yang, 2025), who demonstrated that multimedia and AI-enhanced learning environments support social-emotional learning and foster adaptive behaviors among young learners. Accordingly, the affective benefits of AI-assisted reading environments play a crucial role in sustaining students' motivation and resilience, thereby reinforcing the holistic effectiveness of AI integration in elementary literacy education.

Despite these positive outcomes, several implementation challenges were identified. Teachers initially faced difficulties in navigating AI interfaces and required additional training to integrate the tools effectively into literacy instruction. Moreover, infrastructural constraints, including inconsistent internet connectivity and limited access to digital devices, restricted optimal use of AI-based media in some classroom sessions. These challenges reflect the broader issue of digital inequality in education, as highlighted by (Rosário & Dadaczynski, 2025), who argued that disparities in technological access can impede sustainable and equitable technology adoption in schools. Thus, addressing teachers' digital competencies and

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infrastructural limitations is essential to ensure equitable, sustainable, and effective implementation of AI-based learning media in elementary literacy education.

Nevertheless, the overall findings affirm that AI-based learning media represent effective and innovative tools for enhancing reading literacy in elementary education. The combination of adaptive algorithms, multimodal learning pathways, and continuous feedback mechanisms not only improved students' reading competence but also enhanced teachers' instructional precision and responsiveness. Furthermore, the integration of AI-based literacy instruction aligns with the UNESCO digital literacy framework (2023), which positions artificial intelligence as a key enabler of inclusive, equitable, and lifelong learning.

In summary, this study reinforces the growing body of evidence supporting AI-enhanced literacy environments as catalysts for active, self-regulated, and data-informed learning. The synergistic integration of human pedagogy and artificial intelligence creates a hybrid model of literacy education that holds strong potential for scalability and sustainability in elementary classrooms in Indonesia and comparable educational contexts worldwide.

## 4. CONCLUSION

This study concludes that the integration of Artificial Intelligence-based learning media has a significant and positive impact on enhancing the reading literacy skills of elementary school students. The findings reveal that AI-assisted learning environments improve students' reading comprehension, fluency, and motivation through adaptive feedback and interactive digital engagement. Students demonstrated a consistent increase in literacy scores and exhibited more autonomous and reflective learning behaviors.

Moreover, AI tools empowered teachers to monitor student progress through real-time analytics, allowing for more accurate and data-driven pedagogical interventions. This confirms the dual role of AI as a technological enhancer and as a pedagogical partner that supports individualized instruction and optimizes learning outcomes.Nevertheless, several challenges remain, including limited technological infrastructure and varying levels of teacher digital competence. Addressing these issues requires systemic professional development and equitable access to digital resources.

Overall, the study reinforces that AI-based media integration is not merely a technological innovation but a transformative educational practice that fosters critical, creative, and literate learners. The results of this research are expected to serve as a reference for future policies and practices aimed at strengthening digital literacy and artificial intelligence integration in primary education.

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