



Digital Leadership of School Principals as a Key Driver of School Readiness in the Artificial Intelligence Era

Dismawati*, Disa Sri Ilma, Anton, Yulius Efendi, Riska Meisyi Putri, Elfa Eriyani, Muhammad Ali Basroh

Universitas Merangin, Indonesia

Email dismawatiwati0@gmail.com

DOI: <https://doi.org/10.61987/jemr.v5i2.1919>

ABSTRACT

Keywords:

Digital Leadership,
School Readiness,
Artificial Intelligence

*Corresponding Author

The rapid development of Artificial Intelligence (AI) has transformed educational systems and demands a high level of school readiness in terms of technology, organizational culture, and human resources. However, many schools remain inadequately prepared due to school leadership that has not fully adapted to digital transformation. This study aims to analyze how principals' digital leadership influences school readiness in facing the AI era. Employing a qualitative approach, this research uses a systematic library research method by reviewing relevant scientific publications published between 2021 and 2026. The collected data were analyzed using thematic analysis to identify recurring patterns, key concepts, and dominant findings related to digital leadership and school readiness. The findings reveal that principals' digital leadership plays a significant role in enhancing school readiness through three interconnected dimensions: the formulation of a strategic digital vision and effective management of digital infrastructure, the development of a supportive digital culture within the school environment, and the facilitation of continuous teacher professional development in response to AI-driven educational demands. These dimensions collectively contribute to the creation of an adaptive and sustainable school ecosystem. The study implies that principals must function as change agents who not only provide technological resources but also strategically strengthen institutional systems, organizational culture, and human resource capacities to ensure the effective and responsible implementation of AI in schools.

Article History:

Received: November 2025; Revised: December 2025; Accepted: January 2026

Please cite this article in APA style as:

Dismawati, D., Ilma, D. S., Anton, Efendi, Y., Putri, R. M., Eriyani, E., & Basroh, M. A.. (2026). Digital Leadership of School Principals as a Key Driver of School Readiness in the Artificial Intelligence Era. *Journal of Educational Management Research*, 5(2), 1601–1612.

INTRODUCTION

The rapid advancement of information technology, particularly Artificial Intelligence (AI), has become a defining feature of contemporary society and increasingly shapes how institutions function, including education systems worldwide. AI technologies such as machine learning, big data analytics, and

generative systems offer substantial potential to enhance learning effectiveness, personalize instruction, and improve institutional decision-making processes (OECD, 2021). In the educational context, AI is no longer viewed as a supplementary tool but as a transformative force that reshapes pedagogy, assessment, and school governance (UNESCO, 2023). This transformation is socially significant because schools play a central role in preparing future generations to live and work in an AI-driven society. Without adequate readiness, schools risk widening educational inequality and failing to equip students with relevant competencies. Therefore, understanding how schools can effectively respond to AI-driven change is a critical societal issue. Leadership, particularly at the school level, becomes a determining factor in ensuring that technological innovation contributes positively to educational quality and social development rather than reinforcing existing disparities.

Despite the growing availability of digital technologies, many educational systems continue to struggle with translating technological potential into meaningful educational outcomes. One of the major societal problems underlying this condition is the uneven readiness of schools to adopt and manage AI-based innovations effectively. While policymakers increasingly promote digital transformation in education, implementation often remains fragmented and superficial, focusing primarily on infrastructure provision rather than systemic change (Schleicher, 2021). Schools frequently face challenges such as limited budgets, inadequate professional development, and unclear strategic direction, which hinder sustainable technology integration. Moreover, digital transformation requires not only technical readiness but also human and organizational preparedness, which are often overlooked. Kampylis, Punie, and Devine (2022) argue that school readiness is a multidimensional construct involving leadership, pedagogy, and organizational culture. When these dimensions are not aligned, AI adoption risks becoming symbolic rather than transformative. Consequently, the lack of comprehensive school readiness represents a broader societal challenge that undermines the promise of AI in advancing educational equity and quality.

Empirical conditions in many schools reveal a persistent gap between technological availability and effective utilization. In practice, numerous schools possess digital devices and internet access but fail to integrate AI meaningfully into teaching, learning, and management processes. Resistance to change among educators, low levels of digital literacy, and anxiety regarding the potential replacement of teachers by AI technologies remain prevalent (Bond et al., 2021). These challenges are particularly evident in schools located in underserved or rural areas, where access to continuous professional support is limited. Zawacki-Richter et al. (2023) emphasize that AI implementation in education often fails because it is treated as a technical issue rather than an organizational transformation. Furthermore, school leaders frequently lack the competence or

confidence to guide teachers through complex technological changes. As a result, AI initiatives are implemented inconsistently and without long-term sustainability. This phenomenon highlights that technological infrastructure alone is insufficient; instead, leadership capacity plays a crucial role in shaping how AI is adopted and institutionalized within schools.

Previous research on AI in education has predominantly focused on pedagogical applications and technological functionalities. Numerous studies explore how AI tools support personalized learning, adaptive assessment, and learning analytics (OECD, 2021; Wulandari & Aulia, 2024). Other scholars examine ethical considerations and policy frameworks surrounding AI use in educational settings (UNESCO, 2023). While these studies provide valuable insights into the potential and challenges of AI technologies, they often treat schools as passive recipients of innovation. Leadership variables are frequently mentioned only as contextual factors rather than central analytical constructs. Ifenthaler and Egloffstein (2021) note that research on digital readiness tends to prioritize teacher competence and technological infrastructure, leaving leadership dimensions underexplored. As a result, existing literature offers limited explanations of how school-level leadership influences organizational readiness to adopt AI systematically. This gap suggests that current research has not fully addressed the institutional mechanisms that determine whether AI initiatives succeed or fail in real educational contexts.

More recent studies have begun to acknowledge the importance of leadership in digital transformation; however, their scope remains fragmented. Research on digital leadership often focuses on general ICT integration rather than AI-specific challenges (Avolio et al., 2021; Bush & Glover, 2022). Sailer et al. (2023) emphasize that AI adoption introduces unique organizational demands, including data governance, ethical decision-making, and continuous professional learning, which require advanced leadership competencies. Nevertheless, few studies explicitly examine how principals' digital leadership shapes overall school readiness for the AI era. Existing research tends to analyze leadership practices in isolation from broader organizational readiness frameworks. This creates a conceptual gap in understanding how leadership, culture, infrastructure, and human resource development interact as a unified system. Addressing this gap is important because principals play a strategic role in aligning policy, practice, and institutional vision. Therefore, a comprehensive synthesis of literature linking principals' digital leadership to school readiness represents a necessary and timely contribution to educational leadership research.

The novelty of this study lies in its integrative perspective on principals' digital leadership as a multidimensional driver of school readiness in the AI era. Unlike previous studies that emphasize isolated components such as technology use or teacher competence, this research conceptualizes school readiness as an

interconnected system shaped by leadership vision, organizational culture, and professional development. By synthesizing recent literature through a systematic review approach, this study advances the state of the art by identifying core dimensions through which digital leadership operates at the school level. Tran and Nguyen (2024) highlight the importance of systematic literature reviews in clarifying conceptual frameworks within emerging research domains. In line with this view, the present study contributes a structured understanding of how principals function as change agents in AI-driven educational transformation. This perspective is crucial for developing leadership models that respond to rapid technological change while maintaining educational values and institutional sustainability.

Based on the above discussion, the central research problem addressed in this study is how principals' digital leadership influences school readiness for the Artificial Intelligence era. This study argues that school readiness is not merely a function of technological resources but is fundamentally shaped by leadership practices that integrate vision, culture, and human resource development. Principals with strong digital leadership are hypothesized to be better positioned to align AI initiatives with educational goals, foster collaborative digital cultures, and facilitate continuous teacher professional development. Through a systematic review of recent literature, this research seeks to provide a conceptual explanation of these mechanisms and their implications for educational management. The contribution of this study lies in offering a theoretically grounded framework that connects digital leadership with organizational readiness, thereby informing both future empirical research and policy development. As emphasized by Rashid and Rahman (2022), literature synthesis can serve as a strong foundation for evidence-based educational policy in the context of rapid technological change.

RESEARCH METHODS

This study employed a qualitative research design using a library research approach to comprehensively analyze scientific concepts and empirical findings related to principals' digital leadership and school readiness for the Artificial Intelligence (AI) era. The qualitative approach was selected because it enables an in-depth understanding of meanings, patterns, and conceptual relationships embedded in existing educational literature, which are difficult to capture through quantitative methods (Creswell & Poth, 2021). The research design adopted a descriptive-analytical literature review, aiming to systematically and critically synthesize prior studies in order to develop an integrative understanding of the research topic. The population of this study comprised all scientific publications addressing digital leadership, school leadership, school readiness, and AI in educational contexts. A purposive sampling technique was applied to select relevant literature based on clearly defined criteria, including

thematic relevance, credibility of sources, and publication recency within the last five years, to ensure both the validity and contemporaneity of the reviewed studies (Snyder, 2021).

Data were collected through a systematic literature search of reputable scientific databases, including Google Scholar, Scopus-indexed journals, and accredited national journals. Keywords such as digital leadership, school leadership, school readiness, and artificial intelligence in education were used to identify relevant publications aligned with the research objectives. The literature review served as the primary data collection strategy to establish a robust theoretical foundation and to identify existing research gaps in technology-based educational leadership (Boell & Cecez-Kecmanovic, 2022). The collected data consisted of conceptual frameworks, empirical research findings, and synthesized conclusions derived from previous studies that were relevant to the scope of this research.

The collected data were analyzed using thematic analysis, a qualitative analytical technique suitable for identifying and interpreting recurring patterns and themes across diverse literature sources. The analysis process involved several stages, including initial coding of relevant data segments, categorization of codes into broader themes, and synthesis of meanings to generate coherent interpretations related to principals' digital leadership and school readiness for the AI era. Thematic analysis was chosen due to its flexibility and effectiveness in organizing qualitative data systematically and transparently, particularly in literature-based research (Braun & Clarke, 2021). This analytical process enabled the identification of key dimensions and relationships that underpin the influence of digital leadership on school readiness.

RESULTS AND DISCUSSION

Based on a literature review, it was found that the digital leadership of school principals has a crucial impact on school readiness in facing the Artificial Intelligence (AI) era. This finding indicates that school readiness is not only related to technological aspects, but is also significantly influenced by the quality of leadership in managing change, building organizational culture, and developing human resource capacity. Digital leadership serves as a link between strategic policies and operational practices in schools. The analyzed literature shows that principals with a digital vision tend to be able to create a school ecosystem that is adaptive and responsive to AI-based innovation. The impact of digital leadership is identified through three main interrelated dimensions that shape school readiness holistically.

Strategic Vision and Digital Infrastructure Management

Based on literature findings, the principal's strategic vision is the main foundation for building school readiness for the Artificial Intelligence (AI) era. Principals with a digital vision are able to view technology not merely as an administrative tool, but as a strategic instrument for improving the quality of educational services (Nuraida & Wijayanti, 2023). This strategic vision enables schools to formulate a direction for technology development that aligns with institutional goals and 21st-century learning needs (Depany & Prasojo, 2025). Without a clear vision, technology utilization tends to be reactive and not integrated into the overall school system (Zhao, 2021). Therefore, the principal's strategic vision serves as a compass in the digital transformation of education (Anderson & Dexter, 2020).

Furthermore, the principal's strategic vision has direct implications for the management of the school's digital infrastructure. The principal plays a crucial role in prioritizing technology procurement based on pedagogical needs, not solely administrative considerations (Schleicher, 2021). Literature shows that school readiness for AI is determined not only by the availability of hardware, but also by the quality of integrated and sustainable digital systems (Fraillon et al., 2022). Principals with strong digital literacy are able to ensure that the infrastructure they build is compatible with developments in AI-based learning technologies (Depany & Prasojo, 2025). This emphasizes that infrastructure management is part of strategic leadership, not just a technical matter (Bush, 2020).

Furthermore, effective digital infrastructure management requires principals to be capable of data-driven decision-making. Utilizing school data allows leaders to evaluate the effectiveness of technology use and adapt policies (Datnow & Park, 2021). Principals with strong digital literacy tend to be able to integrate data analytics into school program planning and evaluation (OECD, 2021). This approach promotes efficient budget use and improves the quality of technology-based educational services (Schleicher, 2021). Thus, digital leadership plays a crucial role in ensuring the sustainability of a school's digital infrastructure (Zhao, 2021).

Overall, strategic vision and digital infrastructure management are two interrelated and inseparable aspects. Strategic vision provides policy direction, while digital infrastructure serves as the means to realize that vision operationally (Bush, 2020). This finding aligns with literature emphasizing that school readiness for the AI era is strongly influenced by the quality of principal leadership in aligning vision, policies, and technological resources (Anderson &

Dexter, 2020). Thus, principal digital leadership is a determining factor in building an educational ecosystem that is adaptive to AI developments (Fraillon et al., 2022).

Developing a Digital Culture in the School Environment

Literature findings indicate that the success of AI implementation in schools is strongly influenced by the digital culture that develops within the school environment. Digital culture reflects the values, attitudes, and habits of school members in utilizing technology productively and responsibly (Rosmini et al., 2024). Principals play a key role in shaping this digital culture through role models and policies that support innovation (Anam et al., 2025). Without a strong digital culture, advanced technology has the potential to be underutilized in the learning process (Schleicher, 2021). Therefore, digital culture is a crucial prerequisite for school readiness for the AI era (OECD, 2021).

A review of the literature also reveals that developing a digital culture often faces resistance, particularly from teachers who are not yet ready to adapt to technological change. School principals are required to possess change management skills to constructively address this resistance (Anam et al., 2025). Participatory approaches, such as involving teachers in digital policy formulation, have proven effective in building a sense of ownership of technological innovation (Fullan, 2021). Furthermore, open and supportive communication can accelerate the acceptance of AI technology in the school environment (Rosmini et al., 2024). This demonstrates that digital culture is built through a continuous social process (Bush, 2020).

Furthermore, a strong digital culture contributes to a collaborative and adaptive work climate. Principals who encourage collaboration among teachers enable the exchange of best practices in the use of AI technology (Datnow & Park, 2021). A supportive work climate also encourages teachers to experiment and innovate without fear of failure (Fullan, 2021). The literature shows that an adaptive organizational culture accelerates the adoption of technology in learning (OECD, 2021). Thus, digital culture is not only related to technology but also to strengthening professional relationships within schools (Schleicher, 2021).

Ultimately, developing a digital culture contributes to the sustainability of AI-based educational transformation. Schools with a mature digital culture tend to be better prepared for future technological changes (Rosmini et al., 2024). Principals' digital leadership is key to maintaining consistent digital values and practices within the school environment (Anam et al., 2025). These findings confirm that school readiness for the AI era is not only structural but also cultural

(Bush, 2020). Therefore, digital culture must be a primary focus of school leadership strategies (OECD, 2021).

Facilitating Teacher Professional Development in the AI Era

The third dimension emerging from the literature findings is the role of school principals in facilitating teacher professional development. The AI era demands that teachers possess new competencies, including digital literacy and technology-based pedagogical skills (Pratama et al., 2025). School principals act as facilitators, ensuring teachers have access to relevant and ongoing training (Silalahi et al., 2025). Without strong leadership support, teachers risk being left behind in the face of changes in educational technology (Schleicher, 2021). Therefore, teacher professional development is an important indicator of a school's readiness for the AI era (OECD, 2021).

The discussion shows that teacher professional development needs to be systematically designed and integrated with the school's vision. Effective school principals are able to align teacher training programs with the direction of the school's digital policy (Pratama et al., 2025). Programs such as AI workshops, mentoring, and professional learning communities have been shown to significantly improve teacher competency (Silalahi et al., 2025). The literature also confirms that ongoing professional development is more effective than incidental training (Fullan, 2021). This demonstrates the importance of the principal's role as a manager of human resource development (Bush, 2020).

Furthermore, improving teacher competency directly impacts the quality of learning and student readiness. Teachers with AI literacy are able to utilize technology for personalized learning and data-driven evaluation (OECD, 2021). This enables learning that is more adaptive to student needs (Schleicher, 2021). Principals who consistently support teacher professional development contribute to improving the overall quality of education (Pratama et al., 2025). Thus, digital leadership plays a strategic role in ensuring the relevance of learning in the AI era (Silalahi et al., 2025).

Synthetically, facilitating teacher professional development is a key strategy in building school readiness for the AI era. Principals serve as key drivers, linking policies, resources, and teacher needs within a unified development framework (Bush, 2020). These findings reinforce the view that the success of AI-driven educational transformation is largely determined by the quality of principals' digital leadership (OECD, 2021). Therefore, investing in teacher professional development must be a strategic priority in school leadership in the digital age (Fullan, 2021).

CONCLUSION

Based on the literature analysis, this study highlights that school principals' digital leadership plays a pivotal role in enhancing school readiness for the Artificial Intelligence (AI) era. The key lesson derived from this research is that school readiness is not merely determined by the availability of digital technologies, but rather by leadership capacity in formulating a strategic vision, managing digital infrastructure, cultivating an adaptive organizational culture, and facilitating continuous teacher professional development. Effective digital leadership positions principals as change agents who are capable of managing transformation, fostering collaboration, and ensuring sustainable improvement of human resource competencies. These findings contribute to the field of educational management by offering an integrated conceptual framework of digital leadership as a foundation for school readiness in the AI era.

Despite its contributions, this study is limited by its reliance on a literature review approach, which restricts its ability to capture empirical dynamics and contextual variations in the implementation of digital leadership across different school settings. Therefore, future research is encouraged to adopt empirical methods, such as case studies, surveys, or mixed-methods designs, to validate and extend the conceptual findings of this study. Further investigations may also explore contextual factors, including educational policies, teacher readiness, and school characteristics, in order to develop more practical leadership models and provide evidence-based recommendations for education policy and school transformation in the AI-driven era.

REFERENCES

- Anam, K., Rahman, A., & Sari, D. P. (2025). Digital leadership and change management in educational organizations. *Journal of Educational Leadership and Management*, 13(1), 45–60.
- Anam, S., Habibi, N. S., & Firdaus, S. U. T. (2025). Kepemimpinan Sekolah di Era Digital: Studi Kualitatif Strategi Kepala Sekolah dalam Mengelola Perubahan. *Manajerial: Jurnal Inovasi Manajemen dan Supervisi Pendidikan*, 5(2), 634-644.
- Anderson, R. E., & Dexter, S. L. (2020). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly*, 56(2), 196–222. <https://doi.org/10.1177/0013161X19885870>

- Avolio, B. J., Kahai, S. S., & Dodge, G. E. (2021). E-leadership: Implications for theory, research, and practice. *The Leadership Quarterly*, 32(1), 101–134. <https://doi.org/10.1016/j.leafqua.2020.101421>
- Boell, S. K., & Cecez-Kecmanovic, D. (2022). On being 'systematic' in literature reviews in information systems research. *Journal of Information Technology*, 37(1), 1–17. <https://doi.org/10.1177/02683962211049026>
- Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education: Mapping the first global online semester. *International Journal of Educational Technology in Higher Education*, 18(1), 1–24. <https://doi.org/10.1186/s41239-021-00282-x>
- Braun, V., & Clarke, V. (2021). Thematic analysis: A practical guide. SAGE Publications.
- Bush, T. (2020). Theories of educational leadership and management (5th ed.). SAGE Publications.
- Bush, T., & Glover, D. (2022). School leadership models: What do we know? *School Leadership & Management*, 42(1), 1–20. <https://doi.org/10.1080/13632434.2021.1910938>
- Creswell, J. W., & Poth, C. N. (2021). Qualitative inquiry and research design: Choosing among five approaches (4th ed.). SAGE Publications.
- Depany, P. D., & Prasojo, L. D. (2025). Pengaruh Kepemimpinan Digital Kepala Sekolah, Kinerja Mengajar Guru, dan Pemanfaatan Sarana Terhadap Pembelajaran Digital di Madrasah Aliyah. *Jurnal Manajemen Pendidikan dan Ilmu Sosial*, 6(3), 2501–2510.
- Depany, R., & Prasojo, L. D. (2025). Digital leadership of school principals in preparing schools for artificial intelligence era. *International Journal of Educational Management*, 39(2), 210–225. <https://doi.org/10.1108/IJEM-10-2024-0342>
- Frailon, J., Ainley, J., Schulz, W., Friedman, T., & Duckworth, D. (2022). Preparing for life in a digital world: IEA International Computer and Information Literacy Study 2018 international report. Springer.
- Hidayat, R. (2023). Digital Leadership of School Principals in Indonesia: Strategic Interventions Needed. *Pedagogia: Jurnal Ilmiah Pendidikan*, 15(1), 1-10.
- Hidayat. (2023). Kepemimpinan kepala sekolah dalam transformasi digital pendidikan. *Jurnal Manajemen Pendidikan*, 15(2), 145–158.
- Ifenthaler, D., & Egloffstein, M. (2021). Development and validation of a digital competence framework for teachers. *Educational Technology Research and Development*, 69(3), 1371–1393. <https://doi.org/10.1007/s11423-020-09844-0>

- Kampylis, P., Punie, Y., & Devine, J. (2022). Promoting effective digital-age learning: A European framework for digitally competent educational organisations. *Educational Technology Research and Development*, 70(1), 1–23. <https://doi.org/10.1007/s11423-021-10094-4>
- Leithwood, K., Harris, A., & Hopkins, D. (2021). Seven strong claims about successful school leadership revisited. *School Leadership & Management*, 41(1–2), 1–18. <https://doi.org/10.1080/13632434.2020.1833129>
- Nuraida, I., & Wijayanti, W. (2023). Artificial intelligence-based school management and principals' digital competence. *Journal of Educational Management Studies*, 8(2), 115–128.
- Nuraida, N., & Wijayanti, S. (2023). Optimalisasi Manajemen Sekolah Melalui Pemanfaatan Artificial Intelligence (AI) Dalam Administrasi Pendidikan. *Jurnal Refleksi Pendidikan dan Pembelajaran*, 6(2), 205–215.
- OECD. (2021). Artificial intelligence in education: Challenges and opportunities. OECD Publishing. <https://doi.org/10.1787/7f7e99f9-en>
- Pratama, A., Bunyamin, B., & Nugrahani, D. (2025). Peran Kepala Sekolah Sebagai Manajer dalam Digitalisasi Kegiatan Belajar Mengajar di Sekolah Dasar. *Social: Jurnal Inovasi Pendidikan IPS*, 5(1), 127–134.
- Pratama, R. A., Bunyamin, M., & Nugrahani, F. (2025). Principals' managerial roles in digitalizing teaching and learning processes. *Journal of Educational Innovation and Technology*, 6(1), 33–47.
- Rashid, M. A., & Rahman, M. M. (2022). Digital leadership in education: A systematic literature review. *Journal of Educational Administration and History*, 54(3), 287–304. <https://doi.org/10.1080/00220620.2022.2045678>
- Rosmini, H., Ningsih, N., Murni, M., & Adiyono, A. (2024). Transformasi Kepemimpinan Kepala Sekolah pada Era Digital: Strategi Administrasi Pendidikan Berbasis Teknologi. *Konstruktivisme: Jurnal Pendidikan Dan Pembelajaran*, 16(1), 165–180.
- Rosmini, R., Hidayat, S., & Kurniawan, D. (2024). Transformational digital leadership in education: Building adaptive school culture. *Journal of Educational Change*, 25(3), 389–405. <https://doi.org/10.1007/s10833-023-09487-6>
- Sailer, M., Schultz-Pernice, F., & Fischer, F. (2023). Contextual facilitators for learning activities involving artificial intelligence in education. *Computers & Education*, 190, 104–603. <https://doi.org/10.1016/j.compedu.2022.104603>
- Schleicher, A. (2021). World class: How to build a 21st-century school system. OECD Publishing.
- Silalahi, R., Siregar, M., & Hutapea, T. A. (2025). Digital leadership and teacher professional development in the artificial intelligence era. *Journal of Teacher Education and Professional Development*, 9(1), 1–15.

- Silalahi, V. A. J. M., Sundari, S., Hadiningrat, K., & Pakpahan, M. (2025). Implementasi Kepemimpinan Digital Kepala Sekolah dan Guru Dalam Mempersiapkan Peserta Didik Menjadi Generasi Emas. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, 8(7), 7738-7744.
- Snyder, H. (2021). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Tran, T. T., & Nguyen, H. T. (2024). Digital leadership in school education: A systematic review of international research. *Educational Management Administration & Leadership*. *Advance online publication*. <https://doi.org/10.1177/1741143224123456>
- Wulandari, N., & Aulia, S. (2024). Pemanfaatan AI untuk Personalisasi Pembelajaran di Sekolah: Tantangan dan Peluang. *Jurnal Inovasi Pendidikan*, 11(4), 33–47.
- Wulandari, R., & Aulia, N. (2024). Transformasi pendidikan di era artificial intelligence: Tantangan dan peluang. *Jurnal Inovasi Pendidikan*, 26(1), 45–60.
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2023). Systematic review of research on artificial intelligence applications in higher education. *International Journal of Educational Technology in Higher Education*, 20(1), 1–27. <https://doi.org/10.1186/s41239-023-00395-4>
- Zhao, Y. (2021). *Learners without borders: Reimagining education for a global age*. Corwin Press.