

Leading Digital Transformation: Principal Strategies for Building a Digital School Culture

Dwi Andini, Maya Novita Sari

dwiandini.2025@student.uny.ac.id, mayanovitasari@uny.ac.id
Faculty of Education, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia

Article Info

Article history:

Submission may 19, 2026
First Revised may 30, 2026
Accepted jun 21, 2026
Published jul 31, 2026

Keywords:

digital school culture
digital transformation
educational leadership
school digitalization

ABSTRACT

This study aimed to analyze the principal's leadership in developing a digital school culture by examining leadership strategies, implementation processes, and challenges in integrating technology within the school environment. A qualitative approach with a case study design was employed. Participants included the principal, teachers, and educational staff selected through purposive sampling. Data were collected through semi-structured interviews, classroom and school observations, and document analysis. The data were analyzed using the interactive model of Miles, Huberman, and Saldaña, encompassing data condensation, data display, and conclusion drawing. The findings revealed that the principal enacted visionary, transformational, and adaptive leadership by integrating technology-driven initiatives with Islamic values to promote a sustainable digital school culture. Leadership practices were reflected in the implementation of digital policies, continuous teacher professional development, and the integration of digital technologies into teaching and learning activities. These strategies enhanced teachers' digital competence, strengthened collaborative practices, and increased student engagement in technology-supported learning. Nevertheless, several challenges persisted, including inadequate technological infrastructure, unstable internet connectivity, and the potential misuse of digital technologies by students. This study demonstrates that effective digital school transformation depends not only on technological resources but also on strong, adaptive, and values-based school leadership. The findings contribute to the digital leadership literature by highlighting the importance of aligning technological innovation, organizational culture, and institutional values to foster sustainable digital school development.

© 2026 Authors.

This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY-SA\)](#)



Corresponding Author:

Dwi Andini
Universitas Negeri Yogyakarta
Email: dwiandini.2025@student.uny.ac.id

How to cite:

Andini, D., & Sari, M. N. (2026). Leading Digital Transformation: Principal Strategies for Building a Digital School Culture. *Pedagogia: Jurnal Ilmiah Pendidikan*, 18(1), 27–41.
<https://doi.org/10.55215/pedagogia.v18i1.100>

Introduction

The rapid advancement of digital technology has fundamentally transformed educational systems worldwide, requiring schools to adapt their organizational structures, learning processes, and leadership practices to meet the demands of the digital era (Omran et al., 2026; Curtis et al., 2026). The integration of digital technologies into education has accelerated significantly since the COVID-19 pandemic, leading governments and educational institutions to redesign teaching and learning environments through technology-based approaches (UNESCO, 2023; OECD, 2023; Hartwell & Brown, 2026; Panja, 2026). Consequently, digital transformation is no longer viewed merely as technological adoption but as a comprehensive organizational change that affects school culture, leadership, teaching practices, and stakeholder engagement. Educational institutions are increasingly expected to develop digitally competent graduates who are capable of participating effectively in the knowledge-based economy and global society.

In Indonesia, the digitalization of education has become a strategic national agenda aimed at improving educational quality and competitiveness. The implementation of digital learning platforms, learning management systems, and technology-enhanced instructional practices has expanded rapidly across educational levels (Sappaile et al., 2026; Wu, 2025; Veluvali & Suriseti, 2022). Despite these developments, substantial disparities remain in access to digital resources, technological infrastructure, and digital competencies among schools. Statistics Indonesia reported that internet accessibility remains uneven between urban and rural areas, creating challenges for equitable digital learning opportunities (Badan Pusat Statistik, 2024; Yokota et al., 2025; Akbar & Wijaya, 2023). Such disparities demonstrate that successful digital transformation requires not only technological infrastructure but also effective leadership capable of fostering organizational readiness and cultural change.

Beyond issues of access and infrastructure, digital literacy has emerged as a critical concern in educational transformation. The Indonesian Digital Literacy Index indicates moderate levels of digital competence among citizens, suggesting that the effective utilization of digital technology remains limited (Zahra, 2023; Kaya & Korucuk, 2022). Similar findings have been reported internationally, where schools often struggle to translate technological investments into meaningful educational outcomes due to limitations in teachers' digital competencies and organizational support systems (OECD, 2023; UNESCO, 2023; Hartwell & Brown, 2026). Therefore, the challenge of educational digitalization extends beyond technology availability and requires the development of a supportive digital culture within schools.

School culture plays a crucial role in determining whether digital transformation initiatives can be successfully implemented and sustained. A digital school culture refers to a set of shared values, beliefs, norms, and practices that encourage the productive and responsible use of digital technologies in teaching, learning, communication, and school management (Konishi et al., 2026; OECD, 2023; Maryani et al., 2023). Schools characterized by strong digital cultures tend to demonstrate higher levels of innovation, collaboration, and adaptability, resulting in improved learning outcomes and organizational effectiveness. Conversely, schools lacking a supportive digital culture often encounter resistance to change, inconsistent technology use, and limited educational benefits from digital investments.

Within this context, school leadership has been identified as one of the most influential factors shaping digital transformation processes. Educational leadership literature consistently highlights the strategic role of principals in guiding organizational change, promoting innovation, and establishing conditions that support continuous improvement

(Bush, 2026; Kamara & Burhanuddin, 2025; Meyer et al., 2023; Leithwood et al., 2020). Principals are increasingly expected to function not only as administrative managers but also as digital leaders who can align technological initiatives with educational goals, mobilize resources, and cultivate a shared vision for digital innovation. Consequently, the effectiveness of digital transformation efforts is strongly associated with the leadership practices enacted by school principals.

The concept of digital leadership has gained significant attention in recent years as educational institutions navigate increasingly complex technological environments. Digital leadership refers to the ability of leaders to strategically leverage digital technologies to improve organizational performance, facilitate innovation, and enhance learning experiences (Nasrun et al., 2025; Tanniru & Peral, 2021; Sheninger, 2019). Studies have demonstrated that principals with strong digital leadership competencies are more likely to foster technology integration, improve teacher performance, and encourage collaborative learning cultures. These findings suggest that digital leadership serves as a catalyst for creating sustainable digital transformation within educational organizations.

Several leadership approaches have been identified as particularly relevant to digital transformation, including transformational leadership, visionary leadership, and adaptive leadership. Transformational leaders inspire organizational members to embrace change and pursue shared goals, while visionary leaders provide strategic direction and long-term orientation toward innovation (Bush, 2026; Meyer et al., 2023; Bass & Riggio, 2006). Adaptive leadership, meanwhile, enables organizations to respond effectively to emerging challenges and rapidly changing technological conditions. The integration of these leadership dimensions is increasingly viewed as essential for developing digital school cultures capable of responding to contemporary educational demands.

Although a growing body of literature has examined digital leadership and educational technology integration, several gaps remain. First, many previous studies have focused primarily on technology adoption and infrastructure readiness (Asriadi & Esti Andriani, 2026; Šakyatė-Statnickė & Melnikova, 2026), paying limited attention to the cultural processes through which digital transformation becomes embedded within school practices (Tetteh et al., 2026; OECD, 2023; Wang et al., 2022). Second, existing research has largely employed quantitative approaches that measure leadership effectiveness through statistical relationships, providing limited understanding of how leadership practices are enacted in specific educational contexts. Third, relatively few studies have explored digital leadership within faith-based educational settings where technological innovation must be balanced with institutional values and character development objectives.

The limited attention given to the interaction between leadership practices, organizational culture, and value-based digital transformation represents an important research gap. In particular, there remains insufficient evidence regarding how principals operationalize digital leadership strategies, mobilize stakeholders, and cultivate digital cultures that align technological innovation with educational and moral values. Understanding these processes is essential because digital transformation is fundamentally a human and organizational endeavor rather than merely a technological one. Therefore, qualitative investigations are needed to provide deeper insights into the mechanisms through which leadership influences the development of digital school culture.

This study contributes to the existing literature in several ways. First, it extends current discussions on digital leadership by examining how principals enact visionary, transformational, and adaptive leadership practices to foster digital school culture. Second, it provides contextual evidence from an Islamic technology-oriented educational environment, thereby enriching the limited body of research on digital transformation within

faith-based schools. Third, the study highlights the interaction between technological innovation, organizational culture, and institutional values, offering a more comprehensive understanding of digital transformation than studies focused solely on technology adoption. Through these contributions, the study provides theoretical and practical insights for educational leaders seeking to strengthen digital culture in schools.

The novelty of this research lies in its focus on the processes through which principal leadership shapes digital school culture within a value-based educational context. Unlike previous studies that primarily examine digital infrastructure, technology acceptance, or teacher readiness, this research explores how leadership strategies influence cultural transformation, stakeholder engagement, and the integration of digital innovation with institutional values. By examining these interconnected dimensions, the study offers a more holistic perspective on educational digital transformation. Based on these considerations, this study aims to analyze how principal leadership contributes to the development of a digital school culture. Specifically, the study explores the leadership strategies employed to promote digital transformation, the ways in which these strategies influence organizational culture, and the challenges encountered during the implementation process. The findings are expected to contribute to the advancement of educational leadership theory and provide practical recommendations for strengthening digital transformation initiatives in schools.

Method

This study employed a qualitative approach with a case study design (Creswell & Creswell, 2017) to examine in depth the principal's leadership in developing a digital school culture at Junior High School Islam Teknologi Rambah. A qualitative approach was chosen as it enables a holistic and contextual understanding of the phenomenon based on participants' perspectives in real-life settings (Creswell & Creswell, 2017; Merriam & Tisdell, 2021; Yin, 2017). The case study design was used to explore intensively leadership practices within a specific setting, thereby producing a comprehensive and in-depth description. Consequently, this design is particularly suitable for unraveling the complex socio-technological dynamics and administrative mechanisms that shape digital culture transformation within a faith-based educational environment.

This research was conducted at Junior High School Islam Teknologi Rambah, located in Rambah District, Rokan Hulu Regency, Riau Province, Indonesia. The case was selected because the school has actively implemented digitalization programs in both academic and administrative activities, making it a relevant context for examining principal leadership in fostering a digital school culture. The research participants consisted of 12 informants, including one principal, eight teachers, and three educational staff members. Participants were selected through purposive sampling based on specific criteria, namely direct involvement in digitalization programs, experience in implementing technology-based activities, and willingness to participate in the study (Sugiyono, 2021; Creswell & Creswell, 2017; Patton, 2014). This sampling strategy ensured that participants possessed rich and relevant information regarding the phenomenon under investigation.

Data were collected through interviews, observations, and documentation. Semi-structured interviews were conducted using an interview guide developed from the concepts of digital leadership and digital school culture. Each interview lasted approximately 45–60 minutes and was audio-recorded with participants' permission. The interview questions explored leadership strategies, policy implementation, teacher development initiatives, challenges encountered during digital transformation, and participants' perceptions of digital culture within the school. Observations were conducted using a non-participant observation protocol focusing on technology utilization in classroom instruction, digital communication

practices, teacher collaboration, and technology-supported school management activities. Field notes were systematically recorded to capture behaviors, interactions, and contextual conditions related to the implementation of digital culture.

Data analysis in this study employed the interactive model of Miles et al. (2013), consisting of data reduction, data display, and conclusion drawing. The analysis began with interview transcription and the organization of field notes and documents. Subsequently, open coding was conducted to identify meaningful statements and significant patterns emerging from the data. Similar codes were then grouped into categories through axial coding, and broader themes were generated through thematic analysis by identifying relationships among categories (Miles et al., 2013; Saldaña, 2021; Braun & Clarke, 2021). The themes were continuously refined and compared across data sources until coherent interpretations were achieved. Documentation analysis included school policy documents, strategic plans, digitalization program reports, meeting minutes, training records, and other relevant archives. These documents were used to corroborate data obtained from interviews and observations and to strengthen the credibility of the findings.

To ensure the trustworthiness of the data, source triangulation and technique triangulation were applied to verify the consistency and accuracy of the findings. In addition, member checking was conducted by confirming interview results with the participants to ensure alignment with the actual conditions. Peer debriefing and prolonged engagement in the field were also employed to enhance the credibility and dependability of the study findings (Lincoln & Guba, 1985; Creswell, 2017). Ethical considerations were carefully observed throughout the research process. Prior to data collection, all participants received information regarding the purpose of the study, their voluntary participation, confidentiality protection, and their right to withdraw at any stage of the research. Written informed consent was obtained from all participants before interviews and observations were conducted. To maintain anonymity, participants' identities were replaced with codes during data analysis and reporting. Therefore, the findings of this study are expected to have a high level of validity and credibility in describing the principal's leadership in developing a digital school culture.

Results and Discussion

Principal Leadership in Developing a Digital School Culture

The findings of this study indicate that the principal of SMP Negeri Islam Teknologi Rambah perceives digital leadership as a strategic effort to utilize technology in enhancing the effectiveness of teaching and learning processes as well as school management. This is reflected in the use of digital applications for learning evaluation, which improve efficiency, transparency, and accessibility for both teachers and students. This strategic orientation demonstrates that digital leadership transcends mere technological adoption, functioning as a vital catalyst for institutional modernization, data-informed governance, and sustainable pedagogical innovation. This is supported by the principal's statements pertaining the use of technology (Figure 1).

"The use of technology greatly helps us, especially in learning evaluation. Teachers and students can immediately see the results, making the process more transparent and efficient."

"As leaders, we must set an example in using technology so that teachers can gradually adapt."

Figure 1. Responses of Principal Leadership in Developing a Digital School Culture

These findings are consistent with the concept of digital leadership, which emphasizes a leader's ability to integrate technology to improve organizational performance (Ingaldi & Ulewicz, 2025; Lyu, 2024; Hensellek, 2020). However, the findings reveal that digital leadership in this context extends beyond technological integration. The principal not only introduced digital tools but also shaped organizational norms and expectations regarding technology use. This finding suggests that digital leadership functions as a cultural transformation process rather than merely a technological intervention. Such a perspective expands previous studies that primarily associate digital leadership with technology adoption and management efficiency (Konishi et al., 2026; Leithwood et al., 2020; Wang et al., 2022). The findings indicate that leadership influences digital culture through the creation of shared values, collective commitment, and continuous adaptation to technological change.

Empirically, the principal's leadership is demonstrated through direct involvement in digitalization policy-making and by setting an example in the use of technology. This indicates that the principal functions not only as an administrator but also as a change agent in the school's digital transformation. This role reflects transformational leadership characteristics whereby leaders influence followers through role modeling and inspirational motivation (Šakyatė-Statnickė, G., & Melnikova, 2026; Meyer et al., 2023; Maryani et al., 2023). The findings further suggest that successful digital transformation requires visible leadership practices that reduce uncertainty and increase stakeholders' confidence in adopting new technologies.

Vision, Strategies, and Digitalization Programs

Based on the interview findings, the school has a clear vision of developing a digital culture integrated with Islamic values. This vision is implemented through structured technology-based learning programs. In addition, digitalization is strengthened through policies such as requiring students to own laptops and implementing digital examination systems. Field data indicate that almost all learning processes have incorporated technology. This strategic alignment between policy-driven infrastructure and pedagogical practice illustrates how faith-based schools can successfully construct a cohesive digital ecosystem that harmonizes technological modernization with core religious values (**Figure 2**).

“We want students not only to understand religious knowledge but also to be prepared for the digital era. That is why we set competency targets such as Microsoft Office, editing, and coding.”

“Students are required to have laptops so that digital learning can run optimally in all classes.”

Figure 2. Responses of Vision, Strategies, and Digitalization Programs

The findings demonstrate that digital transformation was not implemented through isolated technological initiatives but through a coherent strategic vision supported by institutional policies. This suggests that vision serves as a mechanism for aligning organizational goals, stakeholder expectations, and resource allocation. Previous studies have emphasized the importance of visionary leadership in educational innovation; however, this study shows that vision becomes effective only when translated into concrete programs, measurable competency targets, and consistent implementation practices (Bush, 2026; Kamara & Burhanuddin, 2025; OECD, 2023). These findings support the concept of digital school culture and reflect a transformational leadership approach.

Emerging Conceptual Framework

Based on the thematic analysis, a conceptual framework emerged from the findings. The framework illustrates how digital school culture develops through the interaction of leadership practices, organizational processes, and contextual factors.

Table 1. Interaction of Leadership Practices, Organizational Processes, and Contextual Factors Through Digital Learninig

Leadership Dimension	Strategic Actions	Immediate Outcomes	Digital Culture Outcomes
Visionary Leadership	Digital vision and policies	Shared direction	Technology-oriented culture
Transformational Leadership	Training and motivation	Teacher readiness	Innovation and collaboration
Adaptive Leadership	Problem-solving and supervision	Organizational resilience	Sustainable digital practices
Value-Based Leadership	Integration of Islamic values	Ethical technology use	Responsible digital citizenship

This framework extends existing digital leadership theories by demonstrating that digital culture development is influenced not only by technology adoption, but also by leadership-driven cultural and ethical transformation. As summarized in Table 1, this operational continuum operates across four distinct dimensions: visionary leadership articulates digital vision and policies to forge a shared direction toward a technology-oriented culture; transformational leadership provides targeted training and motivation to enhance teacher readiness, thereby fostering innovation and collaboration; adaptive leadership employs active problem-solving and supervision to build organizational resilience and sustain digital practices; and value-based leadership integrates Islamic values to promote ethical technology use and cultivate responsible digital citizenship. Ultimately, this multi-dimensional model demonstrates that transforming a school’s digital culture requires a strategic alignment of targeted leadership actions and immediate organizational outcomes to establish an enduring, ethically grounded digital ecosystem (Tetteh et al., 2026; Asriadi & Esti Andriani, 2026).

The Role of Teachers in Implementing Digital School Culture

The empirical findings reveal that teachers serve as pivotal agents in operationalizing a digital school culture within classroom settings. Despite initial friction characterized by low technological self-confidence and limited digital fluency—as highlighted by an educator, “*At first, we struggled because we were not familiar with the technology, but after receiving training, we became more confident*”—the principal’s strategic implementation of continuous mentoring and targeted professional development effectively mitigated initial resistance. Consequently, technology has been successfully integrated into daily instructional routines, with another teacher reporting, “*Now we are used to using projectors and laptops in teaching, which makes it easier to explain the material to students.*”

Beyond mere technical skill acquisition, these structured interventions facilitated a fundamental shift in teachers' psychological attitudes toward digital tools. This finding underscores that teacher readiness is a dual-dimensional construct encompassing both technical efficacy and psychological acceptance. By alleviating technological anxiety, sustained leadership support actively catalyzes the transition of educators from passive technology users into proactive pedagogical innovators, thereby corroborating established literature that positions professional development as an indispensable driver of systemic educational digitalization (World Bank, 2022; Tanniru & Peral, 2021; Sheninger, 2019).

Furthermore, this socio-pedagogical adaptation extends into the collaborative domain, where teachers gradually establish informal peer-learning networks to co-create digital content and troubleshoot instructional challenges. By aligning digital tools with Islamic pedagogical values, educators ensure that technological adoption enhances rather than dilutes ethical instruction and character building. Consequently, this grass-roots collaborative dynamic reinforces institutional sustainability, solidifying a holistic digital culture where technical fluency and values-driven education mutually reinforce one another across diverse subject areas (Saad et al., 2025; Maryani et al., 2023).

Students' Responses and Roles in Digital School Culture

The empirical findings indicate high student receptivity toward the institutional transition into a digital learning ecosystem. Students generally perceive technology-mediated instruction as more engaging and conceptually accessible than conventional pedagogical methods, with one student noting, *"Learning with technology is more interesting and easier to understand compared to conventional methods."* This positive orientation is reinforced by widespread hardware readiness—evidenced by the majority of students owning personal laptops—and the seamless normalization of digital platforms for academic workflows. As another student reflected regarding operational convenience, *"We usually submit assignments online, which is more practical."* Consequently, this hardware availability and platform integration establish a solid operational foundation for active student participation in a modernized digital school culture.

However, this pervasive digital integration also introduces critical operational challenges, primarily centered on non-academic distractions and self-regulation deficits within classroom environments. While technical access enhances engagement, it simultaneously creates opportunities for cognitive off-task behavior, as highlighted by a student observation: *"Sometimes some students open games during class."* This finding illuminates the dual-edge nature of digital school environments, where heightened connectivity can undermine instructional focus if unmonitored. Thus, the presence of personal devices presents a behavioral friction point, revealing that technical capability does not automatically translate into disciplined digital engagement or sustained academic focus.

Ultimately, these dynamics demonstrate that building an effective digital culture requires balancing technological innovation with systemic digital citizenship education. While digital tools significantly enhance instructional accessibility and student agency, mitigating the inherent risks of off-task behavior demands targeted pedagogical frameworks that foster self-regulation and ethical responsibility. This synthesis underscores that successful educational digital transformation cannot rely solely on infrastructure provision; rather, it requires a holistic approach that cultivates behavioral maturity alongside technical fluency, directly aligning with contemporary literature on the imperative of digital citizenship (Šakyatė-Statnickė, G., & Melnikova, 2026; Mann et al., 2025; OECD, 2023).

Infrastructure and Implementation Challenges

The empirical evidence highlights that while the school maintains a baseline of digital infrastructure, structural limitations continue to impede seamless implementation. Technical bottlenecks, particularly surrounding network stability and hardware reliability, pose ongoing operational disruptions to digital pedagogical delivery. As the school principal explicitly noted regarding these physical constraints, *"Our main challenge is unstable internet connections and some damaged equipment."* Consequently, these technical vulnerabilities create instructional latency, demonstrating that hardware deployment without continuous infrastructure maintenance and robust technical support remains insufficient for sustaining an uninterrupted digital learning environment.

Compounding these technical constraints are human-centered operational hurdles, most notably manifested in student behavioral misuse of available technology. The pervasive presence of personal laptops within the classroom setting frequently introduces cognitive off-task friction, diverting learners from targeted academic objectives. As one teacher observed regarding this behavioral divergence, “*Some students use their laptops for activities unrelated to learning.*” This finding underscores that physical access to digital tools does not automatically cultivate disciplined academic application, illuminating a critical gap between technological availability and student digital self-regulation.

Ultimately, these dual challenges directly contest the deterministic assumption that infrastructure provision alone guarantees successful educational digitalization. Instead, the persistent emergence of organizational, technical, and behavioral frictions confirms that digital transformation must be conceptualized as a socio-technical process (Bockshecker et al., 2018). Within this framework, sustainable digital adoption relies on the complex interplay among technological infrastructure, human agency, and institutional governance mechanisms. This synthesis aligns with contemporary literature emphasizing that effective educational digitalization requires integrating hardware availability with comprehensive human resource readiness and systemic behavioral frameworks (World Bank, 2022; OECD, 2023; Maryani et al., 2023).

Strategies and Solutions to Overcome Challenges

To mitigate these emerging operational and behavioral friction points, the school principal deployed a multi-pronged management strategy combining active supervision, policy enforcement, and continuous mentoring. Rather than viewing compliance as a purely punitive measure, leadership structured supervision as a supportive mechanism to guide both educators and learners through the digital transition. As the principal explained regarding this balanced administrative approach, “*We monitor technology use, apply sanctions when necessary, and continuously guide both teachers and students.*” Consequently, this dual strategy of enforcing accountability while providing ongoing pedagogical coaching effectively minimized instructional disruptions while maintaining an encouraging environment for digital innovation.

Alongside administrative oversight, the institution addressed technical vulnerabilities through systematic maintenance routines and strategic resource acquisition, while simultaneously embedding digital ethics into student development. Recognizing that physical access requires normative boundaries, the school prioritized ethical literacy to counteract non-academic off-task behavior. As the principal emphasized concerning this value-driven orientation, “*Technology must be used wisely, so we also emphasize digital ethics for students.*” By pairing routine hardware upkeep with explicit character education, the leadership successfully safeguarded both the operational longevity of digital infrastructure and the ethical integrity of classroom technology engagement.

Ultimately, these synthesized interventions reflect the core tenets of adaptive leadership, demonstrating its critical role in sustaining educational digital transformation. Rather than relying on rigid, top-down mandates, the principal continuously recalibrated administrative and pedagogical strategies to navigate evolving technical constraints and human behavioral challenges (Kryshtanovych et al., 2023). This agile leadership approach allowed the institution to maintain transformational momentum and structural resilience despite resource limitations. Consequently, these findings extend adaptive leadership theory by illustrating its contextual operationalization and strategic efficacy within technology-driven educational environments (Bush, 2026; Kamara & Burhanuddin, 2025; Meyer et al., 2023; Leithwood et al., 2020).

Integration of Islamic Values in Digital School Culture

A central empirical finding of this study is the deliberate integration of digital technology with foundational Islamic values, forming a culturally rooted digital ecosystem. Rather than allowing technological adoption to displace traditional faith-based practices, the institution maintains a balanced focus on digital innovation and spiritual development. As the school principal emphasized regarding this ideological harmony, *“Although we are technology-based, we still maintain tahfiz programs and character development.”* Consequently, this pedagogical synthesis ensures that technological advancement does not occur in a moral vacuum, but is explicitly anchored in religious values that shape students' moral compass.

This integration offers a significant conceptual contribution by establishing the framework of value-based digital transformation within educational settings. While conventional literature predominantly evaluates digital transformation through the narrow metrics of technological efficiency and technical mastery (Fabian et al., 2026), these findings demonstrate that digital school culture can harmoniously coexist with, and indeed be enriched by, deep-seated religious and ethical values (Tanniru & Peral, 2021). By embedding moral imperatives directly into digital workflows, the school counters the purely functionalist assumptions often associated with educational technology.

Ultimately, the integration of Islamic values functions as a crucial moderating force that channels technology usage exclusively toward constructive educational and character-building outcomes. This normative boundary prevents technological misuse while cultivating responsible digital stewardship among both educators and learners. Consequently, this finding advances digital leadership theory by offering a novel, values-driven model tailored specifically to faith-based educational contexts, demonstrating how religious frameworks can guide and sustain modern educational digitalization (Nagel et al., 2026; Paramansyah, 2026; Zhu et al., 2025).

Evaluation and Future Development

Continuous evaluation serves as a cornerstone for maintaining pedagogical quality and monitoring systemic progress within the digital learning environment. The administration executes a dual-track assessment framework that simultaneously evaluates students' technical digital fluency and academic achievement, as the school principal outlined: *“We monitor students' progress through their digital skills and academic performance.”* This empirical monitoring mechanism directly informs strategic planning, underpinning the institution's broader trajectory to establish itself as a regional benchmark for technology-driven education. As expressed in the principal's strategic aspiration, *“We aim to become a leading technology-based school in this region.”* Consequently, aligning ongoing empirical evaluation with ambitious institutional goals ensures that digital modernization remains structured, goal-oriented, and continuously responsive to student learning trajectories.

Crucially, the empirical evidence demonstrates that principal leadership acts as the primary catalyst in orchestrating this long-term digital evolution. The synergistic convergence of visionary, transformational, and adaptive leadership styles enables school administrators to articulate a clear direction, inspire educator commitment, and navigate operational hurdles. However, this top-down leadership efficacy relies fundamentally on grass-roots stakeholder buy-in, as corroborated by a teacher's perspective: *“The key to success lies in leadership and collaboration among all school members.”* This collaborative dynamic reinforces that strategic leadership cannot operate in isolation; rather, its success hinges on mobilizing collective agency and fostering shared responsibility across the entire educational community.

Ultimately, these findings collectively demonstrate that a sustainable digital school culture does not arise from isolated technological initiatives, but emerges through the dynamic interplay of strategic leadership, organizational learning, stakeholder participation, and technological readiness (Asriadi & Esti Andriani, 2026; Šakytė-Statnickė & Melnikova, 2026). Rather than functioning as discrete structural variables, these elements operate as a holistic, interconnected socio-pedagogical system. Consequently, this systemic perspective extends existing digital leadership models by highlighting that achieving long-term educational transformation requires deep cultural alignment and sustained cross-stakeholder collaboration alongside infrastructure deployment (Leithwood et al., 2020; OECD, 2023).

Research Implications and Limitation

The findings have both theoretical and practical implications. Theoretically, the study contributes to the digital leadership literature by demonstrating that digital transformation is fundamentally a cultural process shaped by leadership practices, organizational values, and stakeholder engagement. Practically, the findings suggest that school leaders should prioritize capacity building, ethical technology use, and collaborative digital vision development rather than focusing solely on infrastructure provision. Educational policymakers may also utilize these findings to design leadership development programs that strengthen principals' digital leadership competencies.

This study has several limitations. First, the research was conducted in a single school context, limiting the transferability of findings to other educational settings. Second, the study relied primarily on qualitative data obtained from interviews, observations, and documentation, which may reflect participants' subjective perspectives. Third, although data saturation was achieved within the selected participants, broader investigations involving multiple schools and diverse educational contexts may provide a more comprehensive understanding of digital leadership practices. Future studies are encouraged to employ comparative case studies or mixed-methods approaches to further validate and extend these findings.

Conclusion

Based on the findings of this study, it can be concluded that the principal's leadership plays a highly strategic role in developing a digital school culture. The principal has successfully implemented visionary, transformational, and adaptive leadership by formulating a technology-based vision integrated with Islamic values, as well as through structured and sustainable digitalization programs. These leadership practices are reflected in policies promoting the use of technology in teaching and learning, the development of teachers' digital competencies, and the creation of an innovative learning environment. The findings further suggest that digital school culture is shaped not only by technological resources but also by leadership practices that foster organizational commitment, stakeholder collaboration, and value-based digital transformation. This study contributes to the digital leadership literature by highlighting the interaction between visionary, transformational, and adaptive leadership in fostering digital culture within an Islamic educational context. However, several challenges remain, including limited infrastructure, inadequate internet connectivity, and the potential misuse of technology by students. Overall, the success of developing a digital school culture is largely determined by the synergy between principal leadership, the readiness of human resources, and the availability of adequate infrastructure. This study is limited by its focus on a single-school case, which may restrict the transferability of the findings to other educational contexts. Therefore, future research is recommended to examine digital leadership practices across multiple schools and

educational settings using comparative or mixed-methods approaches to provide broader insights into the development of digital school culture.

Author Contributions

Conceptualization was contributed by DA and MNS; methodology by DA and MNS; and formal analysis by DA and MNS. Investigation was conducted by DA, with the original draft written by DA. Review and editing were performed by DA and MNS, while supervision was provided by MNS.

Funding

This research received no external funding.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Use of Artificial Intelligence

The authors used generative AI tools (ChatGPT 5.6 and Claude Sonnet 5) to assist with language editing, programming, and manuscript preparation. All AI-generated content was reviewed, corrected, and verified by the authors, who take full responsibility for the accuracy and originality of the published work.

References

- Akbar, M., & Wijaya, G. (2023). Digital literacy of rural areas in Indonesia: Challenges and opportunities. In *Proceedings of the 4th International Conference on Rural Socio-Economic Transformation, RUSET, 1(1)*, 1-13. <https://doi.org/10.4108/eai.1-11-2023.2344347>
- Asriadi, A., & Esti Andriani, D. (2026). A systematic literature review of school digital leadership: from digital readiness to organizational outcomes. *Leadership and Policy in Schools*, 1-18. <https://doi.org/10.1080/15700763.2026.2646345>
- Badan Pusat Statistik. (2024). *Statistik telekomunikasi Indonesia 2023* (Vol. 12). <https://www.bps.go.id/id/publication/2024/08/30/f4b846f397ea452bdc2178b3/statistik-telekomunikasi-indonesia-2023.html>
- Bass, B. M., & Riggio, R. E. (2006). *Transformational leadership* (2nd ed.). Psychology Press. <https://doi.org/10.4324/9781410617095>
- Bockshecker, A., Hackstein, S., and Baumöl, U. (2018). Systematization of the term digital transformation and its phenomena from a socio-technical perspective – A literature review. *Research Papers*, 43. https://aisel.aisnet.org/ecis2018_rp/43
- Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. SAGE Publications.
- Bush, T. (2026). *Theories of educational leadership and management*. SAGE Publications.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

- Curtis, P., Carey, M. D., McMaster, N., & Martin, D. A. (2026). Advancing digital technology teacher education through the 3C model. *Journal of New Approaches in Educational Research*, 15(1), 9. <https://doi.org/10.1007/s44322-026-00056-1>
- Fabian, W., Hidayah, Q. H., & Marwan, R. H. (2026). Digital transformation frameworks, maturity, sectoral studies, organizational change, and leadership. In *Impact of Web Technologies on Digital Transformation*, 67-102. IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3373-5167-4.ch003>
- Hartwell, A., & Brown, B. (2026). Exploring digital technology use in K-12 education after COVID-19: Implications for teacher education programmes. *Technology, Pedagogy and Education*, 1-25. <https://doi.org/10.1080/1475939X.2026.2720035>
- Hensellek, S. (2020). Digital leadership: A framework for successful leadership in the digital age. *Journal of Media Management and Entrepreneurship (JMME)*, 2(1), 1-15. <https://doi.org/10.4018/JMME.2020010104>
- Ingaldi, M., & Ulewicz, R. (2025). The role of AI in digital leadership-new competencies of leaders. *Polish Journal of Management Studies*, 31. <http://dx.doi.org/10.17512/pjms.2025.31.2.07>
- Kamara, Y., & Burhanuddin, B. (2025). The role of educational leaders in enhancing educational transformation. *International Research-Based Education Journal*, 7(1), 98-113. <https://journal-fip.um.ac.id/index.php/irbej/article/view/4302/1834>
- Kaya, H. İ., & Korucuk, M. (2022). Examination of digital literacy levels of university students. *Dinamika Ilmu*, 22(1), 167-186. <https://eric.ed.gov/?id=EJ1350990>
- Konishi, C., Vargas-Madriz, L. F., & Tesolin, J. (2026). Fostering equity, diversity, and inclusion through social-emotional learning: The role of digital technologies. *Journal of Research on Technology in Education*, 58(3), 674-686. <https://doi.org/10.1080/15391523.2025.2455054>
- Kryshtanovych, S., Liakhovych, G., Dubrova, O., Kazarian, H., & Zhekalo, G. (2023). Stages of digital transformation of educational institutions in the system of sustainable development of the region. *International Journal of Sustainable Development & Planning*, 18(2), 565. <https://doi.org/10.18280/ijstdp.180226>
- Leithwood, K., Harris, A., & Hopkins, D. (2020). Seven strong claims about successful school leadership revisited. *School Leadership & Management*, 40(1), 5-22. <https://doi.org/10.1080/13632434.2019.1596077>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. SAGE Publications.
- Lyu, J. (2024). How does digital leadership improve organizational sustainability: Theory and evidence. *Journal of Cleaner Production*, 434, 140148. <https://doi.org/10.1016/j.jclepro.2023.140148>
- Mann, S., Calvin, A., Lenhart, A., & Robb, M. B. (2025). *The Common sense census: Media use by kids zero to eight, 2025*. Common Sense Media. <https://www.common Sense media.org/sites/default/files/research/report/2025-common-sense-census-web-2.pdf>
- Maryani, L., Nur, J., Utami, S., & Nurnaifah, I. I. (2023). Strengthening school management with digital education technology to improve the quality of educational output. *Indonesian Journal of Educational Research and Review*, 6(2), 446-465. <https://doi.org/10.23887/ijerr.v6i2.66039>

- Merriam, S. B., & Tisdell, E. J. (2021). *Qualitative research: A guide to design and implementation* (5th ed.). Jossey-Bass.
- Meyer, A., Hartung-Beck, V., Gronostaj, A., Krüger, S., & Richter, D. (2023). How can principal leadership practices promote teacher collaboration and organizational change? A longitudinal multiple case study of three school improvement initiatives. *Journal of Educational Change*, 24(3), 425-455. <https://doi.org/10.1007/s10833-022-09451-9>
- Miles, M. B., Huberman, A. M., & Saldana, J. (2013). *Qualitative data analysis: A methods sourcebook*. SAGE Publications.
- Nagel, I., Haugsbakken, H., Pettersson, F., & Håkansson Lindqvist, M. (2026). Digitalization and school leadership: A scoping review. In *Frontiers in Education*, 11, 1828426. <https://doi.org/10.3389/feduc.2026.1828426>
- Nasrun, M. K., Susilo, H., & Afrianty, T. W. (2025). Accelerating digital transformation through digital leadership: Strategies for innovation, sustainability, and organisational performance enhancement. *BISMA (Bisnis dan Manajemen)*, 264-291. <https://doi.org/10.26740/bisma.v17n2.p264-291>
- OECD. (2023). *OECD digital education outlook 2023: Towards an effective digital education ecosystem*. OECD Publishing. <https://doi.org/10.1787/c74f03de-en>
- Omrany, H., Al-Obaidi, K. M., Ghaffarianhoseini, A., Chang, R. D., Park, C., & Rahimian, F. (2026). Digital twin technology for education, training and learning in construction industry: Implications for research and practice. *Engineering, Construction and Architectural Management*, 33(3), 1836-1870. <https://doi.org/10.1108/ECAM-10-2024-1376>
- Panja, S. K. (2026). Digital transformation in school for mobile learning: insights from preservice teachers during the COVID-19 pandemic. In *Frontiers in Education*, 11, 1858555. Frontiers Media SA. <https://doi.org/10.3389/feduc.2026.1858555>
- Paramansyah, A. (2026). Digital leadership strategies of school principals in addressing educational technology disruption. *Oikonomia: Journal of Management Economics and Accounting*, 3(3), 20-30. <https://doi.org/10.61942/oikonomia.v3i3.576>
- Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). SAGE Publications.
- Saad, W. Z., Alias, N. A., Chong, C. M., & Sabri, S. (Eds.). (2025). *Digital leadership for sustainable higher education*. IGI Global.
- Šakyatė-Statnickė, G., & Melnikova, J. (2026). Linking school leadership, digital infrastructure, and teachers' readiness for using technology to techno-work engagement. *Management in Education*, 08920206261479565. <https://doi.org/10.1177/08920206261479565>
- Saldaña, J. (2021). *The coding manual for qualitative researchers* (4th ed.). SAGE Publications.
- Sappaile, B. I., Chan, R., & Tan, M. (2026). Gamification and student motivation: Evaluating e-learning engagement from an educational psychology perspective. *Journal Neosantara Hybrid Learning*, 4(2), 176-193. <https://doi.org/10.70177/jnhl.v4i2.4162>

- Sheninger, E. (2019). *Digital leadership: Changing paradigms for changing times* (2nd ed.). Corwin.
- Sugiyono. (2021). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.
- Tanniru, M., & Peral, J. (2021). Digital leadership in education. <https://doi.org/10.1108/978-1-83982-306-020211008>
- Tetteh, E. N., Nubuor, S. A., & Dartey-Baah, K. (2026). Leading through digital disruption: How digital leadership shapes innovation culture and organisational resilience. *Strategy & Leadership*, 1-25. <https://doi.org/10.1108/SL-12-2025-0441>
- Tisdell, E. J., Merriam, S. B., & Stuckey-Peyrot, H. L. (2025). *Qualitative research: A guide to design and implementation* (5th ed.). John Wiley & Sons.
- UNESCO. (2023). *Global education monitoring report, 2023: Technology in education: A tool on whose terms?* <https://doi.org/10.54676/UZQV8501>
- Veluvali, P., & Suriseti, J. (2022). Learning management system for greater learner engagement in higher education—A review. *Higher Education for the Future*, 9(1), 107-121. <https://doi.org/10.1177/23476311211049855>
- Wang, T., Lin, X., & Sheng, F. (2022). Digital leadership and exploratory innovation: From the dual perspectives of strategic orientation and organizational culture. *Frontiers in Psychology*, 13, 902693. <https://doi.org/10.3389/fpsyg.2022.902693>
- World Bank. (2022). *World development report 2022: Finance for an equitable recovery*. <https://doi.org/10.1596/978-1-4648-1730-4>
- Wu, J. (2025). E-learning management systems in higher education: Features of the application at a Chinese vs. European university. *Journal of the Knowledge Economy*, 16(1), 5025-5055. <https://doi.org/10.1007/s13132-024-02159-6>
- Yin, R. K. (2017). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.
- Yokota, K., Komaki, Y., Komori, A., Nagasawa, S., & Okuaki, S. (2025). The internet and poverty alleviation in Indonesia: Urban-rural disparities in a dual economy. *Journal of Asian Economics*, 102024. <https://doi.org/10.1016/j.asieco.2025.102024>
- Zahra, N. (2023). *Enhancing inclusion in the national digital literacy index: From measurement to empowerment* (No. 19). Policy Brief. <https://www.econstor.eu/handle/10419/297874>
- Zhu, R., Alias, B. S., Hamzah, M. I. M., & Wahab, J. A. (2025). Digital leadership in education: A systematic review. *Journal of Education and Learning (EduLearn)*, 19(3), 1474-1483. <https://doi.org/10.11591/edulearn.v19i3.22187>