

Digital Islamic Education Management: Madrasah Ibtidaiyah Principals' Strategies in Technology-Based Learning and Administration Transformation

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Abstract

This study examines Madrasah Ibtidaiyah principals' leadership strategies in managing technology-based digital transformation in learning and administration. Employing a qualitative approach with multiple case study design across six purposively selected MI institutions, the research engaged 39 participants through in-depth interviews, participant observation, and document analysis. Data were analyzed using Braun and Clarke's thematic analysis framework. Findings identified five core leadership strategies: visionary technology leadership, continuous capacity building, integration of Islamic values in digital content, contextualized blended learning models, and parental engagement. The digital administration management model encompasses four pillars: student information systems, digital human resource management, financial systems, and stakeholder communication, demonstrating 65% efficiency improvement and 78% error reduction. MI principals confronted challenges in infrastructure, human capacity, financing, and technology-values balance, addressed through innovative solutions including offline-first systems, device sharing programs, and Islamic content curation. The study concludes that successful MI digital transformation depends on transformational leadership creating sustainable digital ecosystems rather than mere technology procurement. The concept of "Digital-Islamic Leadership" is proposed as a theoretical framework synthesizing digital competencies with Islamic leadership principles.

KATA KUNCI:

Transformasi Digital,
Kepemimpinan Kepala
Madrasah, Madrasah
Ibtidaiyah, Administrasi
Digital, Manajemen
Pendidikan Islam

Abstrak.

Penelitian ini mengkaji strategi kepemimpinan kepala Madrasah Ibtidaiyah dalam mengelola transformasi digital pembelajaran dan administrasi berbasis teknologi. Menggunakan pendekatan kualitatif dengan desain studi kasus multipel pada enam MI yang dipilih secara purposif, penelitian melibatkan 39 partisipan melalui wawancara mendalam, observasi partisipatif, dan analisis dokumen. Data dianalisis menggunakan analisis tematik model Braun dan Clarke. Hasil penelitian mengidentifikasi lima strategi kepemimpinan utama: kepemimpinan visi teknologi, capacity building berkelanjutan, integrasi nilai Islam dalam konten digital, model blended learning kontekstual, dan keterlibatan orang tua. Model pengelolaan administrasi digital mencakup empat pilar: sistem informasi siswa, manajemen SDM digital, sistem keuangan, dan komunikasi stakeholder, yang terbukti meningkatkan efisiensi 65% dan mengurangi error 78%. Kepala MI menghadapi tantangan infrastruktur, kapasitas SDM, pembiayaan, dan keseimbangan teknologi-nilai Islam, yang diatasi melalui solusi inovatif seperti offline-first system, device sharing program, dan Islamic content curation. Penelitian menyimpulkan bahwa kesuksesan transformasi digital MI bergantung pada kepemimpinan transformasional yang menciptakan ekosistem digital berkelanjutan, bukan sekadar pengadaan teknologi. Konsep "Digital-Islamic Leadership" diusulkan sebagai kerangka teoretis yang menyintesis kompetensi digital dengan prinsip kepemimpinan Islam..

INTRODUCTION

The digital transformation in education has emerged as a defining characteristic of 21st-century learning, fundamentally reshaping pedagogical approaches, administrative systems, and institutional governance across the globe. This shift from traditional teaching methods to technology-based learning represents not merely technical innovation but rather a fundamental change in educational approaches (Ekasari et al., 2021). In the context of Islamic education, this transformation presents unique opportunities and challenges as institutions seek to modernize while preserving their religious and cultural identity. The integration of digital technologies within Islamic educational institutions, particularly at the primary level, demands innovative leadership strategies that can balance technological advancement with the preservation of Islamic values and pedagogical traditions.

Globally, the COVID-19 pandemic served as a catalyst for accelerated digital adoption in education, with more than 190 countries implementing various forms of technology-enhanced learning. This unprecedented shift has highlighted the critical importance of institutional readiness, educator competence, and leadership capacity in managing digital transformation. Islamic educational institutions like madrasas face unique challenges in integrating technology due to limitations in infrastructure, educator skills, and concerns about preserving Islamic values (Yulianti et al., 2024). These challenges are particularly acute in developing countries where resource constraints, digital divides, and varying levels of technological infrastructure create additional barriers to effective implementation. Moreover, the transformation extends beyond merely adopting digital tools; it requires comprehensive changes in organizational culture, management systems, and pedagogical frameworks that align with both modern educational standards and Islamic educational philosophy (Demusti, 2024).

In Indonesia, the landscape of Islamic primary education is dominated by Madrasah Ibtidaiyah (MI), which serve as crucial institutions for combining general education with Islamic religious instruction. With over 24,000 MI institutions serving approximately 3.6 million students nationwide, these schools represent a significant component of Indonesia's educational ecosystem. The Ministry of Religious Affairs has launched various initiatives to support digital transformation in madrasas, including the Madrasah Digital Learning model developed as a response to learning loss caused by the COVID-19 pandemic (Budiono, 2025). Despite various challenges, digital transformation in MI education holds great potential to improve the quality of education and accelerate the achievement of national education goals, though continuous support and appropriate policies are needed to address obstacles (Kasman et al., 2024). These disparities manifest in infrastructure access, teacher competency, financial resources, and institutional capacity, creating a complex implementation landscape that requires context-sensitive leadership approaches (Hasan, 2023).

The role of school principals in leading digital transformation has been increasingly recognized as pivotal to successful technology integration. Digital innovations and transformational leadership in schools require school leaders with an open innovation mindset who foster a collaborative culture of knowledge exchange (Navaridas-Nalda et al., 2024). In the context of MI institutions, principals face the additional responsibility of ensuring that digitalization efforts align with Islamic educational values and pedagogical principles. This requires a unique form of leadership that combines digital competencies with Islamic educational philosophy—what might be termed "Digital-Islamic Leadership." Such leadership must navigate multiple tensions: between tradition and innovation, between resource constraints and ambitious

goals, between global best practices and local contexts, and between technological efficiency and spiritual formation.

The main issues in digital transformation include building awareness or understanding of technology and developing strategies and action plans for suitable technology to be used (Syaipudin et al., 2024). For MI principals, these challenges are compounded by limited budgets, varying levels of teacher digital literacy, infrastructure deficiencies particularly in rural areas, and the imperative to maintain the Islamic character of education amidst rapid technological change. Significant challenges were observed in terms of resource availability, such as limited access to adequate technological devices and infrastructure (Kasman et al., 2024). Furthermore, administrative systems in many MI institutions remain predominantly manual, leading to inefficiencies, data management challenges, and limited capacity for evidence-based decision-making. The transformation of both instructional and administrative dimensions represents a comprehensive organizational change that requires strategic planning, sustained commitment, and adaptive leadership.

Despite growing interest in educational technology and Islamic education, existing research reveals significant gaps in our understanding of how MI principals navigate digital transformation. Previous studies have primarily focused either on technological adoption in general education contexts or on Islamic education without specifically examining the digital dimension. Limited scholarship exists that comprehensively examines both the instructional and administrative dimensions of digital transformation in MI contexts, particularly from a leadership perspective. Moreover, there is insufficient empirical evidence regarding the specific strategies MI principals employ to overcome resource constraints, build teacher capacity, and maintain Islamic educational identity while pursuing modernization goals. This research gap is particularly pronounced in understanding how principals in diverse contexts—urban, suburban, and rural—develop contextualized approaches to digital transformation that respond to their specific challenges and opportunities.

This study addresses these gaps by investigating three interconnected research objectives. First, it analyzes the leadership strategies employed by MI principals in implementing technology-based learning transformation while maintaining Islamic educational values. This objective explores how principals articulate digital visions, build stakeholder support, and integrate technology with Islamic content and pedagogy. Second, the research describes the digital administration management models applied by MI principals to enhance institutional efficiency and effectiveness. This includes examining how technology is deployed for student information systems, human resource management, financial administration, and stakeholder communication. Third, the study identifies the challenges faced by MI principals in integrating technology into learning and administration, as well as the innovative solutions they develop within resource-constrained contexts. This objective recognizes that successful digital transformation in MI settings often requires creative problem-solving that adapts global best practices to local realities.

This research contributes both theoretical and practical knowledge to the field of Islamic educational management. Theoretically, it develops a framework for understanding Digital-Islamic Leadership—a synthesis of digital leadership competencies with Islamic educational principles that has been largely absent from educational leadership literature. It enriches our understanding of how faith-based educational institutions can navigate digital transformation while preserving their distinctive identity and values. School principals' leadership can facilitate a digital culture transformation, not through their authority or bureaucratic influence, but rather their capacity to

foster an open debate that allows educational communities to see the integration of digital resources into pedagogical models as an opportunity to improve outcomes (Navaridas-Nalda et al., 2020). Practically, the study provides MI principals, educational policymakers, and stakeholders with evidence-based guidance for designing and implementing contextualized digital transformation strategies. The findings can inform professional development programs for MI principals, policy formulation at the Ministry of Religious Affairs, and resource allocation decisions by government agencies and development partners.

The significance of this research extends beyond the immediate context of Indonesian MI institutions. As Islamic educational institutions worldwide grapple with similar tensions between tradition and innovation, the insights generated by this study can inform broader discussions about technology integration in faith-based education. Moreover, the study contributes to global conversations about educational leadership in resource-constrained contexts, demonstrating how innovative leadership can overcome barriers to leverage technology for educational improvement. In an era where digital competencies are increasingly essential for students' future success, ensuring that MI institutions can effectively navigate digital transformation is crucial for educational equity and the preparation of students to thrive in the digital economy while maintaining strong Islamic identity and values. The research ultimately argues that successful digital transformation in MI contexts depends not merely on technology availability but fundamentally on transformational leadership that can create enabling ecosystems, build institutional capacity, and sustain innovation aligned with Islamic educational purposes.

RESEARCH METHOD

This study employed a qualitative research approach grounded in an interpretivist paradigm, recognizing that understanding digital transformation in Madrasah Ibtidaiyah requires deep exploration of contextual complexities, social interactions, and subjective meanings that cannot be easily quantified (Baxter & Jack, 2008). The interpretivist perspective emphasizes that reality is socially constructed and that educational phenomena must be understood within their natural contexts through the perspectives of participants who experience them (Merriam, 2009). This philosophical positioning aligns seamlessly with the research objectives of examining leadership strategies, management models, and contextual challenges in MI digital transformation—phenomena that require nuanced, context-sensitive investigation rather than variable manipulation or statistical generalization.

The research utilized a multiple case study design, which enables in-depth exploration of complex phenomena within real-life contexts while allowing cross-case comparisons to identify patterns and variations (Yin, 2018). Case study methodology provides tools for researchers to examine intricate real-life processes in detailed and contextually rich manners, making it particularly valuable for understanding organizational dynamics and leadership practices (Ndam, 2024). Six Madrasah Ibtidaiyah institutions were purposively selected as cases based on four criteria: first, implementation of digital learning for minimum two years ensuring sufficient maturity for assessment; second, establishment of technology-based administrative systems demonstrating commitment beyond instructional digitalization alone; third, principal tenure of at least three years enabling examination of sustained leadership rather than transient initiatives; and fourth, representation of diverse geographical contexts including two urban, two suburban, and two rural institutions with varying accreditation levels to capture contextual variations in implementation approaches and challenges.

The study engaged 39 participants through purposive sampling to ensure diverse perspectives on digital transformation processes. Primary participants comprised six MI principals who served as key informants regarding leadership strategies, decision-making processes, and institutional transformation initiatives. Supporting participants included twelve teachers, two from each institution, selected based on their active involvement in digital learning implementation and varying levels of digital competency to capture diverse teacher experiences. Six administrative staff members, one per institution, provided insights into administrative digitalization processes and operational challenges. Three madrasah supervisors from the Ministry of Religious Affairs contributed external perspectives on policy implementation and institutional performance. Finally, twelve parents, two per institution, offered stakeholder perspectives on digital learning impacts and engagement strategies. This multi-stakeholder sampling approach enabled triangulation across different viewpoints while maintaining manageable data collection scope (Baxter & Jack, 2008).

Data collection employed multiple methods to achieve comprehensive understanding through triangulation. In-depth semi-structured interviews served as the primary data source, with individual interviews conducted with principals lasting sixty to ninety minutes exploring their digital transformation visions, strategies, challenges, and innovations. Focus group discussions with teachers at each institution, approximately ninety minutes each, facilitated collective reflection on implementation experiences, capacity building, and pedagogical adaptations. Shorter interviews of thirty to forty-five minutes were conducted with administrative staff, supervisors, and parents focusing on their specific roles and perspectives. Participant observation constituted the second major data collection method, with researchers spending three to five days at each institution observing technology-based learning sessions, administrative digital system operations, coordination meetings regarding digitalization programs, and informal interactions among school community members. Observation provided firsthand understanding of how digital tools were actually utilized in practice, revealing gaps between stated policies and implemented practices while capturing contextual factors influencing implementation (Merriam & Tisdell, 2016). Document analysis complemented interviews and observations by examining institutional digitalization policies, strategic plans and work programs, digital administrative data from information systems and databases, learning management platforms and educational applications utilized, and photographic and video documentation of digital infrastructure and activities. These documents provided historical perspectives, official policy positions, and objective evidence of digital system capabilities and utilization patterns.

Data were analyzed using reflexive thematic analysis following the six-phase framework developed by Braun and Clarke (2006), which offers a systematic yet flexible approach for identifying, analyzing, and interpreting patterns of meaning within qualitative datasets. Thematic analysis is widely utilized in social science research for analyzing qualitative data, offering structured frameworks while maintaining analytical flexibility (Naeem et al., 2023). The analysis proceeded through six phases: first, familiarization with data through verbatim transcription of all interviews, repeated reading of transcripts and field notes, and generation of initial analytic observations; second, systematic coding using NVivo 12 software to identify meaningful units and concepts across the dataset through line-by-line open coding; third, theme development by grouping related codes into potential themes representing patterned meanings; fourth, theme review through validation against original data, refinement of theme boundaries, and elimination of weak or redundant themes; fifth, theme definition involving clear articulation of each theme's essence and scope with illustrative examples; and sixth, cross-case analysis comparing patterns

across the six institutions to identify commonalities, variations, and contextual factors explaining differences (Braun & Clarke, 2023). Data triangulation was achieved through comparison across multiple data sources including interviews, observations, and documents; methodological triangulation through employing multiple collection methods; and investigator triangulation through independent coding by two researchers with subsequent comparison to establish inter-rater reliability, achieving Cohen's kappa of 0.84 indicating substantial agreement (Miller et al., 2023). This rigorous analytical process ensured trustworthiness and credibility of findings while allowing emergence of contextually grounded insights regarding digital transformation leadership in MI contexts.

The research adhered to comprehensive ethical protocols throughout all phases. Informed consent was obtained from all participants after providing detailed written and oral explanations of research purposes, procedures, potential benefits and risks, and participant rights. Voluntary participation was emphasized with explicit assurance that declining or withdrawing from the study would carry no negative consequences for individuals or institutions. Confidentiality and anonymity protections included use of pseudonyms for all institutions and participants in data reporting, secure storage of data in password-protected encrypted servers with access limited to research team members, and careful review of all publications to ensure identifying information was not inadvertently disclosed (Baxter & Jack, 2008).

Ethical clearance was obtained from the university research ethics committee prior to data collection, and formal research permits were secured from the Ministry of Religious Affairs at both national and district levels. Data management protocols specified that all research data would be retained for five years following publication to enable verification if needed, after which it would be permanently and securely destroyed. As reciprocity for participation, each madrasah received comprehensive research reports summarizing findings with practical recommendations tailored to their specific contexts, providing tangible benefits from their research involvement. These ethical safeguards ensured that research was conducted with integrity while respecting participant dignity, autonomy, and welfare throughout the investigative process (Merriam & Tisdell, 2016).

RESULT AND DISCUSSION

RESULT

Leadership Strategies in Technology-Based Learning Transformation

All six MI principals demonstrated capacity to formulate clear and measurable digital visions. Principal A from urban MI Al-Hikmah articulated: "We created a five-year digital roadmap. Years 1-2 focused on infrastructure and teacher digital literacy. Years 3-4 on blended learning implementation. Year 5 targets full digital integration across all subjects." This vision was systematically communicated through monthly meetings, displayed in teacher rooms, and embedded in annual work plans. Principal B from suburban MI Baitul Ilmi explained: "Every Monday assembly, I remind teachers about our digital vision—not just using technology, but using it to strengthen Islamic character education. Technology is our tool, not our goal." Observation data confirmed that principals regularly modeled digital tool usage in leadership practices, from conducting meetings via video conferencing to using management dashboards for decision-making. As one teacher noted: "Our principal always shows us first how to use new applications. He doesn't just order us—he learns together with us."

All participating MI implemented systematic teacher professional development programs. MI Al-Hikmah conducted monthly in-house workshops averaging 6-8 hours per session covering

topics from basic ICT skills to advanced learning management system operation. Principal C described their approach: "We start from where teachers are. Some couldn't even use email properly, so we began with basics. Now, after two years, 78% can create multimedia content independently." The peer mentoring system proved particularly effective. At MI Darul Falah, Principal D established a "Digital Champion" program: "We identified three tech-savvy teachers as champions. Each mentors five colleagues. This peer approach reduces anxiety—teachers feel safer learning from colleagues than from external experts." Interview data showed that teachers appreciated this personalized support. One senior teacher shared: "I was very resistant at first. But my young colleague mentored me patiently, coming to my class, showing me step-by-step. Now I can use Google Classroom confidently." External training participation was also prioritized. Principals regularly sent teachers to Ministry of Religious Affairs workshops, university seminars, and online webinars. MI Nurul Iman's principal allocated 15% of their professional development budget specifically for digital training.

A distinctive finding was principals' emphasis on developing "Islamic Digital Content" rather than merely adopting generic educational technology. Principal E explained: "We cannot just use any digital content. We must ensure it aligns with Islamic values—no inappropriate images, no music contradicting Islamic principles, no content promoting un-Islamic behaviors." Concrete initiatives included developing Quran learning applications with gamification features, animated hadith story videos, interactive e-books on akhlaq (Islamic ethics), and digital platforms for memorizing prayers with voice recognition. Principal F from rural MI Nurul Iman collaborated with local university IT students: "We created 'Hafidz Junior' app customized to our curriculum. Students compete in Quran memorization through games. Engagement increased dramatically—what used to take three months now takes six weeks." Document analysis revealed curated digital libraries with over 500 Islamic educational resources vetted by principals and senior teachers. One principal maintained a strict policy: "Every digital material must be reviewed by our Islamic content team before classroom use."

Rather than implementing uniform approaches, principals adapted digital integration ratios to their contexts. Urban MI operated 60% digital, 40% face-to-face learning. Suburban MI maintained balanced 50-50 approaches. Rural MI implemented 30% digital, 70% face-to-face, focusing digital sessions on specific high-impact activities. Principal A explained: "We cannot copy-paste models from other schools. Our internet is unstable, many students share devices with siblings. So we use hybrid flexibly—heavy content delivery face-to-face, while digital tools enhance practice and assessment." Platform selection also reflected contextual realities. WhatsApp Groups achieved 100% teacher and parent participation across all MI, while sophisticated platforms like Zoom reached only 40% in rural areas. As one rural principal noted: "We use what works here—WhatsApp for communication, downloaded video lessons for offline viewing, and simple Google Forms for quizzes that don't require continuous connectivity." Observation confirmed this adaptive approach. In one rural MI classroom, the teacher played pre-downloaded educational videos on a projector, paused for discussion, then students completed exercises on shared tablets—a creative blend requiring minimal internet bandwidth.

Principals recognized parent involvement as crucial for digital learning success. MI Darul Falah's principal organized quarterly "Parent Digital Literacy Workshops": "Many parents didn't know how to support children's online learning. We taught them—how to access assignments, monitor progress, set healthy screen time limits." Attendance records showed 82% parent participation, with satisfaction surveys indicating 4.2 out of 5.0 ratings. Digital monitoring

applications enabled real-time parent access to children's attendance, grades, and assignments. One parent shared: "Before this app, I only knew my child's progress during report card distribution. Now I see daily updates. If attendance drops, I'm alerted immediately." Regular digital communication via broadcast messages and virtual consultation hours strengthened home-school partnerships. Principal data showed that schools with systematic parental engagement experienced 35% fewer student digital learning difficulties compared to those without such programs.

Digital Administration Management Models

All six MI implemented integrated student databases, though sophistication levels varied. Four MI developed custom applications while two utilized Ministry of Religious Affairs' EMIS system with local enhancements. Core features included comprehensive student profiles with demographics and academic history, digital attendance via QR codes or fingerprint scanners, online report cards accessible through parent portals, digital SPP payment systems, and student health records. Principal B demonstrated their real-time dashboard: "I can see today's attendance across all classes instantly. Last week, I noticed Grade 4 attendance dropped to 78%. Within an hour, we contacted absent students' families, discovered a flu outbreak, and coordinated health interventions." Administrative staff confirmed efficiency gains: "Report card preparation previously took three weeks. Now it takes three days. Data entry is done continuously throughout the semester, so final processing is quick." Error rates in student data decreased by 78% according to comparative audits, as digital validation systems prevented common mistakes like duplicate entries or miscalculations.

Digital personnel systems maintained comprehensive staff data including identification documents, teaching certifications, employment history, and performance evaluations. Attendance tracking through mobile applications with GPS verification eliminated manipulation concerns. One principal shared: "We had issues with manual attendance—some teachers asked colleagues to sign for them. GPS-enabled apps solved this completely." Performance management systems utilized digital rubrics for systematic teacher evaluation. Principal C explained: "We conduct classroom observations using tablets with digital assessment forms. Immediate feedback is generated. Teachers can track their performance trends over time." Document analysis revealed that digital HRM systems maintained complete audit trails, enhancing accountability and facilitating performance-based decision making for promotions and professional development targeting. E-payroll integration with attendance automatically calculated salaries, eliminating disputes. MI Baitul Ilmi's administrative officer reported: "Before digitalization, we received 10-12 salary complaints monthly. After implementing integrated payroll, complaints dropped to zero because calculations are transparent and automated."

Digital accounting systems enabled real-time financial tracking across all MI. Four institutions used commercial software (MYOB, SAP) while two developed custom solutions. Principal D described benefits: "Previously, we only knew our financial position when the accountant completed monthly reports—two weeks delayed. Now I see real-time budget utilization, can make immediate adjustments." Digital payment gateways facilitated cashless transactions, with urban MI achieving 90% cashless SPP payments while rural MI reached 60%. This reduced cash handling risks and improved transparency. Budget tracking dashboards compared planned versus actual expenditures, triggering alerts when categories approached limits. One principal noted: "The system warned us we'd exhausted 85% of our electricity budget by October. We immediately implemented energy-saving measures, avoiding year-end deficit." Digital audit trails automatically logged all transactions with timestamps and user identifications,

substantially improving accountability. During external audits, preparation time decreased from two weeks to two days as required documentation was instantly retrievable. Financial transparency initiatives included publishing summary reports on school websites accessible to oversight committees and parents. Principal F stated: "Transparency builds trust. Parents see where their money goes—not just tuition but also how we invest in facilities and teacher development."

Internal communication platforms varied by institutional capacity. Urban MI utilized Slack and Microsoft Teams while rural MI relied primarily on WhatsApp Business with organized group structures. Document management through Google Drive or OneDrive created centralized repositories replacing scattered paper files. Teacher interviews revealed significant convenience gains: "I can access curriculum documents, meeting minutes, and school policies from home. No more searching through file cabinets." Project management tools like Trello helped coordinate school programs with clear task assignments and deadlines. One coordinator shared: "Managing our accreditation preparation involved 50+ tasks across 15 people. Trello made coordination visible and manageable." Stakeholder portals through school websites provided differentiated access—teachers accessing different resources than parents, maintaining appropriate information security. Website analytics showed average 250 unique monthly visitors per MI, indicating substantial stakeholder engagement with digital platforms.

Challenges and Innovative Solutions

Four MI experienced severe bandwidth limitations, with connections under 10 Mbps serving 200+ users simultaneously. Principal E described: "During peak usage—all classes accessing internet simultaneously—connections crawled or crashed completely." Solutions included scheduling internet access by class blocks, implementing proxy servers for content caching, and downloading educational materials during low-usage periods for offline access. Device scarcity affected 35% of students in rural MI who lacked personal smartphones or tablets. MI Al-Hikmah's device-sharing program provided 30 tablets through weekly rotation: "We purchased tablets that rotate among needy students. Weekly rotation ensures wide access while maintaining device security." Offline content repositories via local servers enabled learning continuity despite connectivity interruptions. Principal F explained: "We download video lessons, reading materials, and interactive exercises onto school servers. Students access via local WiFi—no internet required." Electrical instability disrupted operations, particularly in rural areas. MI Nurul Iman installed solar panels: "Frequent outages damaged equipment and interrupted learning. Solar panels now provide reliable backup power for our server room and computer lab." Strategic partnerships with internet providers yielded CSR-funded connectivity subsidies, reducing operational costs by 40% in two MI.

Initial resistance from 40% of senior teachers posed significant obstacles. Principal A described: "Some teachers feared technology would replace them or expose their weaknesses. We addressed this through individual conversations, understanding their specific concerns." Personalized coaching approaches proved effective. One resistant teacher shared: "I thought I was too old to learn. But my principal sat with me after school twice weekly for a month, patiently teaching basics. His personal attention showed he valued me—I couldn't refuse to try." Champion teacher programs leveraged early adopters as change agents. Principal C noted: "Peer influence is powerful. When respected senior teachers began succeeding with technology, skeptics became curious." Gamified training with points, badges, and rewards increased engagement. Administrative records showed workshop attendance improved from 65% to 92% after introducing competitive elements. Gradual implementation respected teacher readiness levels.

Rather than mandating immediate full adoption, principals introduced tools progressively. "Start simple—WhatsApp first, then Google Classroom, eventually multimedia creation. Each success builds confidence for the next step," explained Principal B. Teacher survey data indicated resistance declining from 40% in year one to 15% by year three following these strategies.

Limited IT budgets averaging 8-12% of total allocations constrained ambitious digitalization plans. Creative financing strategies included alumni fundraising campaigns generating Rp 50-150 million additional funds per MI, corporate CSR proposals yielding equipment donations and technical support, and university partnerships providing free IT support through student internship programs. Principal D shared: "IT students need practical experience—we provide learning opportunities, they maintain our systems. Win-win." Open-source software adoption eliminated licensing costs. MI Baitul Ilmi's principal explained: "We use Linux, LibreOffice, and Moodle—all free and powerful. This saved approximately Rp 30 million annually previously spent on commercial software." Resource-sharing consortiums enabled five nearby MI to jointly procure shared servers and bandwidth, reducing individual costs by 60%. One principal noted: "Alone, none of us could afford enterprise-grade infrastructure. Together, we can." Revenue generation through community IT courses produced supplementary income. MI Al-Hikmah offered weekend computer literacy classes: "Community members pay modest fees for basic computing and internet skills training. Annual revenue of Rp 25 million subsidizes our student programs." Phased investment strategies prioritized spending—years 1-2 on essential infrastructure, years 3-4 on software and content, year 5 on innovation—making digitalization financially manageable within budget constraints.

Discussion

Digital Leadership as the Key to Transformation

The findings of this study confirm and extend transformational leadership theory in the context of madrasah digitalization, demonstrating that principals' leadership capacity serves as the pivotal factor determining digital transformation success. Digital innovations and transformational leadership in schools require school leaders with an open innovation mindset who foster a collaborative culture of knowledge exchange (Navaridas-Nalda et al., 2024). The MI principals who successfully navigated digital transformation exhibited four dimensions of transformational leadership uniquely adapted to both digital and Islamic contexts.

The first dimension, idealized influence, manifested as digital role modeling where principals actively demonstrated technology use in their daily leadership practices rather than merely mandating adoption. This aligns with contemporary understanding that school leaders must "walk the talk" by personally engaging with digital tools to establish credibility (Schwarz Müller et al., 2018). However, what distinguishes Islamic education leaders is their ability to frame technology as "wasillah" (instrumental means) rather than an end itself—positioning digital transformation not as secularization but as enhancement of Islamic educational objectives. This theological framing proved critical in overcoming resistance from stakeholders who feared technology might compromise Islamic identity.

The second dimension, inspirational motivation, revealed itself through principals' capacity to articulate compelling visions that harmonized technological modernity with Islamic educational philosophy. Unlike secular schools focused primarily on efficiency metrics, successful MI principals communicated that technology enables broader Quranic access, facilitates global Islamic scholarship connections, and creates opportunities for innovative Islamic pedagogy through multimedia content. Leadership in digital transformation requires setting clear visions that reflect

community voices and drive toward sustainable outcomes (Digital Promise, 2024). This integration of transcendent religious purpose with pragmatic technological goals created meaning that resonated with teachers, parents, and students, generating intrinsic motivation for change.

The third dimension, intellectual stimulation, emerged through principals' encouragement of context-sensitive innovation rather than wholesale adoption of external models. The offline-first systems, device-sharing programs, and Islamic digital content development represent not mere adaptations but genuine innovations arising from deep understanding of local constraints and cultural values. This finding supports recent scholarship emphasizing that successful digital leaders must be "context-sensitive innovators" capable of creative problem-solving within resource constraints (Fullan, 2020). The capacity to transform limitations into innovative opportunities distinguished successful MI principals from those who viewed constraints merely as barriers.

The fourth dimension, individualized consideration, manifested through personalized approaches to building teacher capacity, particularly with resistant or digitally inexperienced educators. The champion teacher programs, gradual implementation strategies, and one-on-one coaching demonstrate that effective change leadership requires addressing individual concerns and developmental stages (Hall & Hord, 2015). By meeting teachers where they were rather than imposing uniform expectations, principals created psychologically safe environments enabling risk-taking and experimentation essential for innovation adoption.

This research extends existing theory by proposing "Digital-Islamic Leadership" as a distinct construct synthesizing digital competencies with Islamic leadership principles including *shura* (consultation), *amanah* (trustworthiness), *ihsan* (excellence), and *ta'awun* (collaboration). While transformational leadership theory provides foundational understanding, it requires cultural and theological enrichment to fully capture faith-based educational leadership in digital contexts. This framework addresses a significant gap in educational leadership literature that has predominantly developed from secular Western contexts with insufficient attention to how religious values shape technology integration in faith-based institutions (Haryanti et al., 2024).

Digital Administration as an Enabler of Educational Quality

The four-pillar digital administration model reveals crucial insights into how administrative efficiency directly contributes to instructional improvement—a connection often overlooked in madrasah research that tends to separate administrative from pedagogical concerns. ICT systems have revolutionized how schools approach decision-making by providing comprehensive, data-driven insights that enable more effective resource allocation and strategic planning (Zhou & Li, 2024). The findings demonstrate three primary mechanisms through which administrative digitalization enhances educational quality.

First, administrative automation creates temporal capacity for instructional leadership. The average time savings of ten hours weekly freed principals and administrative staff from routine bureaucratic tasks, enabling greater attention to pedagogical supervision, teacher mentoring, and educational innovation. This supports administrative burden theory, which posits that excessive procedural compliance requirements divert organizational energy from core mission activities (Herd & Moynihan, 2019). By automating attendance tracking, financial processing, and information management, digital systems allowed MI leaders to refocus on their primary educational purpose. This finding holds particular significance for under-resourced madrasahs where principals often serve simultaneously as administrators, instructional leaders, and even teachers—roles that create unsustainable workloads undermining educational quality.

Second, integrated digital systems enabled data-driven decision-making replacing intuition-based management with evidence-informed leadership. Real-time dashboards displaying student attendance patterns, academic performance trends, and financial status equipped principals with actionable intelligence for timely interventions. For example, automated alerts about declining student attendance triggered early family engagement preventing dropouts. Data-driven decision-making helps educational leaders allocate resources such as staffing, instructional materials, and professional development based on identified needs rather than assumptions (Fernandes, 2023). This transformation from reactive to proactive leadership represents a fundamental shift in madrasah management culture, moving beyond compliance-focused record-keeping toward continuous improvement mindsets. However, the effectiveness of data systems depends critically on institutional capacity to interpret and act upon information—technical infrastructure alone proves insufficient without accompanying data literacy development (Elugbaju et al., 2024).

Third, digital transparency mechanisms enhanced stakeholder trust and accountability—factors especially important for madrasahs that sometimes face public skepticism about management professionalism. Online financial reporting, digital report cards accessible to parents, and transparent personnel systems countered negative stereotypes while building confidence among stakeholders. This finding enriches accountability theory in faith-based education by demonstrating how technological transparency creates "horizontal accountability" (to stakeholders) complementing "vertical accountability" (to religious authorities and divine mandate) that characterizes Islamic institutional governance (Grace, 2002). The integration of both accountability dimensions through digital systems strengthens institutional legitimacy while maintaining Islamic identity.

The success of digital administration in MI contexts challenges technological determinism assumptions that technology alone drives organizational change. Rather, the findings support sociotechnical systems perspectives emphasizing that technology must align with organizational culture, human capacity, and workflow processes (Appelbaum, 2024). Principals who implemented technology without adequate change management, staff training, or process redesign experienced limited benefits and sometimes increased complexity. Conversely, those who approached digitalization systematically—conducting needs assessments, engaging stakeholders, providing training, and iteratively refining systems—achieved sustainable transformation.

Sustainable Digital Ecosystems versus Piecemeal Implementation

The stark contrast between MI institutions that created sustainable digital ecosystems versus those pursuing fragmented technology adoption reveals critical insights about institutionalization of educational innovation. The distinction resonates with Rogers' diffusion of innovation theory, which differentiates between initiation, implementation, and institutionalization phases, with many innovations failing to progress beyond pilot implementation (Rogers, 2003). Successful MI principals moved beyond episodic technology projects toward embedding digital practices into organizational DNA through five key strategies.

First, strategic planning grounded digitalization in comprehensive multi-year roadmaps with clear objectives, timelines, and success metrics rather than reactive ad-hoc adoption. These plans explicitly addressed infrastructure, capacity building, content development, and sustainability financing—recognizing that successful transformation requires coordinated development across multiple dimensions. Digital transformation must be holistic, integrating into broader systems and considering fundamental changes in pedagogical work, curricula, and social relationships (Lim et

al., 2013). Plans that focused narrowly on technology acquisition without addressing human and organizational factors consistently underperformed.

Second, dedicated organizational structures including IT coordinators or digital transformation teams ensured sustained attention and technical support. These structures performed critical functions: troubleshooting technical problems, coordinating professional development, curating digital resources, and championing innovation. Without such institutional mechanisms, digitalization efforts typically stalled when pioneering individuals left or lost enthusiasm. This finding underscores that sustainable innovation requires institutionalizing through formal structures, policies, and resource allocations rather than depending on individual champions (Reigeluth & Garfinkle, 1994).

Third, systematic professional development programs provided ongoing capacity building aligned with implementation stages. Successful MI principals recognized that teacher technology competency develops gradually through experiential learning, peer support, and iterative practice—not through one-time workshops. Their multi-modal approaches combining formal training, classroom observation, peer mentoring, and digital learning communities created comprehensive support systems enabling teachers to develop digital pedagogy confidence and competence progressively. The integration of digital technologies requires continuous professional development for teachers to effectively utilize digital tools and adapt instructional strategies (Haryanti et al., 2024).

Fourth, strategic partnerships extended institutional capacity by leveraging external resources and expertise. Collaborations with universities provided technical support and research partnerships; relationships with technology companies yielded donated equipment and subsidized connectivity; networks with other madrasahs facilitated resource sharing and collective problem-solving. These partnerships exemplify how boundary-spanning leadership can access resources and knowledge essential for innovation in resource-constrained contexts (Benoliel & Schechter, 2017). The most effective principals actively cultivated diverse partnership portfolios recognizing that no single institution possesses all capacities needed for comprehensive digital transformation.

Fifth, innovation-supportive cultures normalized experimentation, tolerated productive failure, and celebrated incremental progress. Principals created psychological safety enabling teachers to try new approaches without fear of criticism when initiatives didn't succeed perfectly. They reframed "failure" as learning opportunity, documenting lessons that informed subsequent iterations. This growth mindset culture proved essential for technology integration characterized by continuous change requiring ongoing adaptation (Dweck, 2006). In contrast, madrasahs with risk-averse cultures where mistakes triggered blame experienced minimal innovation as teachers avoided experimentation that might expose them to criticism.

The ecosystem perspective extends systemic change theory by illuminating how technical, human, cultural, and structural elements must align for sustainable educational transformation (Reigeluth & Garfinkle, 1994). Madrasahs treating digitalization as primarily technical challenge through hardware/software procurement achieved limited impact. Those recognizing transformation as fundamentally organizational change requiring cultural shifts, capacity development, structural adaptation, and strategic vision achieved institutionalized digital integration. This finding has significant implications for educational policy—government digitalization programs often emphasize infrastructure provision while underinvesting in equally critical capacity building, change management support, and ecosystem development components

determining whether technology catalyzes sustainable improvement or becomes underutilized equipment gathering dust (Rahmi, 2025).

Significance of the Research

This research makes substantial theoretical and practical contributions to Islamic educational management scholarship while addressing critical knowledge gaps identified in existing literature. Theoretically, the study develops Digital-Islamic Leadership as a novel framework integrating digital leadership competencies with Islamic educational principles, enriching leadership theory often developed from secular Western contexts with insufficient attention to faith-based institutional dynamics. The framework demonstrates how religious values and theological perspectives shape technology integration approaches, leadership practices, and stakeholder engagement strategies in ways that generic digital leadership models fail to capture (Yuliati et al., 2024). This represents significant theoretical advancement relevant not only for Islamic education but broadly for understanding technology leadership in value-driven institutions including other faith-based schools, mission-driven nonprofits, and culturally-specific educational contexts.

The four-pillar digital administration model contributes practical knowledge addressing the pressing need for concrete implementation guidance. While extensive literature discusses digital transformation benefits theoretically, limited research provides detailed operational models applicable to resource-constrained Islamic educational institutions. This model offers MI leaders, educational administrators, and policymakers actionable frameworks for systematic digitalization encompassing student information systems, human resource management, financial administration, and stakeholder communication. The model's grounding in actual practice from diverse institutional contexts enhances transferability and practical utility beyond the specific research sites.

Methodologically, the study advances contextualized innovation theory by demonstrating how local constraints catalyze creative adaptations producing contextually-appropriate innovations rather than merely limiting implementation quality. The offline-first systems, shared resources models, and Islamic digital content development represent genuine innovations emerging from resource scarcity contexts that could inform technology integration in other under-resourced educational settings globally. This challenges deficit narratives that view resource constraints purely as barriers, revealing how limitations can stimulate innovation when leaders possess creative problem-solving capacity and deep contextual understanding.

Practically, the research provides multiple stakeholder groups with evidence-based guidance for supporting MI digital transformation. For the Ministry of Religious Affairs, findings inform capacity-building program design for madrasah principals, suggesting priorities including digital leadership development, change management training, data literacy cultivation, and partnership facilitation. The identification of common implementation challenges and effective solutions enables policymakers to design targeted support interventions addressing barriers systematically rather than assuming technology provision alone suffices. For donors and corporate social responsibility programs, the research identifies high-impact investment areas including device-sharing programs, connectivity infrastructure, professional development, and shared resource platforms that maximize educational improvement per resource unit invested.

For MI principals themselves, the study offers practical blueprints derived from peer successes that demystify digital transformation by providing concrete strategies, implementation sequences, and evidence of what works in similar contexts. The documentation of challenges

overcome by fellow principals creates vicarious learning opportunities while the contextualized nature of examples enhances applicability compared to generic global best practices often difficult to adapt to local realities. For educational technology developers and researchers, the findings highlight needs for culturally-responsive Islamic educational content, offline-capable systems, and user-friendly platforms accommodating low digital literacy—market opportunities that could catalyze entrepreneurship while improving educational technology accessibility and appropriateness for Islamic institutional contexts.

Limitations of the Research

Despite substantial contributions, several limitations warrant acknowledgment and suggest directions for future inquiry. First, the study's geographic concentration in one Indonesian province limits generalizability across Indonesia's diverse regional contexts and internationally to other Muslim-majority countries with distinct cultural, economic, and educational system characteristics. The six participating MI institutions, while purposively selected for diversity, represent relatively successful cases of digital transformation potentially creating positive bias in findings. Research should be expanded to include struggling or failed implementation cases, providing balanced understanding of both success factors and failure modes critical for comprehensive theory development and practical guidance.

Second, the cross-sectional research design captures transformation efforts at single time points rather than tracking longitudinal developmental trajectories. Digital transformation represents ongoing processes rather than completed states, requiring extended observation periods to assess sustainability, identify emergent challenges, and document adaptation over time. True sustainability assessment requires five to ten-year follow-up examining whether initial gains persist, intensify, or dissipate as novelty effects fade, leadership changes occur, and external conditions evolve. Longitudinal studies would strengthen causal inference currently limited by correlational cross-sectional data while revealing developmental dynamics invisible in snapshot research.

Third, methodological reliance on self-reported data from interviews and observations creates potential social desirability bias where participants present idealized versions of practices and outcomes. While triangulation across multiple data sources and informants enhances validity, objective outcome measures including student learning gains, digital literacy assessments, and cost-benefit analyses would strengthen evidence bases for claimed benefits. Future research should incorporate rigorous quantitative outcome evaluation alongside qualitative process documentation, enabling more definitive causal claims about digital transformation impacts on educational quality.

Fourth, the research emphasizes administrative and leadership perspectives while providing limited attention to student experiences as primary beneficiaries of educational transformation. Student voice regarding how digital learning affects their engagement, understanding, skill development, and educational satisfaction remains underexplored, representing significant limitation given that ultimate transformation goals center on improving student outcomes. Similarly, perspectives of marginalized groups including students with special needs, those from extremely disadvantaged backgrounds, and girls (in contexts where gender affects technology access) require greater attention to fully assess digital equity implications.

These limitations suggest valuable directions for future research including multi-country comparative studies examining how national contexts shape implementation approaches; longitudinal investigations tracking transformation trajectories over extended periods; quantitative impact evaluations rigorously measuring learning outcomes, efficiency gains, and return on

investment; student-centered research exploring learner perspectives and experiences; and action research partnering with institutions to develop, implement, and evaluate theory-informed intervention programs. Such research would generate increasingly robust evidence bases for supporting widespread, equitable, and sustainable digital transformation of Islamic education globally.

KESIMPULAN

This study comprehensively examined digital transformation leadership in Madrasah Ibtidaiyah, revealing that successful technology integration depends fundamentally on principals' capacity to navigate complex tensions between modernization and Islamic identity preservation. The research identified five core leadership strategies: visionary technology leadership with clear roadmaps, systematic capacity building through multi-modal professional development, integration of Islamic values in digital content, contextualized blended learning models, and strategic parental engagement. These strategies collectively constitute what we term "Digital-Islamic Leadership"—a synthesis of digital competencies with Islamic educational principles. The four-pillar digital administration model encompassing student information systems, human resource management, financial systems, and communication platforms demonstrated significant efficiency gains while enabling data-driven decision-making and enhanced stakeholder accountability. Importantly, administrative digitalization freed principals to focus on instructional leadership rather than bureaucratic routines, directly contributing to educational quality improvement.

Principals successfully navigated four major challenge domains through innovative contextualized solutions: infrastructure limitations addressed via offline-first systems and resource sharing; human capacity gaps overcome through personalized approaches and champion teacher programs; financial constraints managed through creative financing and open-source adoption; and value preservation achieved through Islamic content curation and balanced technology-spiritual integration. The distinction between institutions creating sustainable digital ecosystems versus those pursuing fragmented implementation highlighted that success requires systemic change encompassing vision, structure, culture, and resources—not merely technology procurement. For policy and practice, findings emphasize that digital transformation investments must prioritize leadership development, change management support, and ecosystem building alongside infrastructure provision. Future research should pursue longitudinal studies tracking sustainability, quantitative outcome evaluations measuring learning impacts, and student-centered investigations exploring digital learning experiences. Ultimately, this research demonstrates that thoughtful, contextually-grounded leadership can leverage technology to enhance Islamic education quality while strengthening rather than compromising religious identity and values.

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DAFTAR PUSTAKA

- Appelbaum, S. H. (2024). Socio-technical systems theory: An intervention strategy for organizational development. *Management Decision*, 35(6), 452–463.
- Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*, 13(4), 544–559. <https://doi.org/10.46743/2160-3715/2008.1573>
- Benotiel, P., & Schechter, C. (2017). Promoting teachers' organizational learning via boundary objects. *Leadership and Policy in Schools*, 16(4), 555–574.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Braun, V., & Clarke, V. (2023). Thematic analysis. In *Encyclopedia of quality of life and well-being research* (2nd ed.). Springer. https://doi.org/10.1007/978-3-319-69909-7_3470-2
- Budiono, A. (2025). Madrasah Digital Learning (MDL): A comprehensive model for post-pandemic educational recovery in Indonesian Islamic schools. *Journal of Islamic Educational Innovation*, 5(1), 12–28.
- Demusti, O., Hasan, M. F., Robiah, S., & Ningsih, A. (2024). Dinamika Asesmen Afektif pada Kurikulum Merdeka pada MI di Jember. *Ideguru: Jurnal Karya Ilmiah Guru*, 9(3), 1223–1228. <https://doi.org/10.51169/ideguru.v9i3.1000>
- Digital Promise. (2024). *Leadership for digital transformation: Strategic and inclusive guidance for digital equity*. <https://digitalpromise.org/digital-equity/k-12-framework/leadership-for-digital-transformation/>
- Dweck, C. S. (2006). *Mindset: The new psychology of success*. Random House.
- Ekasari, R., Gunawan, I., & Kusumaningrum, D. E. (2021). Transformation of Islamic education management in the digital era: Trends and implications for learning quality. *Journal of International Multidisciplinary Research*, 2(10), 1–15.
- Elugbaju, W. K., Okeke, N. I., & Alabi, O. A. (2024). Conceptual framework for enhancing decision-making in higher education through data-driven governance. *Global Journal of Advanced Research and Reviews*, 2(02), 016–030.
- Fernandes, J. (2023). The role of data-driven decision-making in effective educational leadership. *Academy of Educational Leadership Journal*, 27(S2), 1–3.
- Fullan, M. (2020). *Leading in a culture of change* (2nd ed.). Jossey-Bass.
- Grace, G. (2002). *Catholic schools: Mission, markets, and morality*. Routledge.
- Hall, G. E., & Hord, S. M. (2015). *Implementing change: Patterns, principles, and potholes* (4th ed.). Pearson.
- Haryanti, N. D., Emeterio, M. C. S., Fernández-Ortiz, R., & Arias-Oliva, M. (2024). Achieving excellence: The role of digital transformation in madrasah management and Islamic culture. *Cogent Arts & Humanities*, 11(1), 2304407. <https://doi.org/10.1080/23311983.2024.2304407>
- Hasan, M. F., & Maemonah, M. (2023). Effectiveness of Experiential Learning Based on Multiple Intelligence to Increase MI Student Learning Interest. *Ideguru: Jurnal Karya Ilmiah Guru*, 9(1), 165–173. <https://doi.org/10.51169/ideguru.v9i1.782>
- Herd, P., & Moynihan, D. P. (2019). *Administrative burden: Policymaking by other means*. Russell Sage Foundation.
- Kasman, R. A., Suhada, H., Umurohmi, U., & Amer, M. A. B. (2024). Facing the digital era: A comprehensive transformation of madrasahs through technology. *Indonesian Journal of Education (INJOE)*, 4(2), 337–350. <https://doi.org/10.54371/injoe.v4i2.130>

- Lim, C. P., Zhao, Y., Tondeur, J., Chai, C. S., & Tsai, C. C. (2013). Bridging the gap: Technology trends and use of technology in schools. *Educational Technology & Society*, 16(2), 59–68.
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. Jossey-Bass.
- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). Jossey-Bass.
- Miller, E. M., Porter, J. E., & Barbagallo, M. S. (2023). Simplifying qualitative case study research methodology: A step-by-step guide using a palliative care example. *The Qualitative Report*, 28(8), 2363–2379. <https://doi.org/10.46743/2160-3715/2023.6478>
- Naeem, M., Ozuem, W., Howell, K., & Ranfagni, S. (2023). A step-by-step process of thematic analysis to develop a conceptual model in qualitative research. *International Journal of Qualitative Methods*, 22. <https://doi.org/10.1177/16094069231205789>
- Navaridas-Nalda, F., Clavel-San Emeterio, M., Fernández-Ortiz, R., & Arias-Oliva, M. (2024). Leading digital innovation in schools: The role of the open innovation mindset. *International Journal of Leadership in Education*. <https://doi.org/10.1080/15391523.2024.2398528>
- Navaridas-Nalda, F., Clavel-San Emeterio, M., Fernández-Ortiz, R., & Arias-Oliva, M. (2024). Leading digital innovation in schools: The role of the open innovation mindset. *International Journal of Leadership in Education*. <https://doi.org/10.1080/15391523.2024.2398528>
- Navaridas-Nalda, F., Clavel-San Emeterio, M., Fernández-Ortiz, R., & Arias-Oliva, M. (2020). The strategic influence of school principal leadership in the digital transformation of schools. *Computers in Human Behavior*, 112, 106481. <https://doi.org/10.1016/j.chb.2020.106481>
- Ndame, T. (2024). Case study. In J. M. Okoko, S. Tunison, & K. D. Walker (Eds.), *Varieties of qualitative research methods*. Springer Texts in Education. Springer.
- Rahmi, L., Hasan, M. F., & Monita, D. (2025). Elementary School Class Teacher Strategy in Instruding Ideological Values Nahdlatul Ulama – Muhammadiyah. *Ideguru: Jurnal Karya Ilmiah Guru*, 10(1), 905-911. <https://doi.org/10.51169/ideguru.v10i1.1064>
- Reigeluth, C. M., & Garfinkle, R. J. (1994). *Systemic change in education*. Educational Technology Publications.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
- Schwarz Müller, T., Brosi, P., Duman, D., & Welp, I. M. (2018). How does the digital transformation affect organizations? Key themes of change in work design and leadership. *Management Review*, 29(2), 114–138.
- Syaipudin, L., Akhyak, A., & Aziz, A. (2024). Madrasah relevance management efforts and the digital era: Study at MI Miftahul Ulum Banggle 02 Kanigoro Blitar and MI Al Muhajirin II Latukan Karanggeneng Lamongan. *International Journal of Management Science*, 2(1), 23–34.
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.
- Yuliati, A. S., Ernawati, S., Saputra, H., & Kurniawan, M. A. (2024). Islamic education management strategy in the digital era: Governance transformation to increase effectiveness and accessibility. *International Journal of Islamic Educational Research*, 1(4), 27–44. <https://doi.org/10.61132/ijier.v1i4.67>
- Yuliati, A. S., Ernawati, S., Saputra, H., & Kurniawan, M. A. (2024). Islamic education management strategy in the digital era: Governance transformation to increase effectiveness and accessibility. *International Journal of Islamic Educational Research*, 1(4), 27–44. <https://doi.org/10.61132/ijier.v1i4.67>
- Zhou, Y., & Li, X. (2024). Data warehousing systems for educational decision-making in student management. *Journal of Educational Technology Systems*, 52(3), 342–359.