

The Digitization of Madrasah Administration: Relationship between Transformational Leadership and Technology Implementation in Jambi

Tabroni¹, A A Musyaffa²

¹ Universitas Islam Negeri Sultan Thaha Saifuddin, Jambi, Indonesia; tabroni@uinjambi.ac.id

² Universitas Islam Negeri Sultan Thaha Saifuddin, Jambi, Indonesia; musyaffa@uinjambi.ac.id

ARTICLE INFO

Keywords:

digitalization of administration;
transformational leadership;
implementation of technology;
Madrasah Ibtidaiyah;
Jambi

Article history:

Received 2025-10-07

Revised 2025-11-04

Accepted 2025-12-11

ABSTRACT

The digital transformation of school administration is increasingly essential in ensuring efficiency and transparency in education. In the context of Islamic elementary schools (*Madrasah Ibtidaiyah*) in Jambi City, this study investigates the role of transformational leadership in facilitating the implementation of administrative digitalization. A mixed-methods approach was employed, combining quantitative and qualitative data collection. Surveys and interviews were conducted with 39 school principals, and the quantitative data were analyzed using Pearson correlation and regression analysis, while qualitative data were interpreted through thematic analysis based on Miles and Huberman's framework. The findings indicate that digital platforms such as EMIS, SIMPATIKA, and digital archiving tools have enhanced administrative performance in terms of data management, reporting, and transparency. However, implementation remains uneven due to disparities in infrastructure and digital literacy. Quantitative analysis revealed a strong and significant positive correlation between transformational leadership and the success of digital administration ($r = 0.894$, $p < 0.01$), with leadership accounting for approximately 89% of the variance. Principals demonstrating idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration were more effective in promoting innovation and organizational adaptability. The study highlights that transformational leadership is a key driver of digital innovation in Islamic education settings. It fosters a culture of collaboration, professional development, and readiness for change. To support sustainable digital transformation in madrasahs, leadership development, targeted digital training for staff, and policy alignment are essential. These findings contribute to leadership theory and practice in Islamic educational administration.

This is an open access article under the [CC BY-NC-SA](https://creativecommons.org/licenses/by-nc-sa/4.0/) license.



Corresponding Author:

Tabroni

Universitas Islam Negeri Sultan Thaha Saifuddin, Jambi, Indonesia; tabroni@uinjambi.ac.id

1. INTRODUCTION

Educational institutions, including madrasahs, face significant pressure to innovate and adapt within the era of globalization and rapid advancement of information technology (Cowin, 2021; Parinduri & Ibarra, 2025; Rashed et al., 2025). This adaptation represents a strategic imperative to ensure that madrasahs remain relevant and capable of delivering high-quality education to students. In this context, the madrasah principal occupies a crucial leadership position, responsible not only for daily operations but also as a change agent facilitating modernization, particularly in administrative management and educational methodology (Astuti et al., 2024; Effendi et al., 2020; Tastanova et al., 2023).

Transformational leadership offers a promising approach for driving digitalization initiatives in madrasahs (Shields, 2023; Zhang et al., 2025). By embodying transformational leadership characteristics, madrasah principals can cultivate an innovative organizational culture, motivate staff to embrace change, and enhance institutional effectiveness (Firmansyah et al., 2022; Hamdani, 2023). Prior research has demonstrated that transformational leadership styles significantly influence technology adoption and organizational change across diverse educational contexts (Tran et al., 2024).

Madrasahs, as Islamic educational institutions, encounter unique opportunities and challenges in adopting digital technologies. Specifically, the defining characteristic of madrasahs lies in their commitment to Islamic values and religious education (Romlah et al., 2025). Increasingly, digital technology can serve as a powerful instrument to enhance educational access, improve learning quality, and enable more flexible and personalized approaches for students (Lamm et al., 2021; Zuo et al., 2024). Technology integration in madrasahs extends beyond physical infrastructure such as computers and internet networks; it necessitates the transformation of the curriculum, learning culture, and teacher preparedness. Educators must receive continuous training to integrate technology into active and contextual pedagogical approaches (Assefa & Mujtaba, 2025). The curriculum requires modification to present Islamic content in more engaging ways through digital media, including interactive videos, online assessments, and Qur'anic learning platforms (Affandi et al., 2021). Furthermore, fostering a digital literacy culture among madrasah students is essential to ensure they develop strong digital competencies and can critically evaluate information encountered (Pabbajah et al., 2021).

However, the realization of digitalization in madrasahs remains suboptimal. Data from the Islamic Education Management Information System (EMIS) indicate that information and communication technology (ICT) utilization across numerous madrasahs remains limited (Hidayat & Dhuhani, 2025). Several key impediments have been identified: First, ICT device usage in instructional settings remains low because many educators continue relying on traditional approaches due to insufficient technological competence or inadequate continuous professional development (Nawastheen et al., 2023). Second, technological infrastructure availability, including internet connectivity, computers, and projectors, remains inadequate, particularly in remote areas (Bolaji & Ajia, 2023). Third, technology implementation in madrasah administrative management has not achieved optimal levels. Digital administrative systems such as electronic attendance tracking, student information management, and online evaluation systems have not been comprehensively deployed across many madrasahs. This situation renders administrative processes slow, inefficient, and susceptible to errors (Prathap et al., 2021). Fourth, the absence of explicit institutional policies promoting focused and sustained ICT usage, coupled with insufficient budgets for technology acquisition and maintenance, further impedes technological optimization (Maeko et al., 2025).

Although prior studies have examined transformational leadership and technology adoption in general educational settings, empirical evidence focusing specifically on the intersection of transformational leadership and administrative digitalization within Islamic education, particularly at the Madrasah Ibtidaiyah level, remains scarce (Bohari et al., 2024). Existing literature tends to emphasize pedagogical or instructional technology rather than administrative transformation. Furthermore, most research has been conducted in higher education or secular school contexts, leaving a notable gap in understanding how Islamic educational leaders navigate digital transformation amid unique cultural and organizational structures. Therefore, this study addresses this research gap by exploring how

transformational leadership influences the implementation of administrative digitalization in Madrasah Ibtidaiyahs in Jambi City.

Given these persistent challenges, developing a comprehensive understanding of factors influencing administrative digitalization implementation in madrasahs becomes critically important. Specifically, the role of madrasah principal leadership in facilitating the digitalization process warrants further investigation. The research question guiding this study is: What is the relationship between transformational leadership of madrasah principals and the implementation of administrative digitalization in Madrasah Ibtidaiyahs? By understanding this relationship, this research aims to provide practical recommendations for madrasah leaders, educational policymakers, and stakeholders to enhance the effectiveness and sustainability.

To address this gap, this study investigates the relationship between transformational leadership of madrasah principals and the implementation of administrative digitalization in Madrasah Ibtidaiyah in Jambi City. The core research question guiding this study is: How does the transformational leadership of madrasah principals influence the implementation of administrative digitalization? By answering this question, the study aims to enrich the theoretical understanding of transformational leadership in Islamic educational administration and provide practical insights for policymakers and school leaders in designing effective, context-sensitive digitalization strategies.

2. METHODS

This study uses a mixed methods approach that combines quantitative correlational analysis and qualitative descriptive (Basheer et al., 2025; England, 2022) exploration to gain a comprehensive understanding of the relationship between transformational leadership and the implementation of administrative digitization in madrasah ibtidaiyah in the city of Jambi.

2.1. Research Design

The quantitative stage uses a correlational survey design to measure the relationship between two main variables, namely transformational leadership and madrasah administrative digitization. This design was chosen to determine the extent to which leadership practices influence the successful application of technology in administrative processes. Meanwhile, the qualitative stage aims to provide contextual understanding through interviews, observations, and document analysis based on Miles and Huberman's interactive analysis model (Yuliana et al., 2024).

2.2. Population and Sample

The population of this study included all madrasah principals at Madrasah Ibtidaiyah in Jambi City, with a total of 39 respondents representing public and private madrasahs. In detail, there are 1 public madrasah (2.56%) and 38 private or foundation-based madrasahs (97.44%). The sample selection was carried out using the total sampling technique because the population size was relatively small and could be reached comprehensively.

2.3. Research Instruments

Quantitative data were collected using a structured questionnaire developed based on transformational leadership indicators, namely idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration as well as administrative digitization indicators, including the use of digital platforms such as EMIS, SIMPATIKA, and digital filing systems. Each indicator was measured using a Likert scale with Cronbach's Alpha > 0.80, indicating a high level of internal consistency (Darnton, 2023; Kusmaryono et al., 2022).

2.4. Data Analysis Techniques

Quantitative data analysis was performed using Pearson product-moment correlation tests and simple linear regression to determine the magnitude of influence between variables. Statistical analysis was performed using SPSS version 26, with a significance level of $p < 0.05$. Meanwhile, qualitative data analysis was carried out in stages according to Miles and Huberman, namely data reduction, data presentation, and conclusion drawing and verification. Qualitative findings reinforce quantitative results by showing that madrasah principals who apply transformational leadership characteristics are more successful in implementing digital administration systems in their madrasahs.

3. FINDINGS AND DISCUSSION

3.1. Implementation of administrative digitization in elementary schools in Jambi City

The education sector has undergone a significant transformation in line with rapid advances in information and communication technology (Guaña-Moya et al., 2023; Ochoa-Tataje et al., 2024). These technological developments have encouraged educational institutions, including Islamic educational institutions, to integrate digital systems to improve efficiency, accuracy, and transparency in administration. In the city of Jambi, madrasah ibtidaiyah (elementary Islamic schools) have begun to implement digital-based administrative systems to support more professional and responsive governance.

Field observations and data analysis show that the implementation of administrative digitization in madrasah ibtidaiyah covers several key aspects, including student and teacher data management, financial administration, personnel data archiving, and routine reporting to the Ministry of Religious Affairs. Various digital platforms have been used, such as EMIS (Education Management Information System) and SIMPATIKA, which serve to facilitate more efficient data recording, monitoring, and reporting. In addition, the processes of correspondence, attendance, and document archiving have also begun to transition from manual systems to computer-based and cloud-based systems, indicating a systemic shift towards digital administration.

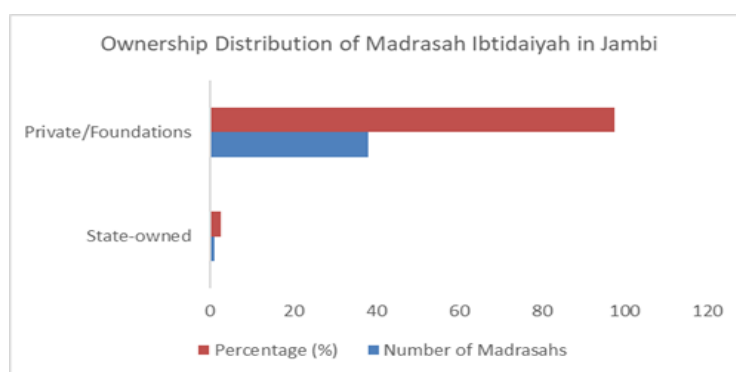


Figure 1. Ownership Distribution of Madrasah Ibtidaiyah in Jambi

Figure 1 illustrates the distribution of madrasah ibtidaiyah ownership in the city of Jambi. Based on empirical data, there are 39 madrasahs in operation, consisting of 1 public madrasah (2.56%) and 38 private or foundation-based madrasahs (97.44%). This distribution shows that most madrasahs are managed by private foundations, which implies differences in leadership capacity, resource allocation, and institutional readiness for digital transformation. The dominance of private madrasahs also shows that digital innovation efforts are highly dependent on the vision and internal commitment of each institution, not solely on government policy.

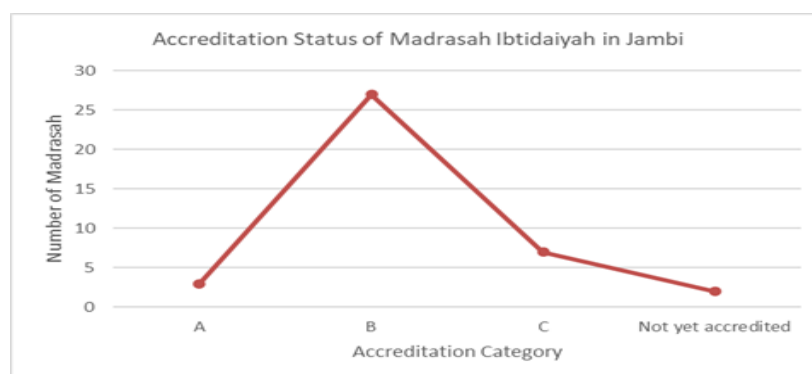


Figure 2. Accreditation Status of Madrasah Ibtidaiyah in Jambi

Meanwhile, Figure 2 shows the accreditation status of Madrasah Ibtidaiyah in Jambi City. Of the total 39 madrasahs, 3 madrasahs (7.69%) are accredited A, 27 madrasahs (69.23%) are accredited B, 7 madrasahs (17.95%) are accredited C, and 2 madrasahs (5.13%) are not yet accredited. The dominance of B accreditation shows that most madrasahs have achieved institutional quality at the intermediate level, but still face obstacles in meeting higher standards, particularly in terms of digital governance, data management, and quality assurance systems. It should also be noted that no madrasah has implemented ISO 9001:2000 or ISO 9001:2008 certification, which emphasizes the need to strengthen institutional standards and digital policies systematically.

Although progress in administrative digitization has begun to be seen, several challenges remain. Some madrasahs still experience limitations in technological infrastructure, low digital literacy among administrative staff, and varying levels of readiness among madrasah principals to lead technological reforms. This condition emphasizes the importance of transformational leadership in driving successful technology adoption. Madrasah principals who have a digital vision, encourage innovation, and provide continuous support to educational staff have proven to be more successful in fully integrating digital-based administrative systems.

Overall, the process of digitalizing madrasah administration in Jambi City shows progress even though it is still in its early stages. The transition from manual to digital systems has improved the quality of internal services, strengthened transparency, and fostered public trust in madrasahs as adaptive educational institutions that are ready to face the challenges of the digital era. With the support of sustainable policies, increased human resource capacity, and strong transformational leadership, the digitization of madrasah administration will become an important foundation for the modernization and sustainability of Islamic education in Indonesia.

3.2 The transformational managerial traits of elementary school principals in Jambi City

The role of madrasah principals in the digital era is not only administrative, but also strategic as drivers of change. In the context of Madrasah Ibtidaiyah in Jambi City, transformational leadership is an important factor that drives innovation and the effectiveness of administrative digitization. Madrasah principals act as visionary leaders who are able to inspire, motivate, and direct educational personnel to adapt to developments in educational technology.

The results of the study show that the transformational leadership of madrasah principals encompasses four main dimensions, namely idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. The distribution of the findings is presented in Table 1 below.

Table 1. Distribution of Transformational Leadership Characteristics of Elementary School Principals in Jambi City

Dimension of Transformational Leadership	Number of Principals	Percentage	Key Description
Idealized Influence	38	97.4%	Serve as role models through integrity, discipline, and consistent use of technology.
Inspirational Motivation	38	97.4%	Build a shared vision and foster enthusiasm for innovation.
Intellectual Stimulation	36	92.3%	Encourage critical thinking and the application of creative solutions.
Individualized Consideration	35	89.7%	Provide support and professional guidance for teachers and staff.

As shown in Table 1, the two most dominant dimensions are ideal influence and inspirational motivation, each indicated by 38 madrasah principals (97.4%). This shows that most madrasah principals have become role models with integrity and are able to foster collective enthusiasm in realizing modern and adaptive madrasahs. Meanwhile, intellectual stimulation was indicated by 36 madrasah principals (92.3%) who encouraged teachers and staff to think critically and innovate. Individual attention was indicated by 35 madrasah principals (89.7%) through coaching and support for the professional development of educators.

These findings confirm that madrasah principals in Jambi City have consistently implemented transformational leadership. These four dimensions are an important foundation for the success of madrasah administrative digitalization, as they create a collaborative, innovative work culture that is ready to face the challenges of the digital era.

3.3 *The relation between transformative leadership and the effective implementation of administrative technology*

In the evolving digital era, educational organizations are required to optimize technology in administrative management to enhance efficiency, transparency, and accountability. The effectiveness of such digital transformation is largely determined by the leadership style adopted by institutional leaders. Within this context, transformational leadership has emerged as a pivotal approach that fosters innovation, motivates personnel, and builds a shared vision toward digital modernization in education. Transformational leaders not only focus on achieving short-term objectives but also drive sustainable organizational change through empowerment, collaboration, and the cultivation of digital competence among staff members.

Empirical analysis conducted in this study demonstrates a strong and significant correlation between transformational leadership and the implementation of administrative digitalization in Madrasah Ibtidaiyah across Jambi City. The results of the Pearson correlation test, presented in Table 2, indicate a correlation coefficient ($r = 0.894$, $p < 0.01$), signifying a very strong positive relationship between the two variables. This means that higher levels of transformational leadership among madrasah principals are associated with greater effectiveness in the implementation of digital-based administrative systems.

Table 2. Correlation Between Transformational Leadership and Administrative Digitalization

Variable	Transformational Leadership (30 Indicators)	Administrative Digitalization (40 Indicators)
Transformational Leadership	1	.894
Administrative Digitalization	.894	1
Sig. (2-tailed)	.000	.000
N	39	39

The R Square value of 0.894 indicates that approximately 89.4% of the variance in the implementation of administrative digitalization can be explained by transformational leadership, while the remaining 10.6% is influenced by external factors such as institutional environment, resource availability, and individual readiness. These findings confirm a high and statistically significant correlation, implying that transformational leadership plays a decisive role in accelerating digital adaptation within Islamic educational institutions.

Further qualitative observations support this quantitative evidence. Madrasahs led by principals who exhibit transformational characteristics such as inspiring a clear digital vision, promoting innovation, and facilitating professional growth demonstrate more advanced integration of technology in administrative operations. This is reflected in the consistent use of EMIS and SIMPATIKA systems, the transition to digital-based correspondence and archiving, the application of electronic attendance systems, and the adoption of digital financial and personnel reporting mechanisms. Moreover, teachers and administrative staff in these institutions show higher digital literacy and openness to change, largely due to continuous support and training provided by transformational leaders.

These results substantiate that transformational leadership significantly enhances the success of administrative digitalization in Madrasah Ibtidaiyah. Leaders who embody this leadership style are capable of creating an organizational culture that values learning, innovation, and adaptability, key elements for sustaining educational quality and competitiveness in the digital era.

Discussion

The results of this study confirm that the implementation of administrative digitization in Madrasah Ibtidaiyah in Jambi City has shown positive progress, although it is still in its early stages (Umah et al., 2023). This condition is in line with the national trend, which shows that many Islamic educational institutions are still in the process of transitioning from manual to digital administrative systems (Almonawer et al., 2023; Parinduri & Ibarra, 2025). The dominance of B-accredited madrasahs and the absence of ISO-certified madrasahs indicate that institutional standards and digital governance are not yet fully optimized (Baharun et al., 2021; Haddade et al., 2024). These findings indicate that although the foundations for digital transformation have been laid, continuous institutional strengthening is still needed to achieve comprehensive quality assurance and management standardization (Bhuiyan & Baniamin, 2025).

Institutional certification, such as accreditation and ISO 9001:2000 or ISO 9001:2008, serves as an important benchmark in quality management and administrative modernization (Arif et al., 2024). Accreditation provides legitimacy, increases public trust, and encourages continuous improvement (Ainissyifa et al., 2024; Lytras et al., 2024). However, as shown in the research results, Madrasah Ibtidaiyah in Jambi City still faces various structural and managerial obstacles, such as limited technological infrastructure, low digital literacy, and resource disparities between madrasahs in urban and rural areas, which hinder the effective implementation of quality management standards (Lumban Gaol, 2023; Wahyuningrum et al., 2020). Previous studies (Jung et al., 2024; Wedi & Mardiana, 2025) have also found that accreditation reform and the implementation of digital monitoring systems can

improve the performance and transparency of educational institutions, provided they are supported by adequate leadership capacity and readiness for innovation (Javed & Alenezi, 2023; Luo et al., 2025).

The findings of this study also show that the effectiveness of administrative digitization in madrasahs is greatly influenced by the leadership practices of madrasah principals. Quantitative analysis results show a very strong and significant relationship ($r = 0.894$; $p < 0.01$) between transformational leadership and the implementation of administrative digitization. This confirms that transformational leadership plays an important role in driving digital innovation and organizational change in Islamic educational institutions (Rosyidin & Arifin, 2021). These findings are in line with previous studies (Sopandi et al., 2023), which confirm that a leadership style oriented towards vision, collaboration, and empowerment creates a positive climate for technology adoption and educational reform.

The four main dimensions of transformational leadership idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration, collectively contribute to the advancement of digital transformation (Alsaleh, 2024). School principals who demonstrate idealized influence and inspirational motivation become role models who are able to foster a shared vision, a spirit of innovation, and adaptive abilities in the work environment. Meanwhile, intellectual stimulation and individualized consideration encourage teachers and administrative staff to think critically, find creative solutions, and develop their professionalism on an ongoing basis (Casma et al., 2023). This leadership style builds an organizational culture that is open to change and innovation-oriented, in line with the findings of Trimulyo et al. (2025) and Oktafia et al. (2021), which prove that transformational leadership can improve managerial innovation and institutional quality.

However, several systemic and contextual obstacles are still evident. Many Madrasah Ibtidaiyah still experience limitations in terms of human resources trained in digital systems and quality management practices. The institutional management structure is also still traditional, with documentation and evaluation mechanisms that are not yet standardized. In addition, limited government support, particularly in terms of technical assistance for ISO certification and infrastructure distribution, remains an obstacle to madrasah development, especially in rural areas. These findings indicate that although leadership acts as the main catalyst for change, long-term progress still requires comprehensive policy intervention, institutional capacity building, and resource distribution.

The results of this discussion confirm that transformational leadership acts as both a driver and enabler in the process of digitizing basic Islamic education administration. The strong relationship between leadership and digitization shows that visionary, inspiring, and empowering leadership can shape an institution's readiness to face digital transformation. However, for digitalization to be sustainable, robust quality assurance mechanisms, standardized management systems, and consistent government support are needed. Strengthening these three aspects will not only accelerate the modernization of Madrasah Ibtidaiyah in Jambi City, but also enhance the competitiveness of Indonesian Islamic education in the digital era.

4. CONCLUSION

This study finds that while administrative digitalization in 39 Madrasah Ibtidaiyah in Jambi City is progressing through the adoption of systems like EMIS, SIMPATIKA, and digital archives, its implementation remains suboptimal due to infrastructure limitations, uneven digital literacy, and institutional disparities. A strong and significant correlation ($r = 0.894$; $p < 0.01$) was identified between transformational leadership and the effectiveness of digital administration, with leadership dimensions such as idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration playing a key role in fostering innovation and adaptability. However, the study is limited by its focus on a single urban area, the use of cross-sectional data, and a relatively small sample, which may constrain the generalizability of the findings. Future research should explore comparative studies

between urban and rural contexts, employ longitudinal designs to assess sustainability over time, and develop context-specific leadership models tailored to the unique dynamics of Islamic education systems in different regions.

REFERENCES

- Affandi, L., Rahmat, M., & Supriadi, U. (2021). A thematic digital quran learning model in islamic religious education. *Jurnal Pendidikan Islam*, 7(2), 181–194. <https://doi.org/10.15575/jpi.v7i2.15062>
- Ainissyifa, H., Nasrullah, Y. M., & Fatonah, N. (2024). Empowering educational autonomy to implement kurikulum merdeka in madrasah. *Jurnal Pendidikan Islam*, 10(1), 25–40. <https://doi.org/10.15575/jpi.v10i1.35133>
- Almonawer, N., Althonayan, A., Alainati, S., Al-Hammad, F., Haque, R., & Senathirajah, A. R. B. S. (2023). Transformational Leadership Style and School Transformation: The Case of Secondary Schools in Kuwait. *International Journal of Operations and Quantitative Management*, 29(1), 51–67. <https://doi.org/10.46970/2022.29.1.4>
- Alsaleh, A. (2024). The impact of technological advancement on culture and society. *Scientific Reports*, 14(1). <https://doi.org/10.1038/s41598-024-83995-z>
- Arif, M., Kartiko, A., Rusydi, I., Zamroni, M. A., & Hasan, M. S. (2024). The Existence of Madrasah Ibtidaiyah Based on Pesantren: Challenges and Opportunities in The Digital Era. *Munaddhomah*, 5(4), 367–382. <https://doi.org/10.31538/munaddhomah.v5i4.1401>
- Assefa, E. A., & Mujtaba, B. G. (2025). Exploring transformational leadership in education by leveraging diversity and technology for inclusive practices. *International Journal of Public Leadership*. <https://doi.org/10.1108/IJPL-10-2024-0112>
- Astuti, M., Ismail, F., Fatimah, S., & Puspita, W. (2024). The Relevance Of The Merdeka Curriculum In Improving The Quality Of Islamic Education In Indonesia. *International Journal of Learning, Teaching and Educational Research*, 23(6), 56–72. <https://doi.org/10.26803/ijlter.23.6.3>
- Baharun, H., El Iq Bali, M. M., Qatrunnada, W., Kulsum, U., Asiyah, U. S., & Abdullah, D. (2021). Utilization of Digital Applications in Learning Assessment. *Journal of Physics: Conference Series*, 1899(1). <https://doi.org/10.1088/1742-6596/1899/1/012156>
- Basheer, N., Ahmed, V., Bahroun, Z., & Anane, C. (2025). Sustainability assessment in higher education institutions: exploring indicators, stakeholder perceptions, and implementation challenges. *Discover Sustainability*, 6(1). <https://doi.org/10.1007/s43621-025-01116-w>
- Bhuiyan, S. A., & Baniamin, H. M. (2025). Intent vs impact: Ramifications of digitalization on the administrative burden. *Public Policy and Administration*. <https://doi.org/10.1177/09520767251348541>
- Bohari, A., Wider, W., Udang, L. N., Jiang, L., Tanucan, J. C. M., & Lajuma, S. (2024). Transformational leadership's role in shaping Education 4.0 within higher education. *Journal of Infrastructure, Policy and Development*, 8(8). <https://doi.org/10.24294/jipd.v8i8.4900>
- Bolaji, H. O., & Ajia, I. S. (2023). Information and Communication Technology (ICT) Integration: A Veritable Technique for Quality Secondary Education. *ASEAN Journal of Educational Research and Technology*, 2(2), 137–144. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-105011212803&partnerID=40&md5=0c0e5f484fcb3b98d4f4750748c0388f>
- Casmana, A. R., Dewantara, J. A., Timoera, D. A., Kusmawati, A. P., & Syafrudin, I. (2023). Global citizenship: preparing the younger generation to possess pro-environment behavior, mutual assistance and tolerance awareness through school engagement. *Globalisation, Societies and Education*, 21(1), 15–32. <https://doi.org/10.1080/14767724.2021.2013167>
- Cowin, J. E. D. (2021). Education and globalization: Artificial intelligence, augmented reality digital technologies, and distributed ledger technology networks. In C. N.C., H. J., S. B., & S. M. (Eds.), *15th International Multi-Conference on Society, Cybernetics and Informatics, IMSCI 2021* (pp. 56–61). International Institute of Informatics and Systemics, IIIS. <https://www.scopus.com/inward/record.uri?eid=2-s2.0->

- 85118885558&partnerID=40&md5=243a6df250807637c7410b414a50e0a1
- Darnton, G. (2023). Likert scales and questions - Uses and abuses. In F. Matos & A. Rosa (Eds.), *Proceedings of the European Conference on Research Methods in Business and Management Studies* (Vols. 2023-September, pp. 44–49). Academic Conferences and Publishing International Limited. <https://doi.org/10.34190/ecrm.22.1.1748>
- Effendi, Y. R., Bafadal, I., Degeng, I. N. S., & Arifin, I. (2020). The principal's transformational leadership approach based on local wisdom in strengthening the character of students. *Malaysian Online Journal of Educational Management*, 8(4), 24–42. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85091835109&partnerID=40&md5=4eeae79e838123d1baa8df393dd9bed3>
- England, A. (2022). Quantitative and qualitative research methods. In *Research for Medical Imaging and Radiation Sciences* (pp. 71–96). Springer International Publishing. https://doi.org/10.1007/978-3-030-79956-4_5
- Firmansyah, F., Prasojo, L. D., Jaedun, A., & Retnawati, H. (2022). Transformational leadership effect on teacher performance in Asia: A meta-analysis. *Cypriot Journal of Educational Sciences*, 17(6), 2127–2146. <https://doi.org/10.18844/cjes.v17i6.7552>
- Guaña-Moya, J., Ballesteros-Casco, T., Arteaga-Alcívar, Y., Antamba-Guasgua, J., Lutsak, E. V. A., & Morales, J. C. (2023). The New Educational Models Based on Information and Communication Technology and Education 4.0. In M. A., A. A., C. J.V., S. C., & de M. C.H. (Eds.), *Smart Innovation, Systems and Technologies* (Vol. 366, pp. 267–277). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1007/978-981-99-5414-8_26
- Haddade, H., Nur, A., Achruh, A., Rasyid, M. N. A., & Ibrahim, A. (2024). Madrasah management strategies through Madrasah Reform program: an evidence from Indonesia. *International Journal of Educational Management*, 38(5), 1289–1304. <https://doi.org/10.1108/IJEM-05-2023-0236>
- Hamdani, N. A. (2023). Scrutinizing islamic higher education institutions in indonesia. *Jurnal Pendidikan Islam*, 9(1), 93–106. <https://doi.org/10.15575/jpi.v0i0.24478>
- Hidayat, A., & Dhuhani, E. M. (2025). Evaluating the Acceptance and Use of Education Management Information System (EMIS) 4.0 in a Private Islamic Boarding School Based on the Technology Acceptance Model. *Nazhruna: Jurnal Pendidikan Islam*, 8(2), 349–362. <https://doi.org/10.31538/nzh.v8i2.150>
- Javed, Y., & Alenezi, M. (2023). A Case Study on Sustainable Quality Assurance in Higher Education. *Sustainability (Switzerland)*, 15(10). <https://doi.org/10.3390/su15108136>
- Jung, J., Choi, S., & Fanguy, M. (2024). Exploring Teachers' Digital Literacy Experiences. *International Review of Research in Open and Distributed Learning*, 25(2), 41–59. <https://doi.org/10.19173/irrodl.v25i2.7572>
- Kusmaryono, I., Wijayanti, D., & Maharani, H. R. (2022). Number of Response Options, Reliability, Validity, and Potential Bias in the Use of the Likert Scale Education and Social Science Research: A Literature Review. *International Journal of Educational Methodology*, 8(4), 625–637. <https://doi.org/10.12973/ijem.8.4.625>
- Lamm, K. W., Sapp, L. R., Randall, N. L., & Lamm, A. J. (2021). Leadership development programming in higher education: an exploration of perceptions of transformational leadership across gender and role types. *Tertiary Education and Management*, 27(4), 297–312. <https://doi.org/10.1007/s11233-021-09076-2>
- Lumban Gaol, N. T. (2023). School leadership in Indonesia: A systematic literature review. *Educational Management Administration and Leadership*, 51(4), 831–848. <https://doi.org/10.1177/17411432211010811>
- Luo, Y., Qin, S.-B., & Wang, D.-S. (2025). Reform of embedded system experiment course based on engineering education accreditation. *International Journal of Electrical Engineering and Education*, 62(1), 3–16. <https://doi.org/10.1177/0020720920918155>
- Lytras, M. D., Serban, A. C., Alkhalidi, A., Aldosemani, T., & Malik, S. (2024). Transformative Learning for Future Higher Education: The Artificial Intelligence-enabled Learning Revolution 2035. *Digital*

- Transformation in Higher Education, Part B*, 231–241. <https://doi.org/10.1108/978-1-83608-424-220241009>
- Maeko, M. S. A., Mlambo, P. B., & Khoza, S. D. (2025). Difficulties encountered by engineering graphics and design teachers in integrating ICT into classroom teaching: A case study of technical schools in Umungundlovu. *Eurasia Journal of Mathematics, Science and Technology Education*, 21(11). <https://doi.org/10.29333/ejmste/17341>
- Nawastheen, F. M., Palthamburaj, K., Shifaan, S., & Thannimalai, T. (2023). A study on the readiness and attitudes of Sri Lankan Tamil medium teachers towards the use of ICT in teaching and learning. *International Journal of Advanced and Applied Sciences*, 10(6), 54–62. <https://doi.org/10.21833/ijaas.2023.06.007>
- Ochoa-Tataje, F., Alanya-Beltran, J., Ruiz-Salazar, J., Velarde-Vela, L., Perez-Peralta, E., & La-Chira-Loli, M. (2024). Beyond the classroom: Integrating cutting-edge pedagogies in 6G curriculum development. In *6G Security Education and Multidisciplinary Implementation* (pp. 58–75). IGI Global. <https://doi.org/10.4018/979-8-3693-7421-4.ch004>
- Oktafia, R., Adripen, A., & Muchlis, L. S. (2021). Effect of Transformational Leadership of Madrasah Principals and Teacher Performance on Madrasah Quality. *Tarbawi : Jurnal Ilmu Pendidikan*, 17(1), 73–82. <https://doi.org/10.32939/tarbawi.v17i1.937>
- Pabbajah, M., Jubba, H., Abdullah, I., & Pabbajah, M. T. H. (2021). From the scriptural to the virtual: Indonesian engineering students responses to the digitalization of Islamic education. *Teaching Theology and Religion*, 24(2), 122–130. <https://doi.org/10.1111/teth.12581>
- Parinduri, M. A., & Ibarra, F. P. (2025). Strengthening the ideology of Islamic religious education in the era of technological disruption. *Jurnal Ilmiah Ilmu Terapan Universitas Jambi*, 9(2), 465–473. <https://doi.org/10.22437/jiituj.v9i2.41841>
- Prathap, D. P., Murali, P., & Venkatasubramanian, V. (2021). Barriers to ICT Usage: An Assessment Among the Sugarcane Farmers in Disadvantaged Districts of Tamil Nadu, India. *Sugar Tech*, 23(2), 286–295. <https://doi.org/10.1007/s12355-020-00889-w>
- Rashed, Z. N., Zhaffar, N. M., Ihwani, S. S., & Iswantir, M. (2025). Driving Islamic Education in the Era of the Industrial Revolution 4.0: Challenges and Strategies. *Global Journal Al-Thaqafah*, 15(1), 18–33. <https://doi.org/10.7187/GJAT072025-2>
- Romlah, R., Warisno, A., Muslim, A. B., & Harun, A. (2025). Navigating tradition and modernity in the strategic management and transformation of Madrasah Aliyah in multicultural Indonesia. *International Journal of Management in Education*, 19(3), 284–310. <https://doi.org/10.1504/IJMIE.2025.145945>
- Rosyidin, M. A., & Arifin, I. (2021). Integration of Islamic and Indonesian Education in the Perspective of KH. Salahuddin Wahid. *Jurnal Pendidikan Agama Islam*, 18(2), 227–256. <https://doi.org/10.14421/jpai.2021.182-02>
- Shields, C. M. (2023). Addressing the goal of inclusive and equitable quality education and lifelong learning for all. In *Inclusive Leadership: Equity and Belonging in Our Communities* (pp. 97–106). Emerald Publishing. <https://doi.org/10.1108/S2058-880120230000009009>
- Sopandi, E., Anwar, S., Habibah, N., Manurung, S., Alia, N., & Hendrawati, S. (2023). The Role of Digital Literacy and Its Relation with Performance of Madrasah Aliyah Students. *Eurasian Journal of Educational Research*, 2023(104), 16–32. <https://doi.org/10.14689/ejer.2023.104.002>
- Tastanova, M., Jilkibayeva, R., Arkhabayeva, Z., & Tripathi, S. (2023). Enhancing Predictive Analytics in Education through Collaborative Filtering Algorithms in Knowledge Management. *2023 4th International Conference on Computation, Automation and Knowledge Management, ICCAKM 2023*. <https://doi.org/10.1109/ICCAKM58659.2023.10449523>
- Tran, V. D., Bui, L. D. T., Le, M. T. L., & Nguyen, H. T. (2024). Principals' Transformational Leadership on Teachers' Self-Efficacy: A Case of Vietnam. *International Journal of Educational Organization and Leadership*, 31(2), 71–90. <https://doi.org/10.18848/2329-1656/CGP/v31i02/71-90>
- Trimulyo, J., Lestari, H., Rahmawati, I., & Thelma, C. C. (2025). The Influence of Transformational

- Leadership on Fostering Management Innovation in Islamic Education Institutions. *Al-Tanzim: Jurnal Manajemen Pendidikan Islam*, 9(1), 316–326. <https://doi.org/10.33650/al-tanzim.v9i1.10785>
- Umah, E. C., Imron, A., Hadi, S., & Praherdhiono, H. (2023). Madrasah principal digital leadership innovation in digital learning transformation. *Revista de Gestao Social e Ambiental*, 17(3). <https://doi.org/10.24857/rgsa.v17n3-025>
- Wahyuningrum, S., Winarni, R., & Murwaningsih, T. (2020). The role of full-day school in student character building in primary school. *ACM International Conference Proceeding Series*. <https://doi.org/10.1145/3452144.3452251>
- Wedi, A., & Mardiana, D. (2025). Digital Transformation Model of Islamic Religious Education in the AI Era: A Case Study of Madrasah Aliyah in East Java, Indonesia. *International Journal of Learning, Teaching and Educational Research*, 24(8), 842–863. <https://doi.org/10.26803/ijlter.24.8.37>
- Yuliana, I. F., Faizah, F., Fatayah, F., & Priyasmika, R. (2024). Students' critical thinking skills using HOTS-based assessment on pH calculation. In H. Habiddin & T. Ronceviv (Eds.), *AIP Conference Proceedings* (Vol. 3106, Issue 1). American Institute of Physics. <https://doi.org/10.1063/5.0215096>
- Zhang, X., Admiraal, W., Saab, N., & Liu, Y. (2025). Exploring teaching quality: The role of school working conditions, principal leadership, and teacher characteristics. *Educational Psychology*, 45(3), 292–313. <https://doi.org/10.1080/01443410.2025.2466663>
- Zuo, X., Omar, I. M., & Lee, K. C. S. (2024). The influence of teacher's transformational leadership on student engagement: unveiling the mediating role of self-efficacy in chinese higher vocational education. *Malaysian Online Journal of Educational Management*, 12(4), 78–94. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85207834922&partnerID=40&md5=9a58039a41b5181e3f0eb682e26b487f>