



# School Management Strategies for Implementing Deep Learning in Indonesian Junior High Schools

Mulyadi\*, Warissuddin Sholeh, Mar'atun Sholihah, Sahrizal Vahlevi

Universitas Jambi, Indonesia

\*Corresponding Author: [mulyadiahmad@unja.ac.id](mailto:mulyadiahmad@unja.ac.id)

DOI: <https://doi.org/10.61987/bamj.v3i1.800>

## Abstract:

Improving the quality of deep learning-based instruction at the junior high school level requires the optimization of school management as a foundation for effective educational governance in the era of educational transformation. This study aims to analyze the effectiveness of school management in facilitating the implementation of deep learning and to identify the supporting factors and challenges encountered in Indonesian junior high schools. The research was conducted in eight public and private schools across three provinces—Jambi, South Sumatra, and West Java—using a mixed methods approach with a sequential explanatory design. A total of 120 teachers and principals participated in the quantitative survey, followed by in-depth interviews with 12 key informants to validate the findings. Quantitative data were analyzed using descriptive statistics and simple regression, while qualitative data were examined through thematic coding. The results indicate that optimized school management significantly supports the implementation of deep learning through policy alignment, teacher professional competence, and the availability of learning infrastructure. However, challenges remain in the form of limited facilities and high administrative workload. These findings contribute to the theoretical development of educational management and offer practical implications for improving the quality of learning in Indonesia.

## ARTICLE HISTORY

Received 12 January 2025

Revised 15 March 2025

Accepted 22 May 2025

## KEYWORDS

Deep Learning,  
School Management,  
Educational Management,  
Teacher Competence

## INTRODUCTION

The transformation of 21st-century education requires schools to adopt learning approaches that promote higher-order thinking skills, creativity, collaboration, and digital literacy. One approach that is increasingly considered relevant in responding to the rapid development of artificial intelligence and the digitalization of education is deep learning (Agarwal & Sharma, 2024; Kong et al., 2023; Ye et al., 2022). Deep learning emphasizes meaningful understanding, critical thinking, and the ability to apply knowledge in complex and authentic situations (Hsieh et al., 2021; Karim et al., 2025; Muniasamy & Alasiry, 2020). In Indonesia, efforts to improve the quality of learning through the implementation of the *Merdeka Belajar* policy also emphasize the importance of learning processes that go beyond basic cognitive achievement and encourage reflective thinking and complex problem-solving skills among students (Baniata et al., 2024; Syarifudin & Muttaqin, 2025).

Despite its growing relevance, the implementation of deep learning in Indonesian junior high schools (SMP) still faces various challenges, particularly in the area of school management. Many schools encounter limitations in institutional support, leadership

capacity, and resource management that affect the effective integration of innovative learning approaches (Fitrah et al., 2025; Kholid et al., 2022; Nasrullah et al., 2024). These conditions indicate that strengthening school management capacity is a crucial requirement to accelerate the implementation of deep learning at the school level.

Globally, several countries have demonstrated that the successful implementation of deep learning is strongly supported by adaptive and innovative school management practices (Thoyib et al., 2024; Zhao et al., 2023). Previous studies show that effective school leadership and participatory governance play an important role in improving teachers' ability to implement collaborative and technology-supported learning environments (Subiyantoro & Musa, 2024; Sziegat, 2022; Widiastuti, 2025). Strong institutional management can create a supportive ecosystem that enables teachers to design learning experiences that foster students' analytical and problem-solving abilities.

However, the situation in Indonesia still reveals disparities in the quality of deep learning implementation across schools. Schools with limited facilities, unequal access to digital infrastructure (Villarreal et al., 2023), and heavy administrative workloads for teachers often struggle to implement innovative learning practices effectively (Isnaeni et al., 2025; Nurtamam & Jannah, 2025; Thornberg et al., 2022). These conditions highlight the need for more comprehensive research on how school management can function as a key driver in facilitating learning approaches that emphasize higher-order reasoning and meaningful learning experiences.

Previous studies have examined deep learning primarily from pedagogical perspectives or from the development of technology-based learning media (Kurniawan et al., 2024; Madkour & Alaskar, 2024; Mwansa et al., 2024). Although some research discusses aspects of school management, studies that specifically analyze the relationship between school management optimization and the successful implementation of deep learning at the junior high school level remain limited. Furthermore, many studies have not integrated quantitative and qualitative approaches to provide a comprehensive understanding of this issue. Comparative analysis across regions with different social contexts and levels of educational readiness is also rarely conducted. This gap indicates the need for further research that examines school management as a strategic factor in strengthening the implementation of deep learning.

To address this gap, this study was conducted in eight public and private junior high schools located in the provinces of Jambi, South Sumatra, and West Java. The research involved 120 teachers and school principals as survey respondents and 12 key informants for in-depth interviews. A mixed methods approach with a sequential explanatory design was employed to obtain a comprehensive empirical understanding by integrating quantitative and qualitative data. Quantitative data were analyzed using descriptive statistics and simple regression, while qualitative data were examined through thematic coding as part of the data reduction and interpretation process. This approach enables the study to identify measurable relationships between school management and the implementation of deep learning while also exploring contextual factors influencing its implementation.

The objectives of this study are to analyze the effectiveness of school management in facilitating the implementation of deep learning in junior high schools and to identify the supporting factors and challenges encountered during its implementation. In addition, this study aims to provide an empirical overview of how school policies, teacher

competence, and the availability of technological resources contribute to the successful adoption of deep learning practices.

This research is expected to contribute theoretically to the development of educational management studies, particularly in the context of integrating deep learning within school-level learning systems. The findings may enrich the literature on innovation-based school governance and the digital transformation of learning processes in the era of technological disruption. Practically, the results of this study can serve as a reference for school principals, teachers, and policymakers in designing effective management strategies to support deep learning through teacher professional development, institutional policy strengthening, and the provision of adequate infrastructure.

## **RESEARCH METHOD**

### ***Design and Research Approach***

This study uses a mixed methods method with a sequential explanatory design, which allows researchers to start with a quantitative stage to obtain an overview of the effectiveness of school management in facilitating the implementation of deep learning, then continue with the qualitative stage to deepen the findings (Pregoner, 2025). This approach was chosen because it is able to provide more comprehensive research results through statistical measurement as well as exploration of the contextual meaning of educational experiences. The quantitative process produces a pattern of variable relationships and school management tendencies, while the qualitative stage enriches the results with narrative explanations and phenomenal rationality.

### ***Research Locations and Participants***

The research was carried out in eight public and private junior high schools (SMP) in Jambi, South Sumatra, and West Java Provinces, which are considered to have implemented or are developing deep learning learning. At the quantitative stage, the study involved 120 respondents consisting of core subject teachers and principals, selected by purposive sampling techniques based on direct involvement in the learning program. The qualitative stage involved 12 key informants, namely 6 principals, 4 teachers experienced in deep learning, and 2 deputy principals in the curriculum field as internal policy makers. The selection of informants takes into account competence and experience in the school management implementation process, so that the data obtained is relevant and in-depth (Chand, 2025). The composition of this sample ensures a representation of the main actors involved in the management of education and the implementation of learning innovations.

### ***Data Collection Techniques***

The data collection technique is carried out through two main stages, namely quantitative and qualitative, in accordance with the sequential explanatory design. At the quantitative stage, data was collected using a Likert scale questionnaire developed based on indicators of school management optimization, teacher competence, policy support, and the availability of learning support infrastructure. The instruments were distributed to 120 respondents online and offline through the school so that the distribution of data was more equitable and valid. At the qualitative stage, data was obtained through semi-structured interviews, accompanied by document analysis such as lesson plans, academic

policies, teacher competency improvement programs, and an inventory of learning facilities. In addition, limited observation of learning activities is carried out to capture the implementation of deep learning in real life.

### ***Research Instruments***

The quantitative instrument is in the form of a Likert scale questionnaire 1–5, which is constructed based on school management and deep learning concepts to measure the level of policy optimization and implementation in schools. The qualitative instrument uses interview guidelines and observation sheets, which are flexible and can be developed according to field dynamics (Akhter, 2022). The validity of the quantitative instrument was tested through the validity of the content (expert judgement) to ensure conformity with the research construct indicators, while the reliability was tested using Cronbach's Alpha to obtain internal consistency (Khidhir & Rassul, 2023). The validity of qualitative instruments is strengthened through source triangulation and member checking, so that the findings produced have credibility.

### ***Data Analysis Techniques***

The data analysis technique is carried out through two stages according to the sequential explanatory model. At the quantitative stage, the data obtained from the questionnaire was analyzed using descriptive statistics to map the tendency of variables, then followed by a simple regression to test the effect of school management optimization on the success of deep learning implementation. The results of this stage of analysis are the basis for formulating the focus of the interview questions at the next stage. At the qualitative stage, the interview data was analyzed using thematic coding, through the stages of data reduction, theme categorization, interpretation of meaning, and verification of results. The integration of the two analyses results in comprehensive and strong conclusions as the basis for making recommendations.

### ***Data Validity***

The validity of quantitative data is guaranteed through the validity and reliability test of the instrument, while qualitative data is tested for validity using method triangulation, source triangulation, member checking, and dependability audit. Reinforcement on these two validation approaches ensures that research findings are scientifically reliable (Younas et al., 2023). Each data was checked for consistency between questionnaire responses, interview narratives, school documents, and observation results to avoid interpretation bias. The cross-verification mechanism is carried out during the analysis process so that conclusions can be accounted for.

### ***Research Ethics***

The research was conducted by paying attention to the principles of scientific ethics through informed consent, where all respondents were informed of the objectives and benefits of the research before giving consent to participate. The identity of the participants is kept confidential and only recorded in the form of a code to maintain the security of the information. The data from the interview results and school documents

are used solely for academic purposes and are analyzed in accordance with research ethics.

## RESULT AND DISCUSSION

### Results

#### School Internal Policy as a Driving Driver for the Implementation of Deep Learning

The results of the survey showed that the school's internal policy support was in the very good category (Mean = 4.21; SD = 0.37) and has a significant relationship with the success of deep learning implementation ( $\beta = 0.61$ ). This value illustrates that structured and directed school governance is the main foundation in driving the transformation of deep learning-based learning in junior high schools. Clear policies give a direct role to teacher readiness, resource provision, and classroom management based on high-level thinking activities (HOTS).

**Table 1. Policy Support and Implementation Readiness Scores**

Variable	Mean	SD	Category
School Policy Support	4.21	0.37	Very Good
Implementation Readiness	4.08	0.41	Good

Table 1 presents the quantitative results related to school policy support and implementation readiness in facilitating deep learning. The findings indicate that school policy support obtained a mean score of 4.21, which falls into the very good category, suggesting that most schools have established strong regulatory frameworks, including standard operating procedures (SOPs) and academic guidelines. Meanwhile, implementation readiness achieved a mean score of 4.08, categorized as good, indicating that although schools are generally prepared to implement deep learning, there are still areas that require improvement, particularly in operational consistency and resource optimization. The relatively low standard deviations for both variables also suggest that responses among participants are fairly homogeneous, reflecting a consistent perception of policy strength and readiness across the sampled schools.

Qualitative deepening shows the consistency of quantitative data. The informant said that the existence of SOPs and academic rules is an umbrella for the implementation of the program. The Principal said, "Schools have started to make rules and SOPs so that teachers have an operational basis in implementing deep learning," Then the teacher added that "We have lowered the guidelines into a lesson plan format that leads to authentic assessments and analytical activities of students" (K-01, Sept. 12, 2025; G-03, 17 Sept 2025). A similar statement emerged from the vice principal, "The written policy makes implementation control more measurable, so that deep learning programs do not stop at discourse" (W-02, Sept. 19, 2025).

The policy is followed by a systematic annual work program. Another teacher revealed, "Every semester there is a training policy at least twice as part of the quality assurance of learning," while the internal supervisor added, "Routine curriculum meetings help map the needs of teachers, so that policies run consistently in the classroom" (G-04, 14 Sept 2025; P-01, 21 Sept 2025). These four quotes show a pattern that policies are not just administrative documents, but really become the driving force for implementation. These findings confirm that school management policies are the main foundation in systematically operationalizing deep learning.

## Teacher Capacity as a Determining Factor for the Effectiveness of Deep Learning Learning

Quantitatively, teacher competence was in the high category with the most dominant influence on the success of deep learning implementation ( $\beta = 0.64$ ). The highest component includes pedagogical skills and digital literacy which play a role in designing problem-solving and inquiry-based learning strategies.

Table 2. Teacher Competence

Variable	Mean	SD	Category
Pedagogical Skills	4.12	0.39	High
Digital Literacy	4.06	0.42	High

Table 2 shows that teachers demonstrate a high level of competence in both pedagogical skills and digital literacy, with mean scores of 4.12 and 4.06, respectively. These results indicate that teachers are generally capable of designing effective learning processes and integrating digital tools to support deep learning implementation. The relatively low standard deviations suggest consistent perceptions among respondents, reflecting a fairly even distribution of competencies across schools.

Training and mentoring are the main strategies of school management in improving teachers' abilities. A teacher said, "The training made me more accustomed to designing problem-solving-based tasks," Then another teacher added, "We started creating project sheets that directed students to analysis, not just memorization" (G-02, 11 Sept 2025; G-04, 19 Sept 2025). The principal also emphasized, "Trained teachers are better equipped to facilitate in-depth discussions," however, he highlighted the challenge that "Some teachers still need in-class assistance to get used to using digital media" (K-05, Sept. 18, 2025).

Other interviews reinforce the role of academic supervision as quality control. Wakasek said, "Our evaluation of lesson plans and classroom practices is an indicator of improving teacher professionalism," Then the training facilitator added, "After coaching, the quality of authentic assessments in the lesson plan increased more consistently than before the training program" (W-01, Sept. 18, 2025; F-01, 22 Sept 2025). These findings show that optimizing school management in the form of training and supervision has a direct impact on increasing teacher capacity, which is the spearhead of the success of deep learning.

## Learning Infrastructure and Administrative Burden as Implementation Challenges

Digital infrastructure readiness was recorded in the medium category (Mean = 3.76), while the administrative burden of teachers was in the high category (Mean = 3.22) and had a negative correlation with the smooth implementation of deep learning ( $r = -0.32$ ). This condition indicates that although schools have provided policy support and improved teacher competence, the sustainability of deep learning implementation is still influenced by limited facilities and distribution of working time.

Table 3. Supporting Facilities & Administrative Load

Variable	Mean	SD	Category
Facilities Availability	3.76	0.48	Moderate
Administrative Load	3.22	0.51	High Burden

Table 3 indicates that facilities availability is at a moderate level (M = 3.76), suggesting that while basic infrastructure to support deep learning is present, it is not yet

optimal across all schools. In contrast, the administrative load shows a relatively high burden ( $M = 3.22$ ), indicating that teachers still face significant non-teaching responsibilities that may hinder the effective implementation of deep learning. The moderate standard deviations reflect some variation in responses, particularly in administrative workload.

The qualitative stage shows a more detailed picture. The Principal said, "Computer labs exist, but there aren't enough devices for one class yet," Then the teacher added, "We have to take turns so that a lot of study time is cut" (K-03, Sept. 12, 2025; G-01, 15 Sept 2025). Other informants highlighted network constraints, "The internet is often unstable when students are working on digital projects," Followed by a squirrel, "Old buildings make LAN installations less than optimal for simultaneous learning" (W-01, 18 Sept 2025; K-06, 21 Sept 2025).

In addition to facilities, administrative burden also emerged as a significant issue. The teacher said, "Our time is running out for activity reports so that the focus on compiling deep learning modules is reduced," Then another teacher added, "The administrative agenda often clashes with the teaching schedule," There was even an additional statement from the curriculum section, "Some mandatory documents are still manual, so it takes a lot of time" (G-03, 20 Sept 2025; G-05, 19 Sept 2025; K-07, Sept. 21, 2025). These findings confirm that the success of deep learning does not only depend on teacher policies and competencies, but also requires the support of digital facilities and proportionate workload management.

## Discussion

The findings of the study show that school internal policies are the main driving force in the implementation of deep learning in junior high schools. Quantitative data showed that policy support was in the very good category (Mean = 4.21), and had a significant relationship with implementation readiness ( $\beta = 0.61$ ). These results reinforce the view that education governance not only functions as an administrative instrument, but also serves as the basis for learning transformation (Cheng et al., 2022; Hefniy et al., 2023). The principal and deputy principal stated that the SOP for project-based learning and the HOTS-based RPP format became operational references in schools. This policy is in line with the theory of educational governance which places school regulations as the foundation for the success of innovation (Bierbaum & Sunderman, 2021; Junaidah et al., 2025). This condition shows that a structured managerial approach is able to create a clear, consistent, and easy-to-implement policy direction by teachers.

Furthermore, policy strengthening is not only present at the document level, but also translated into routine work programs, such as teacher training, curriculum meetings, and implementation evaluations. This implementative approach is in accordance with the policy to practice model which emphasizes that policies must be derived in the form of real activities and actions to have an impact on academic change (Lundeto et al., 2021). Quotes from teachers and internal supervisors emphasized that school regulations are work guidelines that facilitate coordination between units. This condition shows that schools with a clear policy structure show a higher level of readiness for digital transformation than schools with loose policies. Thus, school management policies have proven to be not only formal regulations, but strategic instruments in fostering a deep learning culture in the junior high school environment.

In terms of human resources, the professional capacity of teachers is the second key factor in optimizing deep learning. The quantitative results placed teacher competence in the high category (Mean = 4.09) with the greatest influence contribution to the success of implementation ( $\beta = 0.64$ ). This is in line with research that says that the success of learning based on analysis and reasoning is highly dependent on teachers' pedagogical capacity and digital literacy (Sliwka et al., 2024). Interviews show that training, coaching, and workshops help teachers design LKPDs based on analysis and projects. The statements of the principal and vice chancellor regarding the evaluation of the RPP as an indicator of quality improvement also reinforce that routine supervision plays an important role in maintaining consistency in practice. Thus, training is not only an administrative part, but a continuous investment in improving the quality of teachers.

However, teacher capacity building is not homogeneous. Some teachers still need in-class assistance, especially in the use of digital media. This condition is prevalent in the process of adopting new technologies, where adaptation requires time and ongoing support (Bahri et al., 2022). This shows that school management needs to strengthen an ongoing mentoring system, not just in the form of occasional training. The implementation of the peer coaching model can be an effective alternative to reduce the gap in readiness between teachers (Hsieh et al., 2021). Thus, teacher capacity building is a strategic agenda that requires a long-term approach and consistent academic supervision support.

In terms of infrastructure, the results of the study show that the availability of facilities is in the medium category (Mean = 3.76) and is one of the main obstacles in the implementation of deep learning. The difficulties of the limited computer laboratory and unstable internet network were the dominant findings of the interview. This condition is in line with research that found that the implementation of digital-based student-centered learning in developing schools is often hampered by inadequate facilities (Abbas et al., 2024). The limitations of devices cause the learning process based on data processing and digital exploration to not run optimally. If facilities are not strengthened, the potential of deep learning that demands exploration, independent research, and collaborative work is at risk of not developing optimally.

In addition to facilities, the aspect of the teacher's administrative burden (Mean = 3.22) emerged as a systemic obstacle that negatively impacted the focus of learning design development ( $r = -0.32$ ). Interviews show teachers spend a lot of time reporting activities so that the time to compile modules and evaluations of deep learning is reduced. This is in line with the finding that excessive educational bureaucracy is often a burden on teachers' professionals in developing countries (Rafida et al., 2024). The situation shows that learning innovation requires not only competence and facilities, but also efficient work design. Therefore, the concept of workload reduction strategy and administrative digitalization can be considered as an alternative solution so that teachers can focus more on the core learning tasks.

The findings in this study enrich the literature on education management, that school management optimization is the meeting point between policies, teacher competence, and supporting instruments. All of these elements influence each other and cannot run alone. The contribution of this research lies in the empirical evidence that strong internal policies are able to facilitate teacher capacity building and build a culture of analysis-based learning. Practically, the results of the study can be a reference for local

governments and schools in designing a strategy for implementing deep learning in a gradual and measurable manner.

The study has limitations on the scope of the location and the number of samples. Therefore, advanced research can expand the scope of schools as well as test digital-based teacher mentoring models with comparative experiments. Future research can also explore the effectiveness of policies with mediating variables such as student learning culture or parental involvement. If carried out longitudinally, the research will be able to map changes in the quality of deep learning more accurately. Thus, advanced research is essential to expand the implementation model of deep learning in the context of long-term national education.

## **CONCLUSION**

This study confirms that school management optimization has proven to have a strategic role in facilitating the successful implementation of deep learning at the junior high school level in Indonesia. Structured internal policies, strengthening of project-based learning SOPs, and quality assurance mechanisms are the main driving foundations for learning transformation. Managerial support in the form of curriculum planning, scheduled training policies, and monitoring of KBM implementation directly contributes to improving teacher performance in designing HOTS-based lesson plans, facilitating analytical learning, and creating a more interactive and student-centered learning environment. In this context, schools serve as a change-driving ecosystem that ensures that deep learning orientation does not stop at the concept level, but is implemented in classroom practice consistently and measurably.

The findings of the study also show that teacher competence and learning infrastructure are two determining factors that affect the effectiveness of deep learning. Training and coaching have been proven to improve digital literacy and teachers' pedagogical skills, but obstacles in the form of limited technological devices, internet access, and high administrative burdens are still obstacles that reduce the effectiveness of implementation. Therefore, an adaptive management strategy is needed through the provision of adequate learning facilities, rearrangement of teacher workload allocation, and expansion of technical assistance programs to strengthen the integration of deep learning in a sustainable manner. Practically, this study provides recommendations that schools need to strengthen policy-based governance, professional development of teachers, and strengthen digital infrastructure so that the transformation of deep learning-oriented learning can take place optimally, and encourage the improvement of the quality of national education.

## **ACKNOWLEDGEMENT**

The authors would like to express their sincere gratitude to the principals, teachers, and staff members of the participating junior high schools in Jambi, South Sumatra, and West Java for their valuable cooperation and contributions during the data collection process. Appreciation is also extended to the research assistants and academic reviewers who provided constructive feedback throughout the study.

## REFERENCES

- Abbas, N., Rochmawan, A. E., & Astoko, D. B. (2024). The Role of Classical Islamic Educational Institutions before the Emergence of Madrasah. *JUSPI (Jurnal Sejarah Peradaban Islam)*, 8(1), 134. <https://doi.org/10.30829/juspi.v8i1.19895>
- Agarwal, J., & Sharma, S. (2024). Artificial Intelligence Enabled Cognitive Computer-centered Digital Analysis Model for Examination of The Children's Mental Health. *Evolutionary Intelligence*, 17(5–6), 3675–3685. <https://doi.org/10.1007/s12065-024-00951-6>
- Akhter, S. (2022). Key Informants' Interviews. In *Principles of social research methodology* (pp. 389–403). Springer.
- Bahri, S., Tannady, H., Amaluddin, L. O., Widodo, H., Saekan, M., & Salabi, A. (2022). Role of Educational Management, Islamic Norms and Character Education on the Moral Development in Junior High School Indonesia: Moderating Role of Institutional Support. *Eurasian Journal of Educational Research*, 2022(101), 84–99. <https://doi.org/10.14689/ejer.2022.101.007>
- Baniata, L. H., Kang, S., Alsharaiah, M. A., & Baniata, M. H. (2024). Advanced Deep Learning Model for Predicting the Academic Performances of Students in Educational Institutions. *Applied Sciences (Switzerland)*, 14(5), 1963. <https://doi.org/10.3390/app14051963>
- Bierbaum, A. H., & Sunderman, G. L. (2021). School Desegregation, School Rezoning, and Growth Management in Two Maryland Communities. *Education Policy Analysis Archives*, 29(August-December), 165. <https://doi.org/10.14507/epaa.29.6111>
- Chand, S. P. (2025). Methods of Data Collection in Qualitative Research: Interviews, Focus Groups, Observations, and Document Analysis. *Advances in Educational Research and Evaluation*, 6(1), 303–317. <https://doi.org/10.25082/aere.2025.01.001>
- Cheng, K. M., Tan, J. Y., Wong, S. Y., Koo, A. C., & Sharji, E. A. (2022). A Review of Future Household Waste Management for Sustainable Environment in Malaysian Cities. *Sustainability (Switzerland)*, 14(11), 6517. <https://doi.org/10.3390/su14116517>
- Fitrah, M., Sofroniou, A., Yarmanetti, N., Khotijah, I., Kurniawan, P. D., & Setiawan, D. (2025). Are Teachers Ready to Adopt Deep Learning Pedagogy? The Role of Technology and 21st-Century Competencies Amid Educational Policy Reform. *Education Sciences*, 15(10), 1344. <https://doi.org/10.3390/educsci15101344>
- Hefniy, H., Mardiana, D., Enggal, D., & Baharun, H. (2023). Prophetic Leadership in Creating Superior Educational Institutions: Phenomenological Study of Private Islamic Universities. *Al-Tanzim: Jurnal Manajemen Pendidikan Islam*, 7(4), 1319–1330. <https://doi.org/10.33650/al-tanzim.v7i4.6251>
- Hsieh, F. P., Lin, H. shyang, Liu, S. C., & Tsai, C. Y. (2021). Effect of Peer Coaching on Teachers' Practice and Their Students' Scientific Competencies. *Research in Science Education*, 51(6), 1569–1592. <https://doi.org/10.1007/s11165-019-9839-7>
- Isnaeni, F., Budiman, S. A., Nurjaya, N., & Mukhlisin, M. (2025). Analysis of the Readiness for Implementing Deep Learning Curriculum in Madrasah from the Perspective of Educators. *Attadrib: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, 8(1), 15–30. <https://doi.org/10.54069/attadrib.v8i1.841>
- Junaidah, Mahardika, N. P., & Ma'arif, M. A. (2025). Promoting Green Madrasa as Environmental Education Program: How to Implement and Maintain It. *Munaddhomah*, 6(1), 39–54. <https://doi.org/10.31538/Munaddhomah.V6I1.1572>

- Karim, M., Oktarina, K., & Antoni, S. (2025). The Role of Digital Leadership and Administrative Innovation in Enhancing School Management Effectiveness in the Era of Education 5.0. *Indonesia Journal of Engineering and Education Technology (IJEET)*, 3(2), 60–66.
- Khidhir, R. J., & Rassul, T. H. (2023). Assessing the Validity of Experts' Value Judgment over Research Instruments. *ZANCO Journal of Humanity Sciences*, 27(5), 324–343. <https://doi.org/10.21271/zjhs.27.5.21>
- Kholid, M. N., Sa'Dijah, C., Hidayanto, E., & Permadi, H. (2022). Students' Reflective Thinking Pattern Changes and Characteristics of Problem Solving. *Reflective Practice*, 23(3), 319–341. <https://doi.org/10.1080/14623943.2021.2025353>
- Kong, S. C., Cheung, W. M. Y., & Zhang, G. (2023). Evaluating an Artificial Intelligence Literacy Programme for Developing University Students' Conceptual Understanding, Literacy, Empowerment and Ethical Awareness. *Educational Technology and Society*, 26(1), 16–30. [https://doi.org/10.30191/ETS.202301\\_26\(1\).0002](https://doi.org/10.30191/ETS.202301_26(1).0002)
- Kurniawan, R., Bakar, M. Y. A., & Kholis, N. (2024). Integrating Quranic Framework for Digital Literacy Curriculum in Madrasa. *Al-Tadzkiyyah: Jurnal Pendidikan Islam*, 15(1), 87. <https://doi.org/10.24042/002024151642200>
- Lundeto, A., Talibo, I., & Nento, S. (2021). Challenges and Learning Strategies of Islamic Education in Islamic Boarding Schools in the Industrial Revolution Era 4.0. *AL-ISHLAH: Jurnal Pendidikan*, 13(3), 2231–2240. <https://doi.org/10.35445/alishlah.v13i3.1153>
- Madkour, M., & Alaskar, H. (2024). Exploring Cognitive Teaching Approaches for Inclusive Translation Online Classes: A Case Study During the COVID-19 Pandemic. *Theory and Practice in Language Studies*, 14(4), 1219–1230. <https://doi.org/10.17507/tpls.1404.29>
- Muniasamy, A., & Alasiry, A. (2020). Deep Learning: The Impact on Future eLearning. *International Journal of Emerging Technologies in Learning*, 15(1), 188–199. <https://doi.org/10.3991/IJET.V15I01.11435>
- Mwansa, G., Ngandu, M. R., & Dasi, Z. S. (2024). Enhancing Practical Skills in Computer Networking: Evaluating the Unique Impact of Simulation Tools, Particularly Cisco Packet Tracer, in Resource-Constrained Higher Education Settings. *Education Sciences*, 14(10). <https://doi.org/10.3390/educsci14101099>
- Nasrullah, M., Arwansyah, & Saleh, S. (2024). The Influence of Organizational Culture on Teacher Performance at SMK Negeri 1 Bungoro. *International Journal of Administration and Education (IJAE)*, 7(2), 21–28. <https://doi.org/10.70188/Obznb317>
- Nurtamam, M. E., & Jannah, A. N. (2025). A Systematic Qualitative Review of Teachers' Strategies in Enhancing Mathematical Reasoning in Elementary Schools. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 9(2), 553–562. <https://doi.org/10.31004/obsesi.v9i2.6936>
- Pregoner, J. D. (2025). Research Approaches in Education: A Comparison of Quantitative, Qualitative and Mixed Methods. *SSRN Electronic Journal*, 4(2), 31–36. <https://doi.org/10.2139/ssrn.5111007>
- Rafida, T., Suwandi, S., & Ananda, R. (2024). Efl Students' Perception in Indonesia and Taiwan on Using Artificial Intelligence To Enhance Writing Skills. *Jurnal Ilmiah Peuradeun*, 12(3), 987–1016. <https://doi.org/10.26811/peuradeun.v12i3.1520>

- Sliwka, A., Klopsch, B., Beigel, J., & Tung, L. (2024). Transformational Leadership for Deeper Learning: Shaping Innovative School Practices for Enhanced Learning. *Journal of Educational Administration*, 62(1), 103–121. <https://doi.org/10.1108/JEA-03-2023-0049>
- Subiyantoro, S., & Musa, M. Z. (2024). Preparing Indonesian Primary School Teachers for Deep Learning: Readiness, Challenges, and Institutional Support. *Cognitive Development Journal*, 2(2), 77–86. <https://doi.org/10.32585/cognitive.v2i2.44>
- Syarifudin, A., & Muttaqin, M. A. (2025). Tech-Supported Strategic Management, Digital Leadership, and Play-Based Interactive Learning: A Multilevel Survey of Quality Improvement in Early Childhood Education. *International Journal of Educational Qualitative Quantitative Research*, 4(1), 47–60. <https://doi.org/10.58418/ijeqqr.v4i1.142>
- Sziegat, H. (2022). Transforming Governance of German Higher Education Institutions. *Research in Educational Administration and Leadership*, 7(3), 472–517. <https://doi.org/10.30828/real.1164190>
- Thornberg, R., Forsberg, C., Hammar Chiriatic, E., & Bjereld, Y. (2022). Teacher–Student Relationship Quality and Student Engagement: A Sequential Explanatory Mixed-Methods Study. *Research Papers in Education*, 37(6), 840–859. <https://doi.org/10.1080/02671522.2020.1864772>
- Thoyib, M., Ngoh, B., Badrudin, & Karisma, L. A. (2024). Innovative Change Strategies for Excellence in Islamic Education: Insights From Indonesia and Thailand. *Jurnal Pendidikan Islam*, 10(1), 63–74. <https://doi.org/10.15575/jpi.v10i1.24909>
- Villarreal, R. M., Vilalta-Perdomo, E., Salinas-Navarro, D. E., Thierry-Aguilera, R., & Gerardou, F. S. (2023). Challenges and Opportunities of Generative AI for Higher Education as Explained by ChatGPT. *Education Sciences*, 13(9), 856. <https://doi.org/10.3390/educsci13090856>
- Widiastuti, I. (2025). Assessing the Impact of Education Policies in Indonesia: Challenges, Achievement, and Future Direction. *AL-ISHLAH: Jurnal Pendidikan*, 17(2), 1955–1964. <https://doi.org/10.35445/alishlah.v17i2.6803>
- Ye, Z., Kumar, Y. J., Sing, G. O., Song, F., & Wang, J. (2022). A Comprehensive Survey of Graph Neural Networks for Knowledge Graphs. *IEEE Access*, 10, 75729–75741. <https://doi.org/10.1109/ACCESS.2022.3191784>
- Younas, A., Fàbregues, S., & Creswell, J. W. (2023). Generating Metainferences in Mixed Methods Research: A Worked Example in Convergent Mixed Methods Designs. *Methodological Innovations*, 16(3), 276–291. <https://doi.org/10.1177/20597991231188121>
- Zhao, Y., Zhao, M., & Shi, F. (2023). Integrating Moral Education and Educational Information Technology: A Strategic Approach to Enhance Rural Teacher Training in Universities. *Journal of the Knowledge Economy*, 1–41. <https://doi.org/10.1007/s13132-023-01693-z>