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Digital Pedagogical Transformation in Islamic Education: Deep Learning Integration, Challenges and Solutions

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Abstract:

The digital technology has a significant impact on various sectors, including education. Islamic education, as the moral and spiritual foundation of society, is required to adapt through digital pedagogical transformation. This study aims to examine the integration of deep learning in Islamic education, highlighting its potential, challenges, and potential solutions. This study uses a literature review approach, analyzing various scientific sources, including journals, books, articles, and policy documents related to the application of digitalization in Islamic education. The results indicate that deep learning can improve the effectiveness of the teaching and learning process through interactive, personalized, and critical thinking-based learning. However, several challenges remain, such as limited infrastructure, limited digital competence among educators, and concerns about the displacement of Islamic values in the digital environment. To address these challenges, this study proposes strategies such as technology-based teacher training, the development of a relevant digital curriculum, and the creation of educational content aligned with Islamic values. The integration of deep learning in Islamic education offers significant opportunities for adaptive and visionary pedagogical renewal. In conclusion, digital transformation in Islamic education must be designed holistically and contextually to align with technological developments without neglecting the underlying religious values.

Keywords: *Islamic Education; Digital Pedagogical Transformation; Deep Learning.*

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Introduction

The development of digital technology has brought about significant changes in various aspects of life, including education. In the era of the Industrial Revolution 4.0 and Society 5.0, education no longer relies solely on conventional methods but is required to adapt to advances in information and communication technology. This presents both new challenges and opportunities in education, where digital transformation is inevitable (Supriyadi et al., 2024). Digitalization has impacted how teachers teach, how students learn, and how materials and values are delivered. Traditional pedagogical approaches are no longer sufficient to address the need for relevant, effective, and adaptive learning that adapts to the characteristics of today's learners (Yadi & Anshori, 2024). Therefore, innovation in education is needed that integrates technology comprehensively, not only in the aspect of learning media, but also in ways of thinking and designing more holistic and contextual teaching strategies.

The current generation, often referred to as digital natives, grew up in an environment highly familiar with technology (Sinaga, 2024). They are accustomed to the speed of information, digital accessibility, and instant and visual interaction models. Given these characteristics, one-way and monotonous learning tends to be ineffective. In this regard, pedagogical approaches must be able to deliver a more dynamic, personalized learning experience, one that addresses both affective and cognitive aspects in a balanced manner. One rapidly developing technology with great potential in education is deep learning, a branch of artificial intelligence that enables machines to learn from data, recognize patterns, and make decisions automatically (Musbaing, 2024). This technology can be utilized in education to create a learning system that is adaptive, responsive, and tailored to the needs of each individual student (Musbaing, 2024).

The integration of deep learning into education opens up opportunities for personalized learning, data-driven evaluation systems, and the development of more contextual and in-depth content (Diana & Rodhiyana, 2023). In practice, deep learning can be used to map student learning styles, provide appropriate material recommendations, and monitor learning progress in real time. Thus, technology's role is not merely as a tool but also as part of the pedagogical strategy itself. This innovation aligns with the 21st-century educational paradigm, which emphasizes the use of technology to support student-centered learning, critical thinking, collaboration, and digital literacy (Malik et al., 2023). This pedagogical transformation, which combines a humanistic approach and intelligent technology, is expected to address the increasingly complex and dynamic challenges of future education (Meliyani, 2022).

This transformation also brings new challenges, such as the readiness of educators to adopt technology, the availability of adequate infrastructure, and the need for regulations and policies that support equitable and equitable implementation of technology (Yadi & Anshori, 2024). Furthermore, the integration of technology into education must continue to consider ethical values, local wisdom, and culture, so as not to produce a system based solely on sophistication but also to shape the character and moral values of students. Therefore, digital pedagogical transformation is not only a technical issue, but also involves vision, strategy, and collaboration among various parties in building inclusive, sustainable, and meaningful education (Susrizal et al., 2024).

Several previous studies have discussed the pedagogical competence of Islamic Religious Education teachers in facing the challenges of the digital era. (Diana & Rodhiyana, 2023) emphasize the importance of strengthening the pedagogical competence of Islamic Religious Education teachers as agents of moral formation through an approach based on religious values, but have not yet addressed the realm of digitalization in depth. Research by (Jaya & Halik, 2023) examines the strategies of school principals in improving the pedagogical competence of Islamic Religious Education teachers, but focuses more on administrative barriers and budget constraints without exploring modern digital solutions. (Supriyadi et al., 2024) and (Yadi & Anshori, 2024) show the influence of digital literacy on teachers'

pedagogical abilities, but the focus of the research is more on the statistical relationship between digital literacy and pedagogical competence, rather than technology integration such as deep learning. (Malik et al., 2023) adds the dimensions of VAK-based learning and the family environment, but does not yet link advanced technological approaches to improving students' spiritual understanding. From these studies, it is clear that comprehensive digital pedagogical transformation, particularly through deep learning, has not yet been thoroughly researched in Islamic Education.

Although various studies have addressed the pedagogical competence of Islamic Religious Education teachers in the digital era, a research gap remains in the exploration and application of cutting-edge technologies such as deep learning to enhance the effectiveness of religious education. Most research focuses solely on basic digital literacy and the use of conventional ICT-based learning media, without addressing how intelligent algorithms can be leveraged to holistically personalize religious education. Deep learning, as a subset of artificial intelligence, has not been optimally utilized to detect individual student learning needs, develop data-driven evaluation systems, or design contextual learning interactions in Islamic Religious Education. Therefore, research is needed that not only addresses the pedagogical challenges of the digital era but also introduces technological innovations that can support teachers in conveying Islamic values in a more in-depth, flexible, and adaptive manner to current needs.

The main problem in this research lies in the unpreparedness of the Islamic religious education system to adopt a technologically advanced pedagogical approach, particularly deep learning, amidst the demands of increasingly rapid digital transformation. Although Islamic religious education teachers are required to be relevant to current developments, they still face limitations in terms of technological competence, access to digital infrastructure, and the lack of an adaptive learning system capable of automatically adapting teaching materials to students' characteristics and spiritual needs. As a result, the religious learning process becomes less effective, one-way, and unattractive to the digital native generation. Furthermore, concerns about the authenticity of Islamic content in the use of AI technology are also challenges that have not received comprehensive solutions in previous literature.

This research aims to analyze and formulate a strategy for digital pedagogical transformation in Islamic Religious Education through the integration of deep learning, with a focus on strengthening teacher competencies, developing adaptive learning systems, and ensuring the validity of Islamic content. Another objective is to identify implementation obstacles and propose technology-based solutions and a collaborative approach between educators, technologists, and religious scholars to create a modern yet authentic religious learning ecosystem. Therefore, this research is expected to not only provide theoretical contributions to the realm of Islamic education but also produce a practical model that can be implemented in schools.

This research is highly urgent given the global digital transformation that is changing students' mindsets, learning styles, and spiritual needs. If Islamic Religious Education teachers do not quickly adapt to the latest technology, there is concern that a learning disconnect will occur between students and the religious material being taught. Furthermore, the low utilization of deep learning in religious education results in a learning system that remains conventional and unresponsive to the dynamics of the times. Developing digital pedagogy integrated with smart technology is imperative to maintain the relevance of Islamic Religious Education in the post-digital era. Therefore, this research is presented in response to the urgent need in the education sector to present innovative solutions that combine transcendental Islamic values with technological advances.

The novelty of this research lies in the systematic and applicable integration of a deep learning approach into Islamic Religious Education pedagogy, something that has not been explicitly addressed in previous studies. This research not only highlights digital literacy as a

supporting variable but also positions AI technology as the core of adaptive and sustainable pedagogical transformation. Furthermore, this research offers a model of religious learning based on data-driven personalization, where material is tailored to students' affective and cognitive needs in real time. Another novel aspect is the collaborative framework involving technologists, educators, and religious scholars in overseeing the validity of Islamic content in AI-based systems, thus bridging the gap between technological innovation and authentic spiritual values.

Methods

This research employs a qualitative approach with library research as its primary framework. This method was chosen because it allows researchers to explore the body of knowledge systematically documented in various scientific works, enabling them to construct a comprehensive conceptual understanding of the application of technology in Islamic education. In the academic research tradition, library research is not simply about gathering information, but rather a process of exploring, interpreting, critiquing, and linking theory to current contexts.

The data sources for this research were obtained from credible academic literature such as reputable journals, scientific books, proceedings, and relevant articles. Sources were selected selectively based on three main considerations: credibility to ensure validity, relevance to align with the research focus, and currency to ensure alignment with the latest developments. In this regard, the researcher served as the primary instrument, actively determining references, exploring meaning, and connecting literature findings to the theoretical framework used.

The data analysis in this study fully adheres to the Miles & Huberman (1994) model, which guides all stages of analysis through three main steps. The first process is data condensation, which involves selecting, focusing, and simplifying important information from relevant literature. Through this process, data essential to answering the research questions is retained, while less relevant information is removed. The second stage is data display, where the condensed data is systematically organized—either in a conceptual narrative, a matrix, or a graph—to more easily identify patterns and relationships between themes. The final step is conclusion drawing and verification, where the researcher interprets the meaning of the presented data and conducts verification to ensure the consistency, validity, and accuracy of the findings. Through the systematic application of these three stages, the analysis is structured and in-depth, resulting in a clear and comprehensive conceptual understanding of technology integration in Islamic education. This approach is widely recognized in qualitative research for its high interpretative power and validity. By applying this method, the finding of the study can provide conceptual understanding in-depth and comprehensive.

Results and Discussion

The Integration of Deep Learning in Islamic Education

Literature review shows that digital pedagogical transformation is a process of changing learning patterns from conventional models to a more adaptive and interactive technology-based approach. The integration of deep learning technology in Islamic Education (PAI) not only offers a more personalized learning method but also opens up opportunities for preserving and transmitting Islamic knowledge in ways that are relevant to the digital native generation (Hasanah et al., 2025). In the landscape of Islamic Religious Education (PAI), the integration of deep learning as a progressive manifestation of artificial intelligence technology offers the construction of a new paradigm that requires in-depth analytical elaboration (Mudin et al., 2025). In the Islamic Religious Education (PAI), digital transformation cannot be understood simply as the transfer of material from conventional formats to online platforms. Furthermore, this process

demands the presence of authentic, contextual, and accessible Islamic values, supported by intelligent technology capable of bridging students' spiritual needs in the digital age.

The latest policy of the Ministry of Primary and Secondary Education (Kemendikdasmen) emphasize the deep learning approach as a strategy to improve the quality of education in Indonesia (Khotimah & Abdan, 2025). This research due to the integration of deep learning approach in Islamic education scope. The integration of deep learning in Islamic Religious Education (PAI) refers to the application of learning strategies that encourage students to go beyond memorizing religious material and also to understand, critique, and internalize its values in their daily lives. Within this framework, PAI is not merely a normative subject but rather a vehicle for developing Islamic character that is contextualized and relevant to current developments. The deep learning approach is a pedagogical strategy that emphasizes holistic conceptual understanding, the interconnectedness of ideas, and the application of knowledge in meaningful contexts. In the context of modern pedagogy, the concept of deep learning is a relevant approach to addressing this problem (Azis & Tamimi, 2025).

The integration of deep learning in Islamic Religious Education (PAI) is aimed at creating mindful, meaningful, and joyful learning. *First*, The mindful learning approach invites students to be present with full attention mentally and physically, building self-awareness of the learning process (Irfanuddin et al., 2025). It provides a space for students to engage consciously, understanding religious teachings not as mere routines but as profound spiritual reflection—an approach proven to increase engagement and substantial understanding. *Second*, the meaningful learning is the existence of a meaningful learning process, which is able to encourage students to think critically, be actively involved in every learning activity, and understand the meaning concretely and deeply (Khotimah & Abdan, 2025). Meaningful learning ensures that Islamic Education material is relevant to modern realities. *Third*, Joyful Learning is understood as an educational strategy that focuses not solely on achieving optimal learning outcomes but also seeks to foster students' passion and motivation for learning. This is achieved through the integration of play elements and creative activities into the learning process, creating a warm, interactive, and motivating learning environment (Al & Jannah, 2025).

The implementation of deep learning has the potential to make PAI learning more vibrant through digital media such as interactive videos, adaptive Islamic storytelling applications, and AI-based evaluation systems capable of holistically measuring students' religious character development (Salas-Pilco et al., 2022). Unlike traditional learning, which tends to emphasize memorization or superficial understanding, deep learning encourages students to think more critically, analytically, and reflectively. With this approach, they are not merely recipients of information but also actively participate in exploring, connecting, and constructing new knowledge based on their prior understanding. This approach does not only focus on memorization but also on the application of Islamic values in everyday life, so that students can integrate their understanding in various real situations. One example of a case of implementing deep learning in Islamic Education is through project-based learning (Santoso, 2025).

In the context of Islamic Religious Education (PAI), deep learning provides a significant opportunity for students to explore Islamic values in greater depth. Deep learning-based instruction is closely related to active learning models, in which students serve as the main subjects in the learning process. Through discussion, collaboration, exploration, and reflection, students are given space to construct their own understanding, develop higher-order thinking skills, and cultivate a lifelong learning spirit. (Gustina et al., 2025) For example, when studying Quranic verses about honesty,

students are not only asked to memorize the text and its translation, but are also encouraged to understand their contextual meaning, relate them to Islamic historical events, and apply them to their daily lives. This process helps students discover the relevance of the subject matter to the realities they face, so that religious values are not limited to theory but are internalized in their attitudes and behaviour.

In line with the principles of mindful, meaningful, and joyful learning, the implementation of deep learning in Islamic Religious Education (PAI) not only aims to increase knowledge but also build self-awareness (mindfulness), create meaningful learning experiences, and provide a pleasant learning environment. In this context, PAI teachers do not merely act as knowledge transmitters but also as facilitators who guide students to explore, understand, and internalize Islamic teachings deeply and contextually (Gustina et al., 2025). By applying this approach, students are encouraged to develop spiritual, intellectual, and social competencies in a balanced manner, which in turn contributes to the formation of a strong Islamic character. Furthermore, the integration of in-depth learning in Islamic Religious Education (PAI) aligns with the eight dimensions of the Pancasila Student Profile and Rahmatan lil 'Alamin Student Profile, thus producing a generation that is not only academically intelligent but also virtuous, adaptable to current developments, and committed to national and humanitarian values. Digital transformation has brought fundamental changes in the Islamic education ecosystem that for centuries has relied on conventional learning methods. (Ibrahim et al., 2025).

The use of digital technology, such as artificial intelligence-based adaptive learning platforms, interactive Quran applications, and educational social media, can be a supporting tool in realizing in-depth Islamic Religious Education learning that is more contextual, interesting, and in accordance with the needs of the digital generation. With this technology integration, the learning process does not only take place in the classroom, but can also be expanded to virtual spaces that allow for collaboration, reflection, and access to Islamic knowledge more broadly and inclusively. Thus, Deep Learning is very suitable for application in Islamic religious education which has heterogeneous and varied fields of study (Nasution et al., 2024).

Digital transformation plays an important role in designing innovative PAI teaching strategies, with deep learning having the potential to create a more personalized and adaptive learning experience (Salim & Aditya, 2025). For example, a study conducted by Hudayana which developed an artificial intelligence-based Qur'an reading learning application with speech recognition technology on the Android platform, which was declared very feasible to use (score 92.50%) and effective in detecting short verses although still facing limitations in longer verses. These findings open up space for the use of deep learning in Islamic Religious Education (PAI) to provide a more interactive, personalized, and adaptive Qur'an learning experience as an innovative alternative to traditional approaches (Hudayana et al., 2024). In addition, by utilizing deep learning such as LSTM in Tajweed error detection, PAI can provide smarter, more accurate, and more adaptive Qur'an learning compared to traditional methods (Harere & Jallad, 2023). Thus, deep learning in Islamic Religious Education (PAI) is not solely oriented toward exam results or curriculum completion, but rather focuses on transforming students into individuals with character, intelligence, and adaptability to the challenges of modern life. In this context, the integration of digital transformation and deep learning not only presents pedagogical innovation but also represents a strategic effort to align Islamic education with the demands of the 21st century. Therefore, the results of this study emphasize the urgency of reviewing and redesigning Islamic Religious Education (PAI) learning models that are holistic, meaningful, and future-oriented.

Challenges and Solutions

The implementation of deep learning in Islamic education still faces some challenges. Classroom learning is still dominated by conventional approaches that are oriented towards memorization and lectures, and minimal student involvement. There are still many teachers who do not understand the concept of in-depth learning comprehensively (Madeamin & Sahriani, 2025). One strategy that can be implemented is developing digital competencies for educators. Educators must have adequate digital competencies to face challenges and capitalize on opportunities in education in the digital era. Educators must be provided with training and support in technology use, digital information management, digital communication, and adaptation to technological changes. Educators' digital competencies must also include the ability to integrate technology into learning, create technology-appropriate learning materials, and guide and provide feedback to students in their use of technology (Arum, 2023).

Deep learning, characterized by profound reflection, active engagement, and personal meaning-making, is highly relevant to the principle of internalizing spiritual values in Islamic Religious Education (PAI). However, the implementation of this approach still faces contextual challenges in the form of a dominance of cognitive and behavioristic learning that fails to address the affective and existential dimensions of students (Widiansesi & Kamal, 2025). To address these challenges, teacher can implement an integrative model that emphasizes repositioning the teacher's role, implementing project-based learning with values, and evaluating self-transformation. This approach overcomes the limitations of the old paradigm by presenting learning strategies that are more participatory, in-depth, and aligned with the real-life contexts of students. Thus, the findings of this study provide a significant conceptual contribution to the development of contemporary Islamic pedagogy that is more reflective, transformative, and rooted in spiritual values.

Developing an Islamic Religious Education Curriculum that is relevant to contemporary challenges is an urgent need in today's educational context. Modern developments, including globalization, technological advancement, social change, and cultural diversity, have created challenges that impact the principles of Islamic religious education (Butar & Sari, 2024). The digital era has created both opportunities and challenges for the world of education, which must continually adapt to the dynamics of changing times. These changes affect not only learning delivery methods but also curriculum design, which serves as the primary reference in the educational process. Curricula that previously focused on conventional face-to-face learning are now required to transform toward digital curricula that facilitate flexible, adaptive, and technology-based learning. The development of Islamic education curriculum in the 4.0 era is very important in order to prepare human resources who think and act moderately, inclusively, are cultured, religious and have the ability to live as individuals who are faithful, pious, have noble morals, are creative, productive, innovative and collaborative and can contribute to solving problems in society, the nation, the state and world civilization.(Febriani, 2022)

This research shows that limited access to and experience of learning the Quran remains a major challenge in Islamic Religious Education (PAI), particularly in Indonesia. By utilizing TensorFlow-based AI Deep Speech technology, a solution is offered in the form of a more interactive, adaptive, and accessible Quran learning platform that can meet the needs of the community while increasing the effectiveness of Islamic Religious Education (PAI) learning(Mahmudin & Pratiwi, 2025). This study confirms that the

application of deep learning in Islamic Education (PAI) can improve student learning outcomes by up to 27% while fostering greater interest and motivation in learning compared to conventional methods. These findings offer a solution to learning challenges in madrasas by offering a more adaptive, personalized, and relevant approach to developing technology-based Islamic education policies (Lubis & Ariansyah, 2024). Through the use of AI, specifically Deep Speech and LSTM, a solution is offered: an interactive, adaptive, and easily accessible Quranic learning platform that addresses the needs of the community while supporting technology-based Islamic education policies. Thus, the integration of deep learning into Islamic Religious Education (PAI) not only improves the quality of learning but also opens new directions for more inclusive and sustainable innovation in Islamic education.

Conclusion

Digital transformation in education, particularly Islamic education, is a strategic step to meet the demands of modern developments. The integration of deep learning technology has opened up significant opportunities to create a more interactive and personalized learning process, while encouraging the development of critical thinking skills. This aligns with the primary goal of Islamic education, which is not solely focused on mastering knowledge but also on developing noble morals, spirituality, and character based on Islamic values.

Within the framework of digital pedagogy, the concepts of mindful, meaningful, and joyful learning are highly relevant. Mindful learning emphasizes the importance of full awareness in the learning process, enabling students to internalize Islamic values within digital experiences. Meaningful learning ensures that every lesson is contextual and relevant to real life, so that the knowledge gained is not merely theoretical but also has practical and spiritual benefits. Meanwhile, joyful learning creates a pleasant learning environment, builds intrinsic motivation, and fosters a love for knowledge and religious teachings. With this approach, digitalization can strengthen the role of Islamic education as a moral pillar and a source of inspiration in facing global change.

However, the implementation of digital transformation in Islamic education is not without challenges. Limited technological infrastructure in various regions, low digital competency among some educators, and concerns about the erosion of Islamic values amidst the rapid flow of information are real obstacles. To address these challenges, several solutions can be implemented. First, increasing teacher capacity through ongoing technology-based training so they can utilize digital media wisely. Second, developing an adaptive digital curriculum that remains grounded in Islamic principles. Third, creating innovative learning content that is imbued with Islamic values, so that technology becomes a tool that enriches the educational process rather than a threat.

Therefore, digital transformation in Islamic education must be designed holistically and visionarily. If the challenges can be met with appropriate solutions, technology integration will create a more humanistic and contextual learning model that firmly upholds the spiritual values that are the primary foundation of Islamic education.

References

- Al, S. M. munaw et, & Jannah, N. (2025). Deep Learning in Islamic Religious Education Learning in the Disruption Era (A Study at SMA Negeri 1 Yosowilangun). *Jurnal Mu'allim*, 7(2), 285–302. <https://doi.org/10.35891/muallim.v7i2.6235>
- Arum, D. M. (2023). Strategi Manajemen Pendidikan untuk Meningkatkan Kualitas Pendidikan di Era Digital. *JME Jurnal Management Education*, 1(2), 65–74. <https://doi.org/10.59561/jme.v1i2.70>

- Azis, A. R., & Tamimi, A. R. (2025). Membangun Kompetensi Metakognitif Peserta Didik Melalui Deep Learning Dalam Pembelajaran Pendidikan Agama Islam. *Journal of Research and Thought on Islamic Education (JRTIE)*, 8(1), Article 1. <https://doi.org/10.24260/jrtie.v8i1.3579>
- Butar, F. S. B., & Sari, D. (2024). *Pengembangan Kurikulum Pendidikan Agama Islam yang Relevan dengan Tantangan Kontemporer*. 2(2).
- Diana, R., & Rodhiyana, M. (2023). Kompetensi pedagogik guru pendidikan agama Islam di era digital. *Tahdzib Al-Akhlaq: Jurnal Pendidikan Islam*, 6(1), 1–13.
- Febriani, S. (2022). *Pengembangan dan Inovasi Kurikulum Pendidikan Islam dalam Menghadapi Era Digital 4.0*. 5.
- Gustina, E., Hanani, S., & Sesmiarni, Z. (2025). Active Learning Based on Deep Learning: A Critical Review of The Role and Readiness of Islamic Religious Education Teachers. *International Journal of Islamic Educational Research*, 2(3), 54–60. <https://doi.org/10.61132/ijier.v2i3.331>
- Harere, A. A., & Jallad, K. A. (2023). *Mispronunciation Detection of Basic Quranic Recitation Rules using Deep Learning* (No. arXiv:2305.06429). arXiv. <https://doi.org/10.48550/arXiv.2305.06429>
- Hasanah, U., Attamimi, T. A., Della, D. A., & Khairunnisa, R. (2025). Mapping Deep Learning Research in Digital Transformation of Islamic Religious Education: Bibliometric Analysis 2015-2024. *TARBAWI: Jurnal Pendidikan Agama Islam*, 10(01), 52–71. <https://doi.org/10.26618/jtw.v10i01.17803>
- Hudayana, N. A., Haris, A., & Zakaria, A. R. (2024). Pengembangan Aplikasi Penyimak Al-Qur'an Menggunakan Teknologi AI dengan Metode Speech Recognition pada Platform Android. *Journal of Islamic Education*, 2(2), 83–93. <https://doi.org/10.61231/jie.v2i2.314>
- Ibrahim, M., Taqiyuddin, T., Nasehudin, N., & Arifudin, I. (2025). The Impact of Digital Transformation on Islamic Education Learning Methods: A Study of Deep Learning Implementation. *Intiqad: Jurnal Agama Dan Pendidikan Islam*, 17(1), Article 1. <https://doi.org/10.30596/24345>
- Irfanuddin, F., Selamat, S., & Widodo, H. (2025). Analisis Implementasi Pembelajaran Mendalam (Deep Learning) dalam Kurikulum PAI di SD Negeri 125 Ogan Komerling Ulu Sumatera Selatan. *Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI)*, 5(3), 1566–1576. <https://doi.org/10.53299/jppi.v5i3.1798>
- Jaya, S., & Halik, A. (2023). Strategi kepala sekolah dasar negeri dalam meningkatkan kompetensi pedagogik guru pendidikan agama Islam. *Al-Musannif*, 5(1), 33–48.
- Khotimah, D. K., & Abdan, M. R. (2025a). Analisis Pendekatan Deep Learning untuk Meningkatkan Efektivitas Pembelajaran PAI di SMKN Pringkuku. *Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI)*, 5(2), 866–879. <https://doi.org/10.53299/jppi.v5i2.1466>
- Khotimah, D. K., & Abdan, M. R. (2025b). Analisis Pendekatan Deep Learning untuk Meningkatkan Efektivitas Pembelajaran PAI di SMKN Pringkuku. *Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI)*, 5(2), Article 2. <https://doi.org/10.53299/jppi.v5i2.1466>
- Lubis, M., & Ariansyah, F. (2024). The Use of Deep Learning to Improve Teaching and Learning in Islamic Schools. *JPCIS: Journal of Pergunu and Contemporary Islamic Studies*, 1(1), 170–193.
- Madeamin, R., & Sahriani, S. (2025). Transformation of Indonesian language learning: Integration of deep learning strategy with character education in the era of independent learning. *International Journal of Nusantara Islam*, 13(2), Article 2. <https://doi.org/10.15575/ijni.v13i2.46155>

- Mahmudin, H. M., & Pratiwi, E. (2025). Innovation of Al-Quran Learning Platform with Deepspeech Artificial Intelligence Technology Using Design Sprint Method. *Journal La Multiapp*, 6(1), 102–113. <https://doi.org/10.37899/journallamultiapp.v6i1.1793>
- Malik, A., Hitami, M., & Zamsiswaya, Z. (2023). Kompetensi Pedagogik Guru, Pendidikan Agama Islam Dalam Keluarga Dan Motivasi Belajar Terhadap Hasil Belajar Siswa. *Al-Tarbawi Al-Haditsah: Jurnal Pendidikan Islam*, 8(2).
- Meliyani, N. A. (2022). *Pengaruh Kemampuan Literasi Digital dan Kompetensi Pedagogik Guru Pendidikan Agama Islam Terhadap Hasil Belajar Siswa di SMA Negeri 4 Samarinda*.
- Mudin, I., Ali, M., & Hidayat, A. (2025). Critical Analysis of the Application of Deep Learning in Islamic Religious Education: Opportunities and Obstacles. *Intiqad: Jurnal Agama dan Pendidikan Islam*, 17(1), 167–184. <https://doi.org/10.30596/24275>
- Musbaing, M. (2024). Kompetensi guru PAI di abad 21: Tantangan dan peluang dalam pendidikan berbasis teknologi. *Jurnal Pendidikan Refleksi*, 13(2), 315–324.
- Nasution, B., Prasetyo, A. H., Jibril, A. O., & Saputra, D. (2024). Deep Learning Opportunities in Progressive Islamic Education. *SYAMIL: Journal of Islamic Education*, 12(1), 173–187. <https://doi.org/10.21093/sy.v12i2.10002>
- Salas-Pilco, S. Z., Xiao, K., & Oshima, J. (2022). Artificial Intelligence and New Technologies in Inclusive Education for Minority Students: A Systematic Review. *Sustainability*, 14(20), 13572. <https://doi.org/10.3390/su142013572>
- Salim, M. A., & Aditya, R. B. (2025). Integration of Artificial Intelligence in Islamic Education: Trends, Methods, and Challenges in the Digital Era. *Journal of Modern Islamic Studies and Civilization*, 3(01), 74–89. <https://doi.org/10.59653/jmisc.v3i01.1368>
- Santoso, H. E. (2025). Integrasi Teknologi Deep Learning dalam Pembelajaran Pendidikan Agama Islam (PAI) di Era Digital. *Jurnal Manajemen Pendidikan Dan Ilmu Sosial*, 6(2), 1476–1483. <https://doi.org/10.38035/jmpis.v6i2.4041>
- Sinaga, E. H. (2024). Efektivitas Penggunaan Media Digital dalam Pengajaran Pendidikan Agama Islam untuk Siswa Sekolah Dasar. *Pedagogik: Jurnal Pendidikan Dan Riset*, 2(3), 291–298.
- Supriyadi, S., Kusen, K., & Anshori, S. (2024). “Pengaruh Literasi Digital dan Media Pembelajaran Berbasis Teknologi Informasi dan Komunikasi Terhadap Kompetensi Pedagogik Guru PAI MTs Se-Kabupaten Kepahiang. Pendidikan Agama Islam.
- Susrizal, S., Hamdi, C., Putri, D., Oktavia, D., & Maysa, A. (2024). Pengaruh Penggunaan ICT Terhadap Kompetensi Pedagogik Guru PAI Di Sekolah Dasar. *AL-MANAR: Jurnal Komunikasi Dan Pendidikan Islam*, 13(02), 252–265.
- Widiansesi, W., & Kamal, M. (2025). Analisis Kritis Deep Learning Sebagai Strategi Transformasi Nilai Spiritual Dalam Pembelajaran PAI. *Jurnal Transformasi Pendidikan Modern*, 6(3), Article 3. <https://ejournals.com/ojs/index.php/jtpm/article/view/2562>
- Yadi, S., & Anshori, S. (2024). Pengaruh Literasi Digital dan Media Pembelajaran Berbasis TIK Terhadap Kompetensi Pedagogik Guru PAI. *Kasta: Jurnal Ilmu Sosial, Agama, Budaya Dan Terapan*, 4(2), 63–79.