

## Technology Integration in the Development of Pedagogical Competence of MI Teachers: A Case Study in the Era of Society 5.0

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**Abstract:** Study aims to examine the integration of technology in developing the pedagogical competence of Madrasah Ibtidaiyah (MI) teachers in the era of Society 5.0 through a library research approach with an integrative review type. The analysis was carried out on various relevant scientific publications in the 2015-2024 time span, which were obtained from the Google Scholar, Scispace, DOAJ, and Scopus databases. The article selection process used strict inclusion and exclusion criteria to ensure data relevance and quality. The results show that the implementation of digital technology in MI learning can strengthen teachers' pedagogical skills, increase student engagement, and enrich learning strategies that are contextual and have Islamic values. However, challenges such as limited digital literacy and infrastructure are still the main obstacles. Collaboration between teachers, schools, parents and communities is an important key in realizing holistic educational transformation. The findings emphasize the importance of continuous training for teachers and the synergy of technology with Islamic values in the learning process. This study recommends further research on the development of Islamic value-based digital learning models and empirical studies on the effectiveness of collaboration between MI education stakeholders.

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**Keywords:** Technology Integration, Pedagogical Competence, Mi Teachers, Society 5.0, Islamic Education, Integrative Review.

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### A. INTRODUCTION

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The integration of technology in education is a response to the rapid development of information and communication technology that affects various aspects of life, including education. In the context of Madrasah Ibtidaiyah (MI), the development of teachers' pedagogical competence is crucial to ensure an effective learning process that is relevant to the needs of the times. Pedagogical competence includes the teacher's ability to design, implement, and evaluate learner-centered learning, as well as integrate technology effectively in the process (Kusnadi, 2023). The era of Society 5.0 requires teachers to not only master technology, but also be able to integrate it with a humanistic pedagogical approach, in order to create adaptive and innovative learning (Imamudin et al., 2024).

Research by Suriati (2025) shows that the integration of digital learning media can improve the pedagogical competence of Islamic Religious Education (PAI) teachers, especially in managing interactive and effective learning. However, challenges such as limited access and technology skills are still obstacles in its implementation. Another study by Harianto (2024) confirmed that the implementation of technology integration in learning with the Merdeka Curriculum has a positive impact on teachers' professional competence, including in terms of creativity and confidence in presenting technology-based materials. Meanwhile, research by

Reni et al. (2024) revealed that although teachers have a high awareness of the importance of technology, they still face barriers such as limited access to digital devices and lack of adequate technology training.

An analysis by Maula (2024) at MI Sunan Gunung Djati showed that teachers have implemented student-centered learning and integrated 21st century skills, but still face challenges in learning technology integration. The main gap was found in the ability to use advanced technologies such as Internet of Things (IoT), Virtual Reality/ Augmented Reality, and Artificial Intelligence in learning. Research by Prasetyo et al. (2025) also highlighted the importance of improving teachers' digital competencies in facing the Society 5.0 era, showing that proper training can improve data, technology and human literacy in the learning process. In addition, a study by Putri et al. (2024) emphasized that the integration of educational technology and adaptive skills is essential for teachers' professional development in facing increasingly complex global challenges.

Research by Mawarni et al. (2023) highlighted that the development of digital technology has changed the role of teachers as learning facilitators, demanding mastery of technology-based pedagogical competencies. The Technological Pedagogical Content Knowledge (TPACK) model is an important framework in improving learning effectiveness through the integration of technology, pedagogy, and content. However, there are still obstacles in implementing policies to develop teachers' pedagogical competencies, such as limited access to technology and lack of equitable training for teachers in remote areas. A study by Wandini and Dauly (2024) also showed that the utilization of information and communication technology is an urgent need in PGMI education, despite major challenges related to infrastructure and unmet training needs.

Ismunandar and Kurnia (2024) emphasized that mastery of technology and improving human resource capabilities in the Society 5.0 era are important elements in educational competence. Teachers are required to be able to think critically, reason, be creative, communicative, collaborative, and have problem solving skills, so that technology-based learning systems and social science can be integrated. Research by Imamudin et al. (2024) also highlighted that the competence of educators in facing education in the era of Society 5.0 includes skills in 4C skills and pedagogical, personality, and social competencies, as well as other supporting skills. This is important to create imaginative and creative learning and foster quality learning models according to the needs of the times.

From various studies that have been reviewed, it appears that technology integration in developing the pedagogical competence of MI teachers in the era of Society 5.0 still faces various challenges, such as limited infrastructure, lack of adequate training, and gaps in mastery of advanced technology. Although several studies have shown the positive impact of technology integration on teacher competence, there are still gaps in effective and sustainable implementation, especially at the MI level. The novelty of this research lies in the in-depth case study approach in the MI environment, which aims to identify effective technology integration strategies in developing teachers' pedagogical competencies. The purpose of this study is to explore how technology integration can be optimized in the development of MI teachers'

pedagogical competence, as well as identify the supporting and inhibiting factors in its implementation in the Society 5.0 era.

## **B. METHOD**

This study uses a library research approach with an integrative review type to analyze and synthesize various relevant research results regarding the integration of technology in developing the pedagogical competence of Madrasah Ibtidaiyah (MI) teachers in the Society 5.0 era. This approach allows researchers to evaluate, integrate, and conclude various findings from published scientific sources. This method was chosen because it is able to produce a comprehensive synthesis of previous studies so as to identify research gaps and theoretical and practical contributions to the field of Islamic basic education (Whittemore & Knafl, 2005).

The data sources in this study came from various credible academic databases, namely Google Scholar, Scispace, Directory of Open Access Journals (DOAJ), and Scopus. The inclusion criteria used included: (1) articles published within 2015-2024, (2) focusing on the topics of technology integration, pedagogical competence, Islamic basic education, and Society 5.0, (3) national or international peer-reviewed scientific journal articles, and (4) available in Indonesian or English. The exclusion criteria included opinion articles, non-academic reports, duplication of publications, and articles that were not relevant to the research focus.

The literature search process was conducted systematically using keywords such as: "integration of technology in Islamic elementary education", 'pedagogical competence of Islamic teachers', 'Society 5.0 in education', and 'MI digital pedagogy'. The search was conducted using logical operators (AND, OR, NOT) to maximize search results. Once the articles were collected, an initial screening process was carried out based on the title and abstract, then full text review to ensure the eligibility of the article content according to the inclusion criteria. Eligible articles were analyzed and categorized based on thematic focus and key findings.

The data analysis method was thematic and descriptive qualitative, by identifying the main themes of each article reviewed, then synthesizing the results to reveal trends, gaps and theoretical contributions. Data validity was maintained through source triangulation, by comparing results from different journals from different databases and ensuring compatibility between sources. Reliability was maintained by using consistent analysis protocols and systematic recording at each stage of the literature selection and analysis so that the process could be replicated by other researchers (Snyder, 2019).

## **C. RESULTS AND DISCUSSION**

### **1. Implementation of Digital Technology in MI Teachers' Learning Practices**

The implementation of digital technology in learning practices in Madrasah Ibtidaiyah (MI) has become very important. In the context of guiding the Merdeka Belajar curriculum, digital technology plays a crucial role in creating more innovative and creative learning methods. Aisyah et al. mentioned that by integrating technology in the learning process, teachers and students can create a more interactive and fun learning atmosphere, which in turn increases students' learning motivation (Aisyah et al., 2023). Therefore, it is important for

educators to utilize technological tools such as learning apps that support discussion, collaboration and student engagement in the teaching and learning process

According to research by Ghavifekr and Rosdy, the integration of information and communication technology (ICT) in education has been proven effective to support the learning process (Ghavifekr & Rosdy, 2015). The use of digital media in the classroom allows students to learn in a more flexible and adaptive way. This is in line with the concept of the digital classroom introduced by Bakar, where the use of online platforms and social media applications can encourage student exploration beyond the physical confines of the classroom (Bakar, 2016). Furthermore, research by Tarigan et al. shows that the use of digital media during hybrid learning is important to improve the quality of education (Tarigan et al., 2022). The importance of building digital literacy among teachers and students is also necessary to ensure maximum utilization of technology. A study by Säljö shows that the development of digital technology not only supports learning but also changes the way students understand and interpret information (Säljö, 2010). Therefore, teachers in MI need to be equipped with adequate digital skills, to be able to facilitate better and more up-to-date learning experiences.

In adapting to the demands of the times, teachers in MI should apply new methodologies such as the flipped classroom, which has been proven effective in increasing students' learning independence (Listyarini & Nur, 2018). By reversing traditional learning directions, students are encouraged to learn the material before entering the classroom, so that in-class time can be used for in-depth discussions and problem solving. Research by Chiappe et al. also shows the effectiveness of this strategy in technology-supported learning environments, where the use of innovative methods can help students not only in understanding the material but also in developing their critical thinking skills (Chiappe et al., 2020). In conclusion, the implementation of digital technology in Madrasah Ibtidaiyah should be a priority in the development of learning practices. Through the integration of digital media and innovative pedagogical techniques, more meaningful and engaging learning experiences can be created for students. Efforts to improve digital skills and literacy among teachers are essential to achieve broader educational goals in the digital era.

## **2. Challenges and Strategies for Improving Pedagogical Competence in the Era Of Society 5.0**

Challenges and strategies for improving pedagogical competence in the era of Society 5.0 are becoming increasingly relevant topics given the rapid development of technology and transformation in the education sector. In this context, there are various challenges faced by educators, including the need to adapt to new technologies, changes in the way students learn, and demands to apply higher critical thinking skills (Kamkankaew et al., 2024). Educators in this era must be able to utilize technology and design inclusive and adaptive learning to meet the needs of diverse students (Kamkankaew et al., 2024).

One of the significant challenges is the development of adequate pedagogical competencies among educators. The study by Udovychenko et al. shows the importance of innovations in teaching methods to improve teachers' pedagogical skills, especially in the context of necessary solutions due to rapid scientific and technological progress

(Udovychenko et al., 2021). With the proliferation of online learning and the use of digital tools, teachers are required to improve their skills in designing effective learning in digital environments (Khan et al., 2021). Meanwhile, research by Baleni et al. highlights the importance of academic staff development as an enabler for good teaching practices through pedagogical skills training and collaboration between educational institutions (Baleni et al., 2022).

Strategies to improve pedagogical competence in the Society 5.0 era can be achieved through several approaches. First, ongoing training and professional development programs for teachers should focus on mastering digital tools and innovative teaching methodologies, including active and adaptive learning (Kamkankaew et al., 2024). The use of strategies such as project-based learning and the integration of technology in the curriculum can enrich learning experiences and support the development of students' critical skills (Mukekhe, 2019).

In addition, it is important to build learning communities where teachers can share best practices and support each other in the implementation of new approaches (Loncing et al., 2023). Collaborative learning among educators not only encourages the exchange of ideas but can also increase their confidence in implementing new and more student-oriented teaching methods (Okiri & Hercz, 2024).

Finally, to achieve the desired results, it is also important to involve other stakeholders, such as parents and communities, in the educational process. This can increase the social support necessary for the successful implementation of new pedagogical strategies in the classroom (Lázaro et al., 2024). As the challenges in the context of Society 5.0 become more complex, collaboration between educators, communities and educational institutions will be key to continuously improving pedagogical competence.

### **3. Synergy of Technology and Islamic Education Values in the Context of Madrasah Ibtidaiyah**

The synergy between technology and Islamic education values in the context of Madrasah Ibtidaiyah (MI) reflects an effort to incorporate Islamic principles in an increasingly digital learning process. In facing the era of Society 5.0, it is important for MI to integrate technology effectively while maintaining the essence of Islamic character education. First, the implementation of character education values in MI is a must to ensure that students not only gain academic knowledge but also the formation of good morals. According to Aprily, character education in MI shows its distinctiveness in instilling strong Islamic values to students, in accordance with technological developments that can strengthen the learning process Aprily (2020). By applying technology in learning, religious values can be taught in a more contextual and relevant manner, strengthening the bond between spirituality and education.

Secondly, Hidayat explained that the Indonesian Madrasah Competency Assessment (AKMI) policy in MI aims to measure students' competencies in various aspects, including reading literacy, numeracy, and science (Hidayat, 2023). Regarding synergy with technology, the implementation of digital platforms for competency testing and measurement can help in providing more accurate and real-time data on student development, while still emphasizing the importance of good character, as per Islamic teachings.

Aisyah et al. suggested that adaptation and innovation in MI is a key element in welcoming the Merdeka Belajar curriculum which emphasizes the use of technology (Aisyah et al., 2023). By utilizing the right learning applications, MI can organize a more flexible and engaging learning process, allowing students to learn in an environment that supports Islamic values. For example, the use of apps that include digital religious content can provide greater access for students to explore Islamic teachings while utilizing technological advancements. Furthermore, Sofanudin and Atmanto noted the importance of sharing best practices in pesantren-based MIs as a model of superior educational adaptation in Yogyakarta (Sofanudin & Atmanto, 2020). This kind of MI excellence can be further developed through the application of technology, where learning experiences can be enriched with digital resources that support teaching methodologies that are in line with Islamic education values.

Finally, teachers' pedagogical competence in implementing Islamic education values and technology is very important. Research on pedagogical competence in MI shows that teachers need to have the ability to integrate innovative teaching methods with religious values (Nugrahaini & Biantoro, 2024; , Lestari et al., 2023). This is done so that teachers not only transfer knowledge, but also guide students to understand the context of Muslims in a technology-driven world.

Thus, the synergy between technology and Islamic education values in Madrasah Ibtidaiyah is a strategic step that can have a positive impact on student development, making them individuals who are not only academically intelligent but also have noble character. This effort should be made through the development of curriculum innovations, training for teachers, as well as the application of technology in the learning process that reflects the principles of Islamic education.

#### **D. CONCLUSIONS AND SUGGESTIONS**

Future research needs to focus on developing technology-based learning models that are contextual to the characteristics of Madrasah Ibtidaiyah. In addition, studies on the effectiveness of collaboration between schools, parents and communities in supporting the digital transformation of Islamic education are also an urgent research agenda to be realized.

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