Digital Revolution in Madrasah Aliyah: Adaptation and Innovation in the Implementation of the Independent Curriculum

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Abstract
Education in Indonesia continues to transform with the implementation of the Merdeka Curriculum, which provides flexibility to tailor learning to the needs of students. Digital technology plays an important role in enhancing the quality of education and developing 21st-century skills. Despite challenges such as access gaps and teacher readiness, digital technology offers opportunities to create more interactive and relevant learning experiences. With the right support, madrasahs can leverage technology to prepare students for future challenges. The research method used is qualitative with a literature study. The findings of this research are as follows: digital technology has great potential to improve the quality of education in Madrasah Aliyah, especially with the implementation of the Merdeka Curriculum, which allows for more flexible, competency-based learning that aligns with technological developments. This provides opportunities for students to learn independently, creatively, and develop the 21st-century skills that are highly needed in the workforce. However, challenges in the implementation of digital technology include access gaps to infrastructure and resources, as well as the need to improve teachers' competencies in utilizing technology effectively. Nevertheless, the opportunities provided by digital technology are vast, in creating inclusive, adaptive, and data-driven learning, as well as supporting the holistic development of students' character. The Merdeka Curriculum plays a key role in encouraging the adoption of digital technology in madrasahs, offering the freedom to integrate technology according to local needs, and preparing students to face global challenges. With this policy, madrasahs can optimize technology to create more engaging, relevant, and impactful educational experiences that contribute to students' development in the future
Keywords: Digitalization; Merdeka Curriculum; Madrasahs

Introduction

Education has long been a cornerstone in Indonesia's pursuit of national development, particularly in the effort to cultivate high-quality human resources (Annisa & Gyfend, 2021). Within the national education system, curriculum design plays a pivotal role in directing educational objectives and outcomes (Nasbi, 2017). Since the country's independence, Indonesia has seen multiple curriculum reforms, each intended to adapt to evolving societal needs, global competitiveness, and the demands of the labor market (Hidayat, 2020). These transformations are not only aimed at improving the relevance of education but also at elevating its quality across all levels—from elementary to tertiary education.

Curriculum development in Indonesia is a collaborative endeavor, engaging government agencies, educators, scholars, and civil society (Insani, 2019). This inclusive process seeks to ensure that the curriculum reflects the nation's educational aspirations and is capable of preparing students to meet the multifaceted challenges of the 21st century (Badrus Sholeh et al., 2023). In recent years, the rapid advancement of digital technology has profoundly influenced every aspect of life, including education. The integration of information and communication technologies (ICT) into teaching and learning has become imperative in preparing students for the demands of a digital society.

To respond to these developments, the Indonesian government introduced the Kurikulum Merdeka (Independent Curriculum) in 2022 as a key policy reform (Barlian et al., 2022). This curriculum was designed to overcome persistent challenges in the education system, including the misalignment between classroom instruction and the skills required in the modern workforce (Simon Paulus Olak Wuwur, 2023). The Merdeka Curriculum promotes greater autonomy for schools, allowing them to tailor learning content and pedagogical approaches to student needs, interests, and local contexts. It shifts the educational paradigm from rigid, content-heavy instruction to flexible, competency-based learning that nurtures creativity, critical thinking, and student agency.

In this framework, digital technology plays a crucial role in supporting the development of 21st-century competencies. It offers opportunities for more interactive, student-centered learning experiences and enables access to a wider range of educational resources (Rohmah, 2024). However, despite its potential, the implementation of the Merdeka Curriculum—especially in madrasah aliyah (Islamic senior high schools)—faces significant barriers, such as disparities in digital infrastructure and limited teacher readiness (Yasmansyah & Sesmiarni, 2022).

As faith-based educational institutions, madrasahs are tasked not only with academic instruction but also with cultivating moral and spiritual values. Yet, they must also keep pace with technological advancement to remain relevant and effective in fulfilling their educational mission (Badrus Sholeh et al., 2023). The digital revolution has made it necessary for madrasahs to incorporate technology into their teaching and learning processes to improve educational quality and to provide students with the skills needed in a competitive global environment (Shavab, 2020).

Furthermore, the Merdeka Curriculum encourages schools to design curricula that address both local realities and global trends (Habibah, 2023). For madrasahs, this requires innovative approaches to curriculum development and classroom practice. Digital technologies can facilitate such innovation by expanding access to knowledge, supporting differentiated instruction, and fostering engaging, student-driven learning environments (Ahdar & Musyarif, 2019; Hamdani & Ilmi, 2024).

In the digital era, digital literacy has emerged as a critical skill. Students who are proficient in navigating digital tools and platforms will be better equipped for future academic and professional endeavors. Therefore, madrasahs must ensure that digital competence is integrated into the broader learning experience. This approach not only enhances academic achievement but also contributes to the formation of a technologically literate and morally grounded generation.

Literature Review

Curriculum Reform and the Emergence of the Merdeka Curriculum

Curriculum reform in Indonesia has been an ongoing process to ensure that education remains responsive to societal transformations and global demands. The Merdeka Curriculum, introduced in 2022, marks a significant shift toward a more flexible and student-centered model of learning (Barlian et al., 2022). Unlike previous curricula, which often emphasized content mastery and uniformity, the Merdeka Curriculum prioritizes competency development, personalization of learning, and contextual relevance (Suryaman, 2020). It provides schools with greater autonomy to adapt materials and methods to local needs and student profiles, encouraging innovation and experimentation in pedagogy (Simon Paulus Olak Wuwur, 2023). This curriculum emphasizes 21st-century skills—critical thinking, creativity, collaboration, and communication—which are essential for students to thrive in a rapidly changing world. As noted by Kusumawardani et

al. (2022), the Merdeka Curriculum supports differentiated instruction and promotes student agency, aligning national educational goals with global trends in learner-centered pedagogy.

The Role of Digital Technology in Education

The integration of digital technology in education has become increasingly vital in the era of Industry 4.0. Digital tools and platforms facilitate more interactive, inclusive, and flexible learning environments, which can enhance students' engagement and understanding (Putrawangsa & Hasanah, 2018). As Chaterine (2021) notes, digitalization is no longer optional but a necessity for educational transformation, enabling personalized learning pathways and real-time access to diverse resources. In the context of Islamic education, digital technology supports the modernization of learning processes while preserving core religious values. Ahdar & Musyarif (2019) argue that digital media can enrich religious instruction, especially in contexts like madrasah aliyah, where traditional methods have long been dominant. However, they also caution that digital tools must be used critically and ethically to avoid undermining educational integrity.

Challenges of Digital Integration in Madrasah Aliyah

Despite its promise, the integration of digital technology in madrasah environments faces numerous challenges. Shavab (2020) points to digital inequality as a major barrier, especially for schools in rural areas where internet connectivity and access to devices are limited. Moreover, Yasmansyah & Sesmiarni (2022) highlight the lack of digital competence among many teachers as a critical issue that hinders the effective implementation of digital-based learning strategies. According to Nurfadhillah et al. (2021), most teachers in madrasahs require ongoing training and professional development to utilize digital platforms effectively. Without this, technological tools may be underutilized or misapplied, ultimately reducing their impact on learning outcomes.

Opportunities for Innovation and Educational Improvement

Despite these challenges, digital innovation holds significant potential for transforming education in madrasahs. With the support of the Merdeka Curriculum, madrasahs can adopt project-based learning, blended learning models, and digital assessment systems that align with student interests and real-world applications (Setya Dwi Aryati et al., 2024). These approaches can foster active learning, problem-solving, and self-directed inquiry—skills that are highly valued in both academic and vocational contexts. Moreover, digital platforms can facilitate collaboration not only among students but also between teachers and parents, contributing to a more holistic and supportive learning ecosystem (Hamutoğlu et al., 2021). Cahyani et al. (2024) emphasize that digital classroom management tools can improve student monitoring, feedback, and engagement, thereby enhancing instructional effectiveness.

The Strategic Role of Madrasahs in the Digital Era

As educational institutions with a unique religious and moral foundation, madrasahs occupy a strategic position in shaping well-rounded individuals who are both intellectually competent and spiritually grounded. The challenge for madrasahs is to balance innovation with tradition—integrating modern digital tools while preserving Islamic values (Habibah, 2023). With the flexibility offered by the Merdeka Curriculum, madrasahs have the opportunity to design learning experiences that incorporate both global competencies and local wisdom. This dual approach not only ensures relevance in the

digital age but also reinforces the mission of Islamic education to nurture ethical and resilient future generations (Hamdani & Ilmi, 2024).

Methodology

This study employs a qualitative research approach using a literature review method to explore the digital transformation in Madrasah Aliyah within the framework of the Merdeka Curriculum implementation. The qualitative paradigm was chosen to allow for a comprehensive and in-depth understanding of the phenomenon, particularly in relation to how madrasahs adapt to curriculum reform and digital innovation. Rather than relying on field data or quantitative metrics, this study is descriptive-analytical in nature, grounded in the interpretation of secondary sources.

Data collection was conducted through a systematic review of relevant literature, including peer-reviewed journal articles, scholarly books, government policy documents, research reports, and conference proceedings. These sources were selected based on their credibility and relevance to the themes of curriculum innovation, digital learning, and Islamic educational management. The literature reviewed spans publications from 2017 to 2024, written in both Indonesian and English, and accessed through academic databases and open-access repositories.

The analysis process was carried out using thematic content analysis, whereby the data were organized into key themes that emerged from the literature. These included curriculum innovation in Islamic schools, the integration of digital technology in classroom practice, the readiness of teachers and educational infrastructure, the opportunities presented by digital platforms, and the strategic role of school leadership in supporting educational reform. Each theme was critically examined to identify patterns, challenges, and best practices relevant to the context of madrasahs under the Merdeka Curriculum.

To ensure the validity of the study, only high-quality, reputable sources were used, and findings were triangulated across different literature types—empirical, theoretical, and policy-based. While this study does not aim to generalize findings to all educational contexts, it offers rich, context-sensitive insights that may inform policy and practice in similar Islamic educational institutions navigating the digital shift.

Result

Transformation of Learning with Digital Technology in the Merdeka Curriculum

The transformation of learning through digital technology within the Merdeka Curriculum signifies a shift toward a more modern, adaptive, and needs-based education system. In this framework, digital technology functions not just as a teaching aid but as a core element in delivering more interactive and effective content. The curriculum provides teachers and students with greater flexibility to create innovative and personalized learning strategies, including the use of online learning platforms, educational apps, and other digital tools that promote dynamic and engaging learning environments. In Madrasah Aliyah, the integration of digital tools offers students more active participation in learning. With access to a variety of digital platforms, students can explore a wide range of learning materials beyond the limitations of time and space. This flexibility supports independent learning experiences and fosters greater student autonomy. Technologies such as video conferencing and game-based learning applications enhance engagement and interactivity.

Digital technology also encourages the development of essential 21st-century skills, including digital literacy, information processing, online collaboration, and communication. These skills support students' overall competency development and prepare them for the demands of the digital era. Thus, digital tools serve both as educational

instruments and as enablers of future career readiness. Teachers can also benefit by adopting innovative teaching methods tailored to student needs. With the freedom to adjust teaching approaches, digital technology allows the delivery of content in more diverse and appealing formats. Multimedia and virtual reality tools, for instance, provide deeper, more engaging learning experiences where students participate actively rather than learn passively.

The use of technology further enables project-based and problem-based learning, allowing students to conduct research, collaborate, and present their findings using digital tools. Access to a wide range of online resources helps students work more efficiently and develop their critical thinking and problem-solving abilities through real-world learning scenarios. Personalized and adaptive learning is also made possible through digital platforms that cater to individual learning styles and paces. Whether through video, text, or interactive virtual lessons, students can engage in learning that aligns with their preferences and abilities, resulting in more effective and inclusive educational experiences.

E-learning platforms offer opportunities for students to learn beyond school hours, providing access to materials anytime and anywhere. This supports a more flexible learning model, where students can study based on their individual needs and schedules, reinforcing the personalized learning aspect of the curriculum. Digital collaboration among students, teachers, and parents is another significant advantage. Parents can monitor their children's progress and communicate easily with teachers, creating a more holistic and supportive learning environment. Technology also supports continuous and data-driven assessment. Teachers can track student performance in real time, provide faster feedback, and adjust instructional strategies to meet evolving student needs.

Successful implementation, however, requires readiness from all parties. Teachers need the skills to effectively use technology, and students must be guided to use it responsibly and independently. Collaboration between educators, students, and administrators is crucial for success. Adequate infrastructure is equally essential. Reliable access to devices and stable internet connectivity is a prerequisite for meaningful digital learning. Investments in digital infrastructure will enable madrasahs to maximize the benefits of the Merdeka Curriculum.

Technology also improves classroom management by enabling teachers to monitor student progress and provide targeted support. Real-time feedback enhances the teaching and learning experience. Additionally, digital tools boost student motivation. Interactive applications, videos, quizzes, and simulations make learning more enjoyable and encourage active participation. Cross-disciplinary learning is also supported through digital platforms, giving students access to varied content and enabling them to develop broader knowledge and integrated skills.

Despite its advantages, challenges remain particularly in teacher readiness. Many educators are still unfamiliar with digital tools and require ongoing training. Continuous support from madrasah leadership is necessary to ensure the effective use of technology. In conclusion, the transformation of learning with digital technology under the Merdeka Curriculum is a constructive step forward. It makes education in madrasahs more engaging, flexible, and relevant, while equipping students with the digital, collaborative, and problem-solving skills needed for the future.

Challenges and Opportunities of Digital Innovation in Madrasah Aliyah

The challenges and opportunities of digital innovation in Madrasah Aliyah are highly relevant within the framework of the Merdeka Curriculum. As these institutions strive to modernize and keep pace with technological advancement, they face several significant obstacles that must be addressed to maximize the benefits of digital learning.

While there are pressing issues related to infrastructure and human resources, there are also vast opportunities to harness technology as a tool for improving educational quality, broadening access, and enriching the learning experience.

One of the main challenges is the limited access to adequate technological infrastructure. Many madrasahs, especially in remote areas, lack stable internet connections and digital devices such as computers or tablets. Without strong infrastructure, the implementation of digital learning becomes restricted and may even deepen the educational gap between urban and rural schools. This underscores the urgent need for serious attention from the government and stakeholders to ensure equitable access to digital technology across all regions.

Another significant challenge lies in teacher preparedness. Many educators at Madrasah Aliyah still lack familiarity with digital learning tools and are not yet accustomed to more complex e-learning systems. This highlights the importance of continuous professional development and digital literacy training to empower teachers to effectively integrate technology into interactive and engaging learning processes. Despite these hurdles, there are substantial opportunities for integrating digital innovation into education. One key opportunity is the flexibility that technology offers. Through digital platforms, students can access lessons and engage in learning activities anytime and anywhere, which is particularly beneficial for those with limited access to regular face-to-face instruction.

Technology also enables personalized learning experiences. AI-based applications and platforms can tailor educational content to individual students' abilities and interests. This personalization allows students to engage with materials in formats that suit their learning styles, whether through videos, text, or interactive games, and provides real-time feedback to support growth and improvement. Additionally, digital tools enhance collaboration among students, teachers, and parents. Students can easily work in groups, share tasks, and participate in discussions through digital apps. Parents can stay informed about their children's progress and offer necessary support, contributing to a more holistic and inclusive learning environment.

The Merdeka Curriculum encourages project-based and problem-based learning, and digital innovation aligns well with this approach. Students are given opportunities to solve real-world problems through research and teamwork, using various digital tools. This helps build vital skills such as critical thinking, communication, and teamwork, which are essential for success in the modern workforce. Technology also streamlines evaluation through data-driven systems that allow teachers to monitor student progress in real time. This data helps design more targeted teaching strategies and provides transparent, constructive, and timely feedback to students, improving the overall effectiveness of learning.

However, challenges in policy and management also emerge, particularly in addressing the digital divide between urban and rural madrasahs. Unequal access to technology can exacerbate existing educational disparities. Inclusive and equitable technology policies are needed to ensure that all madrasahs benefit from digital advancements. Adopting digital technology requires a shift in teaching and learning paradigms. Teachers must transition from being the primary source of information to becoming facilitators who help students navigate digital resources. This role change demands sustained professional development and a rethinking of instructional strategies to create more meaningful and engaging learning experiences.

Furthermore, technology use in education must align with broader educational goals, particularly character development. Digital tools should support values such as discipline, responsibility, and collaboration. Technology must not only enhance academic achievement but also foster positive behaviors and attitudes necessary in society. Within

the flexible structure of the Merdeka Curriculum, students are empowered to choose learning paths that suit their interests. Digital tools provide options for customized learning, boosting student motivation and independence.

To ensure successful digital innovation in Madrasah Aliyah, cooperation among the government, school administrators, and private sector is crucial. The government must support policy development and infrastructure investment, while schools ensure responsible and effective use of technology. Private sector actors, especially educational technology providers, play a role in delivering accessible and relevant solutions. One of the major obstacles to technology adoption remains the psychological readiness of both students and teachers. Some students struggle to adapt to digital-based learning, particularly if they are more familiar with traditional classroom methods. Similarly, some teachers may feel anxious or lack confidence in using digital tools. A gradual and supportive transition approach, with adequate training and resources, is essential to help all parties adjust effectively.

Given these multifaceted challenges and opportunities, digital innovation in Madrasah Aliyah requires a holistic and well-planned strategy involving all stakeholders. While the potential to enhance educational quality through technology is significant, the challenges must be addressed with seriousness and commitment. With thorough planning and close collaboration between teachers, students, parents, and related parties, madrasahs can successfully overcome obstacles and leverage technology to deliver more relevant and high-quality education. Ultimately, digital innovation in Madrasah Aliyah is not merely about adopting new technologies, but about building a learning ecosystem that supports the full development of students. With appropriate use of digital tools, madrasahs can create more inclusive, flexible, and enjoyable learning experiences that contribute meaningfully to the overall improvement of education.

The Role of the Merdeka Curriculum in Encouraging the Adoption of Digital Technology in Madrasah Aliyah

The Merdeka Curriculum plays a crucial role in promoting the adoption of digital technology in Madrasah Aliyah, especially amid the rapid development of educational technology. It is designed to provide students with the freedom to choose learning paths that align with their interests and talents. This flexibility opens broader opportunities for integrating digital tools into learning processes, enabling students to access diverse educational resources and enhancing the dynamism and appeal of learning, ultimately improving educational quality. In today's digital age, adopting technology in educational institutions is an unavoidable necessity. As part of Indonesia's education system, Madrasah Aliyah must adapt to technological progress to remain relevant. The Merdeka Curriculum supports this need by giving schools the freedom to select and implement technology that suits their unique contexts. Digital tools thus become more than learning aids—they become instruments for achieving broader educational goals such as fostering creativity, collaboration, and 21st-century skill development.

The curriculum allows madrasahs to integrate a wide range of digital applications that support project-based and problem-based learning. This approach gives students the chance to engage in practical, real-world problem-solving with the help of technology. Students can use digital learning platforms like educational videos, interactive simulations, and online collaboration tools, enriching their learning experiences and preparing them for global challenges. It emphasizes competency-based learning, where students not only master content but also develop essential soft skills such as problem-solving, communication, and teamwork. Digital technology facilitates this by providing platforms

for students to work collaboratively, both inside and outside the classroom, sharing ideas and solving problems together. Moreover, the Merdeka Curriculum allows schools to design curricula that are contextual and tailored to local needs. This includes selecting technology that fits the characteristics of each madrasah. For example, schools in areas with limited internet access might focus on offline learning tools, while those in urban environments with better infrastructure can implement more complex digital technologies. This ensures that technology adoption is flexible and adaptable based on available resources.

One of the major benefits of the Merdeka Curriculum is its attention to character development. Digital learning is not limited to knowledge acquisition—it also supports the formation of student attitudes and behaviors. Through technology-based activities, students can learn values such as responsibility, openness, and collaboration, fostering both academic and emotional growth. Digital technology further supports inclusive education. It allows students of different backgrounds and abilities to learn in ways that suit them best. For students with special needs, technology can provide additional assistance through specialized tools, ensuring that every learner receives a meaningful educational experience.

Technology also enables data-driven learning. Student progress can be evaluated not only through traditional testing but also via real-time digital monitoring. Teachers can gather detailed insights and provide timely feedback, helping students identify and address learning gaps more effectively. The integration of digital technology promotes global learning opportunities. With internet access, students can connect with peers from different countries and cultures, broadening their perspectives and fostering global competence—skills essential in an increasingly interconnected world. It also supports self-directed learning. Students can access online resources at their own pace, revisit difficult material, and explore topics in greater depth. This student-centered approach encourages autonomy and motivation in the learning process.

The Merdeka Curriculum offers teachers the same flexibility. They are encouraged to develop creative and innovative teaching methods, using tools like gamification, video-based learning, or digital simulations to make complex concepts more accessible and engaging. This freedom allows teachers to match their instruction to diverse student learning styles and needs. By using digital technology, students can also develop essential 21st-century skills needed in the workforce, such as critical thinking, problem-solving, creativity, and collaboration. Engaging in various tech-supported activities prepares them to communicate effectively, manage information wisely, and use technology efficiently. Additionally, madrasahs can create more dynamic learning environments. The separation between classroom and external learning spaces becomes increasingly blurred, as learning can happen anytime and anywhere through digital platforms. This transformation encourages flexible and interactive educational experiences.

The curriculum also enhances teacher competency through the integration of technology. Continuous professional development helps educators update their digital skills and apply appropriate tools in meaningful ways to enhance instruction. In this process, government support is essential. Investments in infrastructure, teacher training, and digital learning resources are critical to ensure that all madrasahs across the country can access and benefit from technology. Without such support, technological adoption may remain uneven, especially in underdeveloped areas. Digital technology also allows schools to explore more flexible evaluation methods. With digital assessments, teachers can continuously monitor student progress and provide timely, personalized feedback. This helps students understand their weaknesses and improve before formal evaluations take place.

Furthermore, technology paves the way for the introduction of advanced educational models such as data-driven or AI-assisted learning. These models support more adaptive and responsive instruction, enabling personalized learning tailored to each student's pace and comprehension level. Finally, digital technology is not limited to classroom learning. It can also be applied in extracurricular programs such as coding clubs, digital innovation competitions, or tech skills training. These activities not only enhance students' practical abilities but also spark interest in the growing world of technology.

Discussion

The integration of digital technology into the Merdeka Curriculum at Madrasah Aliyah signifies a paradigm shift in Indonesian Islamic education, aligning with global advancements in educational innovation. This transformation highlights the curriculum's adaptive nature in responding to modern demands by fostering flexibility, student autonomy, and technological integration. A key outcome of this digital shift is the creation of more interactive and personalized learning environments. Digital tools, including e-learning platforms, interactive applications, and collaborative systems, enable student-centered learning by offering flexibility in accessing content anytime and anywhere. This supports the cultivation of critical 21st-century competencies such as digital literacy, critical thinking, creativity, collaboration, and communication (Cahyani et al., 2024; Ramadina, 2021). Moreover, gamification, multimedia, and simulation-based approaches increase student engagement and motivation, reinforcing the curriculum's emphasis on meaningful learning experiences (Kusumawardani et al., 2022; Rizki & Fahkrunisa, 2022).

However, despite these potentials, the implementation of digital innovation is hampered by several systemic challenges. Infrastructure deficits, particularly in rural and remote madrasahs, continue to hinder equitable access to technology (Shavab, 2020). Limited availability of internet connectivity and digital devices leads to a digital divide that risks widening educational disparities between urban and rural learners. Furthermore, teacher readiness remains an essential barrier. Many educators still lack proficiency in using educational technology effectively, highlighting the need for continuous digital literacy training and professional development programs (Nurfadhillah et al., 2021). Nevertheless, the Merdeka Curriculum offers significant structural support to overcome these challenges. It provides madrasahs with the autonomy to contextualize technology usage based on local needs and infrastructure capacity. For example, madrasahs in technology-rich environments may integrate advanced digital tools, while those in low-resource settings can adopt offline-compatible solutions. This flexibility ensures inclusivity and localized relevance (Supriatna et al., 2023; Zakiyyah et al., 2021).

Additionally, digital platforms facilitate collaborative learning models involving students, teachers, and parents. These triadic interactions enhance transparency and responsiveness in the learning process, promoting holistic student development. Importantly, technology supports not only cognitive but also affective and moral dimensions of learning. Through responsible digital engagement, students can internalize values such as discipline, accountability, and cooperation, which are central to character education (Kusumawardani et al., 2022; Ramadina, 2021).

From an instructional perspective, technology encourages the adoption of project-based and problem-based learning models that align with real-world applications. This mode of learning develops essential workforce skills and prepares students for a knowledge-driven economy (Setya Dwi Aryati et al., 2024). With the support of the Merdeka Curriculum, such practices are not only permissible but encouraged, reflecting a national shift toward outcome-oriented education (Sari et al., 2023). Furthermore, digital assessment tools provide real-time data on student progress, enabling timely and

personalized feedback. These analytics empower teachers to tailor instruction to individual learning needs and improve pedagogical strategies (Putrawangsa & Hasanah, 2018). The inclusion of data-driven learning is vital to ensuring continuous improvement and educational accountability across madrasahs.

The curriculum also supports the global outlook of education. Digital connectivity allows students to interact with peers from different cultures and backgrounds, thus broadening their global awareness and intercultural competence. This exposure prepares them not only academically but also socially for a highly interconnected world (Yakin et al., 2023). The role of government remains pivotal in sustaining this transformation. Investment in digital infrastructure, teacher training, and content development is crucial to leveling the playing field across diverse educational settings. Without such policy support, the vision of equitable and technology-enhanced education as envisaged by the Merdeka Curriculum may fall short (Yakin et al., 2023; Rizki & Fahkrunisa, 2022).

Finally, extracurricular integration of digital innovation—such as coding clubs and digital literacy programs—extends learning beyond the classroom and fosters a culture of innovation and exploration among students. These initiatives support self-directed learning and spark long-term interest in technology-related careers, thus enhancing the broader relevance of madrasah education in the digital era.

Conclusion

The adoption of digital technology within the framework of the Merdeka Curriculum at Madrasah Aliyah marks a significant advancement in aligning Islamic education with the demands of the 21st century. Through flexible, student-centered approaches, the curriculum enables the integration of digital tools that enhance learning accessibility, interactivity, and relevance. Students are not only equipped with academic knowledge but also empowered with essential digital and life skills, preparing them to face global challenges with competence and confidence. However, the implementation of digital innovation also brings notable challenges. Limited infrastructure, uneven access to technology, and varying levels of teacher readiness remain critical barriers to achieving equitable and effective digital learning across all madrasahs. Addressing these issues requires strong collaboration among educational stakeholders, including government, school administrators, educators, and the private sector. Despite these obstacles, the opportunities offered by the Merdeka Curriculum are substantial. It provides the autonomy for madrasahs to tailor digital integration to local contexts, supports inclusive and adaptive learning, and fosters both cognitive and character development. With adequate support in infrastructure, training, and policy, Madrasah Aliyah can fully harness the power of digital innovation to create learning environments that are inclusive, dynamic, and future-oriented. In conclusion, the synergy between the Merdeka Curriculum and digital technology offers a transformative path forward for Islamic education in Indonesia. By embracing innovation and addressing existing gaps, Madrasah Aliyah can play a vital role in shaping a generation that is not only grounded in religious values but also equipped with the skills necessary to thrive in a rapidly evolving digital world.

References

Ahdar, & Musyarif. (2019). Challenges of Islamic Education in Indonesia in the Era of Globalization. *Journal of Islamic Education*, 17(06), 13–28.

Annisa, A., & Gyfend, P. (2021). Total Quality Management in Islamic Education. *Syntax Transformation Journal*, 2(7). https://doi.org/10.46799/jst.v2i7.318

Badrus Sholeh, M., Kamsan, N., & Aliyah, H. (2023). Teachers' Perceptions on the Implementation of the Merdeka Curriculum in Madrasahs. *Tafáqquh: Journal of*

Islamic Research and Studies, 11(2), 273–287. https://doi.org/10.52431/tafaqquh.v11i2.2245

Barlian, U. C., Solekah, S., & Rahayu, P. (2022). Implementation of the Merdeka Curriculum in Improving Education Quality. *JOEL: Journal of Educational and Language Research*, 1(12), 2105–2118. https://bajangjournal.com/index.php/JOEL/article/view/3015

Cahyani, A. N., Alfina, A., & Anwar, R. N. (2024). Classroom Management for Effective Learning in Early Childhood Islamic Education Institutions. *Jurnal CARE (Children Advisory Research and Education)*, 11(2), 41. https://doi.org/10.25273/jcare.v11i2.20097

Chaterine, R. N. (2021). Nadiem: School Digitalization Is Inevitable, A Way to Improve Education Quality. Retrieved from https://nasional.kompas.com

Habibah, M. (2023). Student Profile in the Merdeka Curriculum for Madrasahs in the VUCA Era. *Intelektual: Journal of Education and Islamic Studies*, 13(2). https://doi.org/10.33367/ji.v13i2.4061

Hamdani, & Ilmi, D. (2024). Strengthening Character Values through the Pancasila Student Profile and Rahmatan Lil 'Alamin Student Profile Project (P5P2Ra) in the Merdeka Curriculum for Madrasahs. *ADIBA: Journal of Education*, 4(3), 316–326.

Hamutoğlu, N. B., Ünveren-Bilgiç, E. N., Salar, H. C., & Şahin, Y. L. (2021). The Effect of E-Learning Experience on Readiness, Attitude, and Self-Control/Self-Management. *Journal of Information Technology Education: Innovations in Practice*, 20, 93–120. https://doi.org/10.28945/4822

Hidayat, A. W. (2020). Curriculum Innovation in the Perspective of Islamic Education Curriculum Components. *Al-Fahim: Journal of Islamic Education Management*, 2(1). https://doi.org/10.54396/alfahim.v2i1.72

Idayanti, S. (2023). Analysis of P5P2Ra Compatibility with Implementation Principles and Its Impact on Student Behavior. *Wawasan: Journal of Training at the Religious Training Center Jakarta*, 4(1), 48–66. https://doi.org/10.53800/wawasan.v4i1.228

Insani, F. D. (2019). The History of Curriculum Development in Indonesia from Independence to the Present. *As-Salam: Journal of Islamic Law and Education Studies*, 8(1). https://doi.org/10.51226/assalam.v8i1.132

Kusumawardani, D. A., Sapitri, L., & Dewi, M. R. (2022). Implementation of the Merdeka Curriculum at Granada Islamic Integrated and Dhuhaa Islamic Junior High School in Tangerang City. *Journal of Curriculum Development*, 1(2). https://doi.org/10.17509/curricula.v1i2.53569

Nasbi, I. (2017). Curriculum Management: A Theoretical Review. *Idaarah: Journal of Education Management*, 1(2). https://doi.org/10.24252/idaarah.v1i2.4274

Nurfadhillah, S., Ningsih, D. A., Ramadhania, P. R., & Sifa, U. N. (2021). The Role of Learning Media in Increasing Student Interest at Kohod III Public Elementary School. *PENSA: Journal of Education and Social Sciences*, 3(2), 243–255.

Putrawangsa, S., & Hasanah, U. (2018). Integration of Digital Technology in Learning in the Industrial Era 4.0. *Tatsqif Journal*, 16(1), 42–54. https://doi.org/10.20414/jtq.v16i1.203

Ramadina, E. (2021). The Role of School Principals in the Development of the Merdeka Belajar Curriculum. *Mozaic: Islam Nusantara*, 7(2), 131–142. https://doi.org/10.47776/mozaic.v7i2.252

Rizki, R. A., & Fahkrunisa, L. (2022). Evaluation of the Implementation of the Merdeka Curriculum. *Journal of Curriculum and Pedagogic Studies*, 1(1). https://doi.org/10.30631/jcps.v1i1.1383

Rohmah, A. N. (2024). Development Strategy of the Rahmatan Lil Alamin Student Profile in Implementing the Merdeka Curriculum in Madrasah Ibtidaiyah. *Ibtida'*, 05(01), 63–64. https://journal.stitaf.ac.id/index.php/ibtida/article/view/613

Sari, F. F. K., Sukarno, & Murwaningsih, T. (2023). The New Paradigm of the Merdeka Curriculum: Implementation of Pancasila Education in Elementary School. *International Journal of Elementary Education*, 7(1). https://doi.org/10.23887/ijee.v7i1.54092

Setya Dwi Aryati, Mukromin, & Faisal Kamal. (2024). Implementation of the Merdeka Curriculum and the Availability of Learning Resources in Aqidah Akhlak Subjects at MTs Negeri 2 Wonosobo. *Journal of General Studies and Research*, 2(3), 144–155. https://doi.org/10.47861/jkpu-nalanda.v2i3.1106

Shavab, O. A. K. (2020). Digital Literacy through the Use of Edmodo as a Learning Medium in History Learning. *History and Culture: Journal of History, Culture, and Its Teaching*, 14(2). https://doi.org/10.17977/um020v14i22020p142-152

Simon Paulus Olak Wuwur, E. (2023). Issues in the Implementation of the Merdeka Curriculum in Elementary Schools. *SOKO GURU: Journal of Educational Science*, 3(1), 1–9. https://doi.org/10.55606/sokoguru.v3i1.1417

Supriatna, D., Nadirah, S., Aniati, Rahman, A., Aina, M., & Saefudin, A. (2023). Implementation of the Merdeka Belajar Curriculum in Elementary Schools: How Do Teachers Perceive It? *International Journal of Education, Vocational and Social Science (IJEVSS)*, 2(2). https://doi.org/10.99075/ijevss.v2i02.182

Suryaman, M. (2020). Orientation of Merdeka Belajar Curriculum Development. *National Seminar on Language and Literature Education*. https://ejournal.unib.ac.id/semiba/article/view/13357

Yakin, A. A., Muthmainnah, Ganguli, S., Cardoso, L., & Asrifan, A. (2023). Cybersocialization Through Smart Digital Classroom Management as a Pedagogical Innovation of the Merdeka Belajar Kampus Merdeka Curriculum. In *Digital Learning-Based Education*. https://doi.org/10.1007/978-981-19-8967-4_3

Yasmansyah, & Sesmiarni, Z. (2022). The Concept of Merdeka Belajar in the Merdeka Curriculum. *Indonesian Journal of Educational Science Research*, 1(1). https://doi.org/10.31004/jpion.v1i1.12

Zakiyyah, Cahyani, M. D., & Fatnah, N. (2021). Readiness of the Science Education Program to Implement the Merdeka Belajar - Kampus Merdeka Curriculum. *Scientiae Educatia: Journal of Science Education*, 10(2). https://doi.org/10.24235/sc.educatia.v10i2.9243