
ISLAMIC EDUCATION 4.0: RETHINKING MORAL AND RELIGIOUS LEARNING FOR A SOCIALLY CONSCIOUS GENERATION

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Abstract

Islamic Education 4.0 represents a critical response to the challenges and opportunities brought by the Fourth Industrial Revolution. This study fills a research gap in the comparative analysis of Islamic education systems by examining how Indonesia, Malaysia, and Saudi Arabia integrate digital technology within their educational systems. Using the Systematic Literature Review (SLR) method and a descriptive qualitative approach, this study analyzes 63 scholarly sources published between 2019 and 2025. The results indicate that Malaysia is making progress with structured digital policies and student-centered pedagogy, while Saudi Arabia is leading in artificial intelligence (AI) integration through its Vision 2030 initiative; in contrast, Indonesia continues to face challenges related to infrastructure, digital literacy, and policy implementation. This study suggests a step-by-step plan to improve Islamic education in Indonesia by focusing on building ethical digital skills, updating teaching methods, and preparing institutions better. The study contributes to the discourse on Islamic Education 4.0 by providing a contextual strategic guide to harmonize technological adaptation with Islamic ethical values in today's digital era.

Keywords: Islamic Education 4.0; educational technology; Maqasid al-Shariah; digital literacy; AI in education; Muslim countries

Abstrak

Pendidikan Islam 4.0 merupakan respons kritis terhadap tantangan dan peluang yang dibawa oleh Revolusi Industri Keempat. Studi ini mengisi kesenjangan penelitian dalam analisis komparatif sistem pendidikan Islam dengan mengkaji bagaimana Indonesia, Malaysia, dan Arab Saudi mengintegrasikan teknologi digital dalam sistem pendidikan mereka. Dengan menggunakan metode Systematic Literature Review (SLR) dan pendekatan kualitatif deskriptif, studi ini menganalisis 63 sumber ilmiah yang diterbitkan antara tahun 2019 hingga 2025. Hasil penelitian menunjukkan bahwa Malaysia mengalami kemajuan melalui kebijakan digital yang terstruktur dan pendekatan pedagogi yang berpusat pada siswa, sementara Arab Saudi memimpin dalam integrasi kecerdasan buatan (AI) melalui inisiatif Vision 2030. Sebaliknya, Indonesia masih menghadapi tantangan yang berkaitan dengan infrastruktur, literasi digital, dan implementasi kebijakan. Studi ini mengusulkan rencana bertahap untuk meningkatkan pendidikan Islam di Indonesia dengan menekankan pada pembangunan keterampilan digital yang etis, pembaruan metode pengajaran, dan peningkatan kesiapan institusi. Studi ini berkontribusi pada wacana Pendidikan Islam 4.0 dengan menyediakan panduan strategis kontekstual untuk menyelaraskan adaptasi teknologi dengan nilai-nilai etika Islam di era digital saat ini.

Kata kunci: pendidikan Islam 4.0; teknologi pendidikan; Maqasid al-Shariah; literasi digital; kecerdasan buatan dalam pendidikan; negara-negara Muslim

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Introduction

The emergence of Islamic Education 4.0 demonstrates a crucial demand to reconsider moral and religious learning amid the rapid advancement of technology and social change. In the digital era, the role of education is not only limited to developing intellectual capacity but also to fostering moral awareness and social responsibility. Therefore, as part of this effort, Islamic education is challenged to respond proactively to the Fourth Industrial Revolution by implementing pedagogical innovations without compromising its ethical and spiritual values. Hence, Islamic religious education must transform its system by integrating modern educational approaches while maintaining its primary goal: shaping individuals who are ethical, have integrity, and are spiritually mature. As Irfan and Sain state, Islamic religious education plays a crucial role in shaping children's character and moral values. In the era of globalization, Islamic education is not only focused on academic aspects but also serves as a system for shaping children's character and moral values (Irfan & Sain, 2024).

In Indonesia, where Islamic education is widely disseminated through networks such as pesantren and madrasah, which have long been an integral part of the country's educational system, digital transformation has now become a key agenda in Islamic education. However, progress remains uneven due to limitations in infrastructure, the persistence of conventional curricular structures, and shortages in human resources. Therefore, Islamic Education 4.0 is not merely a global trend but a crucial transformation to ensure that Islamic values remain preserved and relevant amid the evolving demands of the digital era.

Islamic education is designed not only to impart knowledge but also to foster spiritual, moral, and intellectual growth in alignment with universal principles of human dignity and perfection (Hadi et al., 2024). However, Rapid advancements in information and communication technology (ICT) have driven significant transformations in education, necessitating the adaptation of Islamic religious education through innovative approaches to effectively address the challenges of the Industrial Revolution 4.0 (Haidir et al., 2021).

Although efforts have been made to integrate technology, Islamic education has yet to optimize digital advancements in a systematic and integrative manner. Rahman states in a journal that Islamic education has yet to intelligently and integratively utilize technological advancements as a comprehensive solution to its unresolved challenges (Rahman, 2016). This statement emphasizes the importance of having a clear and structured guideline for the use of technology in Islamic education, so that it goes beyond merely following a trend.

The integration of technology in education can provide pedagogical benefits, such as increased flexibility, easier access, and greater effectiveness in assessment. Muttaqin highlights, that e-learning has the potential to enhance the effectiveness and accessibility of Islamic education. By integrating digital tools interactively and flexibly, students can actively engage in learning, while educators benefit from more efficient monitoring and assessment processes (Muttaqin, 2024). Although technology is relatively widespread in Islamic education, its implementation still faces ongoing challenges, particularly related to infrastructure and institutional readiness.

According to data from BPS (Central Statistics Agency) in 2018, a survey on the use and adoption of Information and Communication Technology (ICT) in the education sector was

conducted across 4,014 schools in 34 provinces. Based on education levels, 64.55% were elementary schools, 19.22% were junior high schools, and 16.23% were senior high schools (Www.bps.go.id, 2018). While these figures indicate efforts to implement ICT in schools, the integration of digital technology into Islamic pedagogy remains inconsistent. As stated by Rahman, the use of technology in Islamic education, so far has not touched into substantive, but only just reached the level of recognition, consumptive (Rahman, 2016).

To stay relevant and not be left behind in the dynamic era of the Industrial Revolution 4.0, Islamic education must be able to embrace modernization in a positive and constructive way. According to Maulana, to remain relevant in the Industrial Revolution 4.0 era, Islamic education must adapt to the demands of modernity, as clinging to outdated traditions without reform would hinder intellectual progress (Maulana, 2020). Furthermore, Randa and Arsyam explain, the rapid technological changes in the digitalization era pose new challenges for Islamic education, requiring a shift from traditional teaching methods to a more integrative and adaptive approach (Randa & Arsyam, 2023). These realities underscore the need for a strategic, context-based transformation of Islamic education in Indonesia that aligns digital innovation with foundational Islamic values. As (Panggabean & Silalahi, 2025) emphasize, “This study systematically identifies three paradoxical conditions: the inter- action between benefits and risks, coupled with countermeasures, at both individual and institutional levels”. This conceptualization is highly relevant to understanding the dual responsibility of Islamic education in the digital era: embracing technological benefits while mitigating ethical, pedagogical, and institutional risks.

Despite increasing awareness of the need for Islamic Education 4.0, many efforts in Indonesia remain fragmented, lacking a comprehensive and value-based strategy that integrates digital innovation with core Islamic pedagogical principles. While technology adoption is progressing, it often emphasizes access and infrastructure rather than the deeper alignment of digital tools with Islamic educational goals. In comparison, Malaysia and Saudi Arabia have initiated more structured policy responses to digital transformation in education. The absence of an integrative framework in Indonesia reflects a critical gap, one that risks reducing Islamic education to superficial technological adoption without preserving its moral and spiritual depth. Addressing this problem requires a thorough comparative analysis that draws lessons from international experiences while contextualizing them within Indonesia’s unique educational landscape.

Although there have been many studies discussing Islamic Education 4.0, there is still a lack of empirical and comparative research examining the implementation of digital transformation in the Islamic education systems of Muslim-majority countries. Most previous studies have focused primarily on theoretical aspects or national-level experiences, thus providing limited comprehensive insights across countries.

To address this gap, the present study investigates how Indonesia, Malaysia, and Saudi Arabia respond to digital transformation in Islamic education. It explores the challenges and opportunities encountered by each country, and proposes a phased, value-based strategic framework to guide Indonesia’s Islamic education reform in the digital age. Specifically, the study is guided by the following research questions: How has Islamic education responded to digitalization in Indonesia, Malaysia, and Saudi Arabia? What are the specific challenges and opportunities encountered by

each country? How can Indonesia develop a strategic and value-oriented framework for implementing Islamic Education 4.0?

This study contributes to the academic discourse by offering a comparative cross-national perspective that uncovers both shared and context-specific strategies. By focusing on three countries with diverse socio-educational settings, this research provides policy-relevant insights for Indonesia in developing an Islamic education model that is pedagogically sound, digitally adaptive, and firmly rooted in Islamic ethical and spiritual values.

Method

This study uses a qualitative research approach to examine the modernization of Islamic education within the context of Education 4.0. The descriptive-analytical method is employed to analyze how innovative pedagogical approaches can be aligned with Islamic values and address the challenges posed by the emergence of digitalization and technological advancements. As Rukin explains, qualitative research is inherently descriptive and employs inductive reasoning to generate insights from data (Rukin, 2021). This approach was chosen because it makes it easier for researchers to explore concepts in depth without limitations in empirical data collection, making it highly suitable for analyzing the modernization of Islamic education within the context of Education 4.0.

The data for this study were obtained through a Systematic Literature Review (SLR), applying a qualitative descriptive approach to analyze the modernization of Islamic education within the paradigm of Education 4.0. The researcher collected data from various sources, including peer-reviewed academic journals, scholarly books, and conference proceedings published between 2019 and 2025, totaling 63 references. These references include both nationally and internationally indexed journals, as well as proceedings relevant to the research focus. In selecting these sources, particular attention was given to academic credibility and relevance to the research context. To ensure a strong theoretical foundation and global relevance of the analysis, the study deliberately included 10 references from Q1-ranked Scopus-indexed journals.

The process of reference selection was carried out in several stages. The initial stage involved literature identification through searches using various databases such as Google Scholar, Sinta.kemdikbud, International Journal, Google Books, and Scopus. This was followed by filtering references based on inclusion and exclusion criteria. The inclusion criteria covered sources discussing the implementation of technology in Islamic education and published between 2019 and 2025. The main focus of the inclusion criteria was on peer-reviewed publications that addressed the integration of digital technology in Islamic education within Muslim-majority countries. Meanwhile, the exclusion criteria eliminated opinion articles, non-academic blogs, or sources lacking methodological clarity. Therefore, only high-quality and thematically relevant references were included in the analysis.

To support reference management and literature screening efficiently, the researcher also used the Publish or Perish (PoP) application to search for article metadata and saved the selected results in RIS format before importing them into Mendeley (Maisyanah et al., 2024). The keywords used included: Islamic Education 4.0, digital literacy, educational technology, Islamic curriculum,

education policy, and AI in Islamic education. The search was conducted across various databases such as Scopus, Sinta.kemendikbud, and Google Scholar, with a publication range from 2019 to 2025. The selection process was carried out in two stages: an initial screening based on titles and abstracts, followed by a full-text evaluation to ensure relevance to the inclusion and exclusion criteria.

Thematic analysis, as defined by Braun and Clarke in the journal by Damayanti, Priharsari, and Tibyani, is a method for analyzing data with the aim of identifying patterns or discovering themes within the data collected by the researcher (Damayanti et al., 2021). Further emphasize its role in systematically analyzing collected data. This technique involves identifying, analyzing, and reporting recurring themes, offering a flexible approach applicable to various types of qualitative data (Perwitasari et al., 2014).

This study acknowledges several limitations. First, it relies solely on secondary data sourced from journals, books, and conference proceedings, without incorporating primary data or empirical surveys. Second, the study focuses specifically on the implementation of technology in Islamic education. Third, the scope is limited to publications from 2019 to 2025. Fourth, the research is constrained to analyzing the contexts of Indonesia, Malaysia, and Saudi Arabia. This structured and transparent process not only ensures the credibility and dependability of the findings but also enhances the replicability of the study in future comparative analyses.

With this approach, the study aims to provide comprehensive insight into the challenges and opportunities of digitalization in Islamic education, and to offer recommendations for developing effective strategies to integrate technology into the Islamic education system in the era of the Fourth Industrial Revolution. However, as this study is conceptual in nature, future research is encouraged to incorporate empirical assessments to evaluate the practical implementation of Islamic Education 4.0.

Results and Discussion

Modernization of Islamic Education in the Digital Age

The application of technology in Islamic education demonstrates significant potential in enhancing character development and student engagement. However, careful consideration is needed in content selection and supervision to maximize its benefits (Mursidin, 2023). Many institutions have already adopted digital platforms to facilitate interactive and flexible learning. However, the success of technology implementation depends on accessibility, infrastructure, and digital literacy among students and educators.

It should be understood that the implementation of technology in Islamic education is not only related to practical matters but also aligns with the core values of Islamic teachings. Islam strongly encourages its followers to seek knowledge, and the utilization of technology in Islamic education can enhance a person's understanding as well as thinking abilities in the learning process. As explained in the Quran:

يَرْفَعُ اللَّهُ الَّذِينَ ءَامَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ ۚ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ

“Allah will raise those who have believed among you and those who were given knowledge, by degrees. And Allah is Acquainted with what you do” (QS. Al-Mujadilah: 58:11).

This verse emphasizes the importance of seeking knowledge and that knowledgeable people hold a special status. Based on this, several Islamic educational institutions have implemented online platforms to enhance the effectiveness of learning. As Sanusi (2024) states, that platforms like Zoom, Google Meet, and tailored Islamic education tools enhance engagement and collaboration, enabling virtual classes, group discussions, and digital halaqah (Sanusi, 2024). However, in some areas with limited internet access, the implementation of technology in learning is still less effective.

In Indonesia, the integration of Google Classroom into Islamic Religious Education has been shown to bring positive impacts. As evidenced by a study conducted by Kusumah, Bariyah, and Ramdhani at SMP Negeri 2 Telukjambe Timur, Karawang, the findings indicate that the use of Google Classroom (GCR) provides significant benefits for students. They reported easy access to the platform (4.11) and perceived learning benefits (3.88). GCR also facilitates communication and interaction (3.83) and ensures clear instruction delivery (3.87), contributing to overall student satisfaction (3.88). Some students also shared their experiences, stating that GCR offers flexibility in learning, allowing them to remain engaged and complete assignments outside of school hours (Kusumah et al., 2021).

In addition to GCR, Moodle is also used in Islamic educational institutions to support learning. According to Nasution, online learning platforms such as Google Classroom and Moodle enable students and teachers to communicate in real-time, share learning materials, and engage in online discussions on religious topics. This, in turn, enhances student participation in learning, as they can interact and exchange ideas more flexibly (Nasution, 2024). The platform helps facilitate effective interaction and provides opportunities for collaborative learning of religious studies.

Beyond platform functionality, the integration of Islamic religious education with science and technology is crucial, as religion plays a fundamental role in guiding and mitigating the potential negative impacts of technological developments (Tugiah et al., 2022). However, widely circulated unverified online content poses the risk of misinterpreting Islamic teachings. Schools must prioritize critical thinking and ethical digital literacy to help students responsibly filter religious information.

For example, schools in big cities have integrated technology into Islamic Religious Education by utilizing online meeting applications, audio-visual media such as film screenings and interactive CDs, as well as internet-based digital platforms to enhance students' understanding of Islamic teachings (Sugianto et al., 2023). While this improves accessibility, it tends to reduce direct teacher-student engagement, which remains vital in Islamic jurisprudence and ethical learning. To maintain balance, schools should combine technology with traditional methods, including direct supervision, interactive discussions, and moral reasoning-based learning.

Responding to the advancement, Islamic education in the digital era plays a crucial role in enhancing the quality of the nation's future generations (Dina, 2023). However, to ensure that technological advancements do not replace traditional Islamic values, collaboration between

educators, policymakers, and religious scholars is essential in designing a digital Islamic curriculum that remains innovative and spiritually enriching.

This transformation process must be guided not only by technological capability but also by the foundational concepts of Islamic pedagogy, such as *ta'dib* (disciplining the self through knowledge and ethics) and *tarbiyah* (nurturing moral and intellectual development). These concepts remind educators that digital tools are means, not ends, for forming spiritually aware and morally grounded learners.

The Transformation of Islamic Education in the Digital Era

The digital era has significantly transformed Islamic education, reshaping teaching methodologies, access to learning resources, and the integration of Islamic values in digital platforms. Islamic education aligns with the use of digital technology in the learning process by helping students and teachers, as well as the learning process itself, personalized learning or self study, freedom to choose all learning approaches, project based learning, and applicable field practice (Hirzulloh & Annadhif, 2024).

What was once simply a form of entertainment, digital technology particularly augmented reality has now evolved into a tool that enhances students' learning experiences, making education more engaging and interactive while reinvigorating traditional teaching methods that may feel monotonous (Muslim, 2024). This shift requires for more than just the use of digital tools it demands a pedagogical transformation that centers on learner agency, critical thinking, and adaptive instruction. As (Useche et al., 2022) emphasize: Institutions should focus on designing learning environments by utilizing the opportunities offered by technology (learning anywhere and anytime and supported by different media) with student's active knowledge making, formative assessment, collaborative learning, critical self-reflection on their learning process and differentiated learning.

This perspective aligns with the vision of Islamic Education 4.0, which not only aims to modernize teaching methods but also to nurture comprehensive students who are spiritually grounded, intellectually engaged, and socially aware. However, the main challenge or obstacle in the digitalization of Islamic education is the low digital competence of teachers. As explained by Rahman, Pisol, Sari, and Nurya, Teacher competencies such as digital literacy have undeniably become the biggest challenge when the transition to learning requires using digital technology (Rahman et al., 2024).

This indicates that many teachers still struggle to use technology in the learning process. Therefore, digital training is essential to help educators better adapt to the transformation of Islamic education in the digital era. A comparative look at Indonesia, Malaysia, and Saudi Arabia illustrates different approaches to digital transformation in Islamic education. In Indonesia, for example, MTs Negeri 5 Sleman has extensively implemented Microsoft Office 365 A1, which resulted in increased platform usage, student participation, and teacher confidence. According to Busyroni Majid, Office 365 is one of the digital applications that matches well with madrasah learning needs (Busyroni Majid, 2022).

Meanwhile, Malaysia's Ministry of Education has introduced the Digital Education Policy, supported by national programs such as JENDELA, CERDIK, and PerantiSiswa, with the aim of

developing digital fluency, enhancing teacher competencies, and bridging the digital divide. As stated by Mad Nordin, et.al, The Digital Education Policy is a government Program to produce a digitally fluent generation and to bridge the digital divide (Nordin et al., 2023).

In Saudi Arabia, the digital transformation of Islamic education is integrated into the broader Vision 2030 initiative, which seeks to modernize the country's economy and society. The education sector focuses on incorporating technology to enhance learning outcomes and align with global standards. According to Nuryanti et al., The educational policies designed within the framework of this vision focus on enhancing the skills of the younger generation to be able to compete in an increasingly dynamic global (Nuryanti et al., 2024). This includes curriculum reforms, increased use of digital tools, and initiatives to improve access to education across the country. One of the goals of Saudi Arabia's Vision 2030 initiative is to raise the standard of education to prepare citizens to compete globally (Alharbi et al., 2024).

This indicates that although the approaches differ, all three countries demonstrate a strong commitment to developing a technology-based Islamic education ecosystem. Indonesia focuses on school-level implementation using specific platforms, Malaysia emphasizes structured national policies involving multiple sectors, while Saudi Arabia integrates educational reforms into a broader national vision. All of these strategies align with the overarching vision of Islamic Education 4.0, creating an Islamic education system that is modern, flexible, and firmly rooted in spiritual values.

To realize Islamic Education 4.0, critical thinking is required regarding how digital technology is integrated—not merely keeping up with the times, but also aligning with the fundamental values of Islamic education. Although digital tools can broaden access and increase student participation, maintaining Islamic values remains a challenge amid the widespread presence of commercial and secular content on online platforms. The principle of *maqasid al-shari'ah*, which emphasizes the importance of preserving religion, intellect, and human dignity, must serve as the main guideline. Therefore, the utilization of technology in Islamic education must be accompanied by wisdom so that it strengthens moral and spiritual values rather than neglecting them.

As (Hussein et al., 2022) state, “perceived usefulness, perceived ease of use, and satisfaction had a significant and positive effect on students’ continued intention to reuse Google Classroom”. These findings highlight the importance of designing Islamic educational technologies that are not only aligned with Islamic values, but also meet the psychological and practical expectations of learners. As (Esfandiari et al., 2025) emphasize, “Digital-based learning is a well-established way to encourage safer online behavior among children and young people”. Suggesting that with intentional design and value-oriented pedagogy, digital tools can become instruments for both ethical formation and intellectual empowerment in Islamic education.

Challenges in Implementing Islamic Education 4.0

Readness of Educator and Students

Islamic Education (PAI) teachers need to improve their digital skills to facilitate the effective integration of technology into the learning process. According to Zubairi and Nurdin, One of the main challenges in implementing Islamic Education 4.0 is the readiness of educators and students to adopt digital technology as an integral part of the learning process. Teachers of Islamic religious education must possess a high level of competence to equip

students with the necessary skills to face the challenges of the Industrial Revolution 4.0. (Zubairi & Nurdin, 2022).

Teachers of Islamic Religious Education need to enhance their competencies to address the perception that they are traditional educators who struggle to adapt to advancements in information and learning technologies. This study seeks to explore the digital-era competencies required for Islamic Religious Education teachers. It examines their proficiency in utilizing technology, the challenges they face in the digital learning environment, and the strategies they employ to overcome these obstacles (Eraku et al., 2021). However, research indicates that many educators still lack adequate digital literacy skills, making it difficult to fully integrate technology into Islamic education. A study by Hulu highlights, the findings suggest that teachers struggle to keep pace with technological advancements. Thus, digital training and government support are recognized as possible solutions (Hulu, 2023).

Although efforts to provide digital training are increasing, many teachers still struggle to adapt to online learning without clear guidance and support. As Verstraeten emphasize: Job resources that can improve the experience of teachers who teach online, are autonomy, exchanging insights with peers and (technical) support, such as support by student assistants or educational consultants. Teachers appreciate the flexibility to adjust their lessons according to their needs. However, too much autonomy is not appreciated, for example, when numerous tips are given without additional information on which tips to implement, how, and when (Verstraeten et al., 2025).

This highlights the importance of a balanced and well-supported transition for teachers when integrating digital tools into their practice. This emphasizes the importance of a balanced and adequately supported transition process for teachers when integrating digital technology into their teaching methods. As explained by Rahman, Islamic education in Indonesia has entered a new phase, directly facing a significant wave of technological advancement. In general, Islamic education in Indonesia is inherently open to various forms of innovation, including the integration of technology that has emerged in multiple forms. However, during the initial stages of adaptation, Islamic education encountered challenges in aligning itself with these changes (Rahman, 2019).

Rahman's explanation indicates that Islamic education does not essentially reject modernization but rather faces obstacles in its early implementation. Therefore, a well structured and precise strategy is essential to effectively integrate technology while preserving the fundamental principles of Islam. On the other hand, students also face challenges in adapting to digital learning environments. Many students, especially in rural areas, have limited access to digital devices and the internet, which hinders their ability to engage in technology based education. As Jamaludin found, Based on the research findings, although they face challenges in online learning, they remain enthusiastic and strive to continue their education despite these limitations (Jamaludin, 2021).

Infrastructure and Accessibility

Education in Indonesia faces various complex challenges, one of which is the disparity in technology implementation. While technology holds significant potential to enhance the

learning process, many schools in different regions still lack adequate access to technological devices and internet connectivity. This gap further exacerbates educational inequality, particularly in remote and underdeveloped areas. As emphasized by Hasfi, Gono, and Rakhmad, Firstly, constraint in infrastructure and disparate opportunity in internet use. This occurs due to geographical factors, such as the unequal distribution of infrastructure between urban and rural or remote areas. In addition, financial limitations prevent individuals from purchasing the necessary devices—such as laptops, mobile phones, or data packages—and there is also a lack of accessible assistive technologies, including software that can support participation in online activities. (Hasfi et al., 2020).

According to the results of research conducted by Abrar and Handayono, 68.37% of urban residents access the internet while only 31.63% are in rural areas (Abrar, 2020). These figures highlight the continuing digital divide that hinders equitable access to education across the country. In addition, infrastructure problems, cost limitations are also obstacles in the implementation of e-learning. Schools with limited financial resources face difficulties in implementing e-learning platforms and integrating advanced educational technologies. As stated in Aminullah's study, one of the challenges in the e-learning system is the limited funding required for its implementation, as well as school leadership policies in allocating budgets for the development of learning media (Aminullah 2021). Therefore, to support the implementation of Islamic Education 4.0, it is necessary to ensure equitable infrastructure, clear policy support, and teacher training to facilitate the optimal use of technology in the learning process.

Misinformation and Digital Literacy

The dissemination of unverified religious content can pose risks that lead to misunderstandings in comprehending Islamic teachings. However, digitalization also presents challenges such as misinterpretations of religious teachings, the spread of invalid information, and a tendency toward more individualistic interpretations of religion. The principle of *Hifz al-Aql* plays a crucial role in safeguarding the intellect from manipulative information that may undermine ethical and religious values, while also serving as a foundation for developing digital literacy grounded in religious principles (Syamraeni et al., 2024).

Furthermore, the use of social media in the context of Islam faces challenges related to the authenticity and validity of information. Religious content disseminated on social media does not always undergo rigorous verification processes, posing a risk of spreading inaccurate or misleading information. This can influence Muslims' understanding of their religious teachings and the way they practice their faith (Dermawan, 2024).

This phenomenon shows that many people still receive and disseminate information without proper verification, which can lead to misunderstandings in religious comprehension. To address this issue, Islamic education needs to equip students with hadith verification skills, such as examining sources from authentic hadith books or using credible digital platforms. In doing so, this effort can enhance both digital and religious literacy, enabling individuals to better deal with and minimize misinformation in the digital era. Moreover, schools should

prioritize critical thinking and digital literacy to help students filter religious information responsibly. As explained in the Qur'an:

يَا أَيُّهَا الَّذِينَ آمَنُوا إِن جَاءَكُمْ فَاسِقٌ بِنَبَأٍ فَتَبَيَّنُوا أَن تُصِيبُوا قَوْمًا بِجَهَالَةٍ فَتُصْحَبُوا عَلَىٰ مَا فَعَلْتُمْ لَادِيمِينَ

It means: O you who have believed, if a transgressor brings you information, investigate it, lest you harm a people out of ignorance and become regretful over what you have done. (QS. Al-Hujurat: 49:6).

This verse emphasizes the importance of seeking the truth of information sources before accepting them, a principle that is highly relevant in the digital era, where false information and misleading religious content are widespread. The guidance of the Qur'an aligns with the need for media literacy in Islamic education, ensuring that students critically evaluate online religious content rather than accepting it blindly without verifying its authenticity. By integrating digital literacy with Islamic values, educators can equip students with the necessary skills to distinguish valid and credible sources of Islamic teachings, thereby fostering a more responsible and well-informed generation of Muslims. A major advantage of Islamic education in the digital era is its expanded global accessibility, allowing individuals from different regions to access high quality Islamic learning resources through digital technology (Huda & Dewantara, 2024).

Opportunities in Islamic Education 4.0

Increased Global Accessibility

Technological advancements have expanded opportunities for students from various regions, including remote areas, to access high-quality Islamic education. E-learning platforms and mobile applications broaden learning opportunities, making Islamic education more inclusive. As Mahmud, Haris, and Hilmy state, In the era of Islamic Education 4.0, technological advancements provide significant opportunities for innovation in teaching and learning. Digital learning refers to an educational process conducted over a computer network, typically through the internet or an intranet (Mahmud et al., 2023). This highlights how digital technology plays a role in expanding access to Islamic education beyond traditional classroom settings.

As (Alzahrani, 2025) affirms, ICT including augmented reality have significant potential to enhance teaching and learning processes, especially in science education, reinforcing the transformative role of digital tools in enriching content delivery, engagement, and conceptual understanding within Islamic educational contexts.

Innovation in Learning Methods

The integration of Artificial Intelligence (AI), Virtual Reality (VR), and Augmented Reality (AR) in Islamic education enhances student engagement. Digital storytelling and interactive multimedia make Islamic teachings more engaging and easier to understand. According to Adnan, Islamic education plays an important role in the Industrial Revolution 4.0 era by enhancing students' potential not only in mastering science and technology, but

also in shaping their character, attitudes, and religious values (Adnan, 2022). This demonstrates how technology can be used to improve both cognitive and ethical aspects of Islamic education.

In addition, recent studies highlight the importance of visual tools in helping learners process and retain complex information. As Su and Zou emphasize, “The visualization of reading materials onto concept maps facilitates learners in processing textual information by stimulating meta-cognitive awareness in retrieval and memorization” (Su & Zou, 2024). This supports the idea that digital technologies not only increase engagement but also strengthen students’ comprehension and long-term retention of religious and moral content.

Strengthening Digital Literacy Based on Islamic Value

Islamic education can guide students in using technology ethically and responsibly. Strong digital literacy helps students filter credible religious information and prevent misinformation or digital extremism. Akrim highlights that, The implementation of Islamic Education 4.0 presents both challenges and opportunities, requiring schools to adapt to digital transformation while addressing issues such as infrastructure readiness, teacher competence, and cultural considerations. This study highlights several challenges, including the need for Islamic education to integrate religious teachings with scientific principles while preserving the process of knowledge Islamization (Akrim, 2022). This emphasizes the need for a well-structured digital literacy approach in Islamic education to ensure that students access digital spaces while upholding Islamic values

Critical Reflections: The Ethical and Pedagogical Implications of Digital Transformation

The integration of artificial intelligence (AI) and generative artificial intelligence (GenAI) in education is not merely a technical development, but a significant revolution in the educational aspect. Although the technology offers substantial pedagogical benefits, such as creating a more flexible and adaptive learning environment, it also raises fundamental concerns about academic integrity, critical thinking skills, and the diminishing of teacher-centered learning environments. (Nikolic et al., 2024), state that there is a clear contradiction in the digital transition process in education, where various concerns shape a social environment that simultaneously encourages and hinders the implementation of technology, depending on diverse views based on varied perceptions from peers, institutions, and external opinions. Although technologies such as AI, GenAI, and other digital trends offer many benefits, in reality, concerns still exist that make some individuals hesitant to fully accept these technologies.

This statement reflects a concern in the field of education that the implementation of digital technology can sometimes exceed regulatory boundaries and deviate from ethical and pedagogical principles. Therefore, such careful consideration is essential to ensure that technological advancement does not overlook core educational values such as moral responsibility, intellectual honesty, and character development. The dual challenge of balancing traditional Islamic values with the requirements of modern education (Zahraini et al., 2025). In the context of Islamic education, this consideration becomes even more important. The ethical use of digital technology must be grounded in the principles of *adab*

(propriety), *amanah* (trustworthiness), and *hikmah* (wisdom), emphasizing that technology should serve the learner's holistic development, spiritually, morally, and intellectually.

responsibility are crucial aspects of education, as technology is merely a tool, and what matters more is the ability to use it wisely and ethically. As Sen (1992) emphasized and as cited by Aldossari (2020), "having the freedom and capability to do something imposes the duty to consider whether to do it or not, which involves individual responsibility" (Aldossari, 2020). This emphasizes that having access to digital tools alone is not enough, as careful moral consideration is required to ensure that every decision aligns with the values of Islamic teachings. As (Mustofa et al., 2025) further observe, students who perceive AI as being used ethically exhibit a more positive attitude toward it, highlighting the integral role of ethics in shaping responsible and meaningful engagement with AI in educational contexts.

Comparative Analysis of Islamic Education 4.0: Indonesia, Malaysia, and Saudi Arabia

Indonesia: Infrastructure Challenges and Digital Literacy

Indonesia's Islamic education system faces significant challenges in the transition toward the Education 4.0 era, particularly concerning digital infrastructure and equitable access to learning technologies. Although various government initiatives, such as the digital madrasah program, have been launched, many madrasahs—especially those in rural and underdeveloped areas—still experience limited internet access and inadequate digital equipment. This imbalance in infrastructure creates gaps in education and hinders the effective integration of digital learning. In Indonesia, the Madrasah Digital program, initiated by the Ministry of Religious Affairs in 2019, aims to accelerate the adoption of technology in 24,000 madrasahs; however, its implementation still faces challenges related to infrastructure and human resource capacity (Dwiayama & Wirayama, 2025). This situation reflects a broader issue, as explained by Akrim, The quality of Islamic education in Indonesia, particularly in madrasahs and pesantrens, is still far from expectations and requires significant improvements to remain competitive globally (Akrim, 2022).

Moreover, the use of e-learning is still relatively new and remains inconsistent due to uneven internet access and limited school budgets. Many educational institutions still lack the necessary technology or platforms, making it difficult to maintain innovation consistently. As stated in Aminullah's research, one of the challenges in the system e-learning is the limited funds needed for its implementation, as well as the policy of school leaders in allocating budgets for the development of learning media (Aminullah 2021). These factors underline the need for stronger policy support, infrastructure development, and budget reform to ensure that Islamic Education 4.0 can be realized equitably across all regions of Indonesia.

As noted by Taufik, The use of internet technology has become an important part of various aspects of life, including in education. The Industrial Revolution 4.0 presents significant challenges for the young generation of Indonesia. In this era of smart technology, theoretical and practical knowledge alone is no longer sufficient to ensure their ability to adapt and grow (Taufik, 2020). This statement indicates that the digital divide must be urgently addressed so that Islamic education can adapt optimally to the dynamics and changes of the 4.0 industrial era.

Malaysia: Student-Centered Learning and Authentic Assessment

Malaysia has made significant progress in integrating the principles of Education 4.0 into its Islamic education system through a student-centered learning approach and authentic assessment methods. The curriculum in Malaysia places balanced emphasis on both theoretical knowledge and the practical application of Islamic values, using interactive strategies such as direct worship simulations. One of the main elements of Malaysia's assessment strategy is the PAFA program (Assessment of the Principles of Fardhu Ain), which aims to evaluate students' religious competencies through various activities, combining both direct and indirect observation methods. As described by Munastiwi and Marfuah, "The PAFA Exam (Assessment of the Principles of Fardhu Ain) is performed indirectly by assessing and evaluating students through several activities" (Munastiwi & Marfuah, 2019). This performance-based evaluation aligns closely with the spirit of Education 4.0, which promotes experiential learning, critical thinking, and values-based development.

Mughal and Ibrahim state that, An inclusive and comprehensive approach to academic pedagogy is essential, involving the application of modern methods and skills to equip students for the demands of the evolving times (Mughal & Ibrahim, 2021). Malaysia's Islamic education model offers a progressive and adaptable framework for modern Islamic education that can serve as a benchmark for other Muslim-majority countries. This inclusive approach is also built upon the surrounding social and cultural dynamics. As noted by Mas'ud, Fuad and Zini, The majority of highly aware Malaysian Muslim community have come to conclusion that Islam should be learned and practiced in every step of the way (Mas'ud et al., 2019). This social pressure significantly influences the formation of national education policies and strengthens the implementation of Islamic values across various learning domains.

Furthermore, Malaysia's strategy also focuses on equitable digital access. As noted by Mad Nordin, Alias, and Mahamod, Several initiatives involving the Malaysia Family Digital Economy Center (PEDi), the National Digital Network Plan (JENDELA), CERDIK, the BSN MyRinggit-I COMSIS financing scheme, and PerantiSiswa have been introduced (Nordin et al., 2023). These programs reflect a comprehensive national effort to close the digital divide and support underserved students, particularly in low-income communities. By integrating digital infrastructure with the goals of Islamic education, Malaysia exemplifies a unified model that can be adapted by other Muslim countries in advancing Islamic Education 4.0. As noted by (Azman et al., 2024), The use of digital technology can optimize student learning and make it easier for teachers to manage digital resources and activities.

Islamic Education teachers are currently facing the dynamic development of technology, particularly in the technology-based digital world. They must be able to adapt to the advancement of digital technology and the era of the Industrial Revolution 4.0. (Osman et al., 2020).

Saudi Arabia: Digitalisasi of Saudi Arabia

The educational reform in Saudi Arabia under Vision 2030 prioritizes digital innovation and international competitiveness as main priorities across various sectors, including Islamic education. As noted by Kurniawan and Ghany (2023), "Vision 2030 is the foundation of the

country's development policy in introducing technology to various sectors (Kurniawan & Ghany, 2023).

The Saudi Arabia government has tried to update the curriculum by including science, technology, engineering, and mathematics (STEM) subjects as part of its 2030 vision, but balancing education with traditional Islamic values still presents challenges. The curriculum is very centered on the study of the Islamic religion. One of the characteristics of the education system in Saudi Arabia is that male and female students are separated according to Islamic sharia and the dominance of religious learning in the curriculum there (Khotimah et al., 2025).

Saudi Arabia recognizes that education is the answer for all to confront the advancement of this world, and life skills are needed. If the previous policy approach was more towards teaching staff (lecturers/teachers) by hiring (hiring) teaching staff from abroad, currently the policy of Prince Muhammad bin Salman is more towards reforming institutions/institutions and the education system (Zakki & Mahfud, 2023). Additionally, the Kingdom has made considerable progress in integrating artificial intelligence (AI) into its education sector. As noted by Al Saiari et al. (2025), The education sector in Saudi Arabia has undergone Significant advancements through the adoption of AI technologies. These developments include the creation of AI-based curricula and the establishment of specialized research centers in Saudi universities (Musaed et al., 2025).

This demonstrates the government's strategic intent to elevate educational quality and innovation while aligning with national development goals under Vision 2030. Additionally, in the context of modernizing both educational and religious sectors, it is emphasized that, "Vision 2030 affords the Holy Mosque and the Prophet's Mosque a special place, as the Kingdom derives its place as the Arab and Islamic heart from them" (Alammash et al., 2021).

The government has made efforts to address this issue by strengthening cybersecurity through a robust IT infrastructure, along with socialization programs through national online learning centers aimed at protecting users by providing digital literacy as part of VISION 2030 (Benaïda et al., 2025). Emphasized by the statement that, "SV2030 makes an investment in human resources so that the Saudi citizens will take the lead in the vision, take full self-dependence and enjoy the fruits of their own efforts" (Al-Mwzaiji & Muhammad, 2023). Saudi Arabia's experience shows a strong commitment to combining technological innovation with Islamic identity, offering valuable insights for countries like Indonesia that are still navigating the early phases of digital transformation in religious education. This paves the way for comparative reflection on how different national strategies respond to the goals of Islamic Education 4.0.

The comparative analysis of national strategies in addressing the challenges and opportunities of Islamic Education 4.0 reveals that there is no one-size-fits-all approach. Indonesia continues to face limitations in infrastructure and budget, while Malaysia has made notable progress in fostering an inclusive digital learning ecosystem. Meanwhile, Saudi Arabia has taken progressive steps by incorporating technology and artificial intelligence into its educational vision, although it still grapples with maintaining a balance between modern innovation and traditional Islamic values. These differences highlight the importance of

developing context-specific digital strategies that align with local values, technological readiness, and resource capacity in each country, see table 1.

Table 1. Comparative Overview of Islamic Education 4.0 Implementation.

| Aspect | Description |
|-----------------------------|---|
| Infrastructure Challenges | Indonesia: Limited internet access and digital equipment, especially in rural and underdeveloped areas (Akrim, 2022). Implementation of the Madrasah Digital program faces infrastructure and human resource capacity issues. Malaysia: Malaysia has comprehensive national programs like PEDi, JENDELA, CERDIK, BSN MyRinggit-I COMSIS to close the digital divide. Saudi Arabia: Strong IT infrastructure and cybersecurity efforts as part of Vision 2030; national eLearning centers increase digital literacy |
| Digital Literacy and Access | <ul style="list-style-type: none"> Indonesia: Unequal internet access distribution and financial constraints hinder e-learning development. Malaysia: Focus on equitable digital access for rural and low-income students; digital technology improves learning and teacher management Saudi Arabia: Emphasis on digital literacy campaigns and investment in human resources to lead Vision 2030. |
| Learning & Pedagogy | <ul style="list-style-type: none"> Indonesia: E-learning is still emerging and inconsistent due to infrastructure and budget issues. Malaysia: Student-centered learning with interactive strategies like Round Robin and religious simulations; PAFA assesses religious competencies through direct observation. Saudi Arabia: Curriculum focused on Islamic religion with gender segregation according to Sharia; STEM subjects introduced under Vision 2030. |
| Technology Integration | <ul style="list-style-type: none"> Indonesia: Digital adoption is hindered by limited resources and funding. Malaysia: Integration of digital technologies to support learning and classroom management. Saudi Arabia: Advanced AI adoption in the education sector including AI-based curricula and research centers. |
| Policy and Reform | <ul style="list-style-type: none"> Indonesia: Needs stronger policy support, infrastructure development, and budget reform to ensure equitable implementation. Malaysia: The Digital Education Policy is a government initiative to produce a digitally fluent generation and to bridge the digital divide. Saudi Arabia: Institutional and educational system reforms prioritized by the government under Vision 2030; shift from hiring foreign staff to institutional reform. |
| Social and Cultural Context | <ul style="list-style-type: none"> Indonesia: Many Islamic schools, particularly in rural and underdeveloped regions, continue to suffer from limited internet access and inadequate digital equipment. Malaysia: Significant progress in student-centered learning and authentic assessment (e.g., PAFA program); a highly conscious Muslim community supports the integration of Islamic values in education; multiple government initiatives (PEDi, JENDELA, CERDIK, PerantiSiswa) aim to close the digital divide and support underserved students; Islamic Education teachers actively adapt to evolving Web 2.0 and Education 4.0 technologies to foster innovation and creativity in teaching. Saudi Arabia: Strong Islamic identity with gender-segregated education; Vision 2030 links modernization with the Kingdom's Islamic heritage. |

Proposed Strategic Framework for Islamic Education 4.0 in Indonesia

Building upon the comparative analysis and the key insights drawn from the implementation of Islamic Education 4.0 in Indonesia, Malaysia, and Saudi Arabia, this section introduces a strategic framework tailored to Indonesia's unique context. The proposed framework synthesizes

Indonesia's challenges in digital infrastructure with Malaysia's inclusive access strategies and Saudi Arabia's ambitious technological reforms. It aims to offer a roadmap for the development of a spiritually grounded and technologically empowered Islamic education system in Indonesia. This section proposes a three-tiered strategic framework to guide the development of Islamic Education 4.0 in Indonesia.

The framework builds on ethical values, digital integration, and institutional readiness derived from cross-national insights. As illustrated in Figure 1, the phases include: 1) Foundational Phase: Emphasizing the integration of *maqasid al-shari'ah* principles (*hifz al-din*, *hifz al-'aql*) into digital literacy to ensure ethical engagement with online content; 2) Pedagogical Transformation Phase: Encouraging the adoption of blended and project-based learning through tools like Google Classroom and Moodle, and implementing performance-based assessment inspired by Malaysia's PAFA; 3) Systemic and Institutional Integration Phase: Recommending national-level reforms involving infrastructure improvement, teacher training, and inter-ministerial collaboration to support a sustainable Islamic digital education ecosystem. This framework aims to balance technological innovation with the preservation of Islamic pedagogical identity, contributing to a spiritually grounded and digitally adaptive education model.

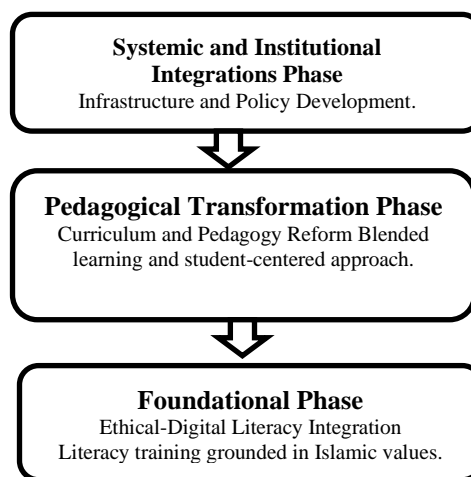


Figure 1. Strategic Framework For Implementing Islamic Education 4.0 in Indonesia

This proposed framework serves not only to address technological and infrastructural gaps but also to ensure that the integration of digital tools in Islamic education remains rooted in the development of moral and spiritual values. It emphasizes that digital learning must support the cultivation of akhlaq, critical moral reasoning, and social empathy elements essential to nurturing a socially conscious generation. By embedding these values into curriculum design and pedagogical innovation, the framework aims to transform Islamic education into a holistic system that prepares learners to engage ethically in both digital and real-world communities.

These three phases also carry direct implications for practice: at the school level, Islamic education institutions must adopt value-based digital literacy and flexible pedagogical strategies; for teacher training, professional development programs should equip educators with ethical and technological competencies; and for national education policy, inter-ministerial coordination is needed to ensure that infrastructure, regulation, and curriculum reform are aligned to support a morally grounded digital Islamic education system.

Conclusion

This study highlights the diverse approaches taken by Indonesia, Malaysia, and Saudi Arabia in implementing Islamic Education 4.0, revealing both challenges and opportunities across different contexts. Indonesia continues to grapple with structural limitations such as insufficient infrastructure, digital literacy gaps, and uneven internet access, particularly in rural areas. Malaysia demonstrates a successful integration of modern pedagogical strategies, exemplified by student-centered learning and authentic assessments like PAFA. Meanwhile, Saudi Arabia has advanced significantly in digital innovation and artificial intelligence, though it still faces the tension between modernization and preserving traditional Islamic educational values.

The uniqueness of this study lies in its cross-national comparative lens, which offers a fresh perspective on how Islamic education systems respond to the demands of Education 4.0. Unlike previous studies that focus on single-country experiences, this research provides a synthesized analysis that bridges theory and practice across three major Muslim-majority nations. These insights can inform policymakers and educators especially in Indonesia in crafting more inclusive, future-oriented Islamic education strategies that harmonize spiritual values with technological advancement. For future research, field-based studies or mixed-method approaches are recommended to validate the conceptual findings and explore implementation models in specific institutional contexts. Addressing these empirical dimensions will further enrich the discourse on Islamic Education 4.0 and enhance its practical applicability in diverse educational landscapes.

Ultimately, Islamic Education 4.0 must transcend mere technological adaptation to fulfill a deeper educational mission: cultivating a generation that is digitally skilled, morally upright, socially aware, and spiritually grounded. To achieve this, policymakers and educators must prioritize practical actions such as comprehensive teacher training in digital pedagogy, curriculum reform that embeds ethical and Islamic digital literacy, and equitable development of technological infrastructure across all regions. By integrating these strategies, Islamic education can guide digital transformation with wisdom and integrity—nurturing learners who navigate the digital age with *iman* (faith), *akhlak* (moral, character), and a strong sense of social responsibility.

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