



ISLAM'S CONTRIBUTION TO THE DEVELOPMENT OF ISLAMIC EDUCATION IN THE ERA OF INDUSTRY 4.0

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Abstract:

The Industry 4.0 era has brought fundamental changes to various aspects of life, including Islamic education. This article aims to analyze Islam's contribution to this digital era through three main dimensions: philosophical, historical, and practical, and its implications for the development of Islamic education. The study used a Systematic Literature Review (SLR) approach to scientific publications from 2020–2025. The results show that Islam plays a strategic role as a moral, epistemological, and applicative foundation capable of balancing technological progress with spiritual values. In the philosophical dimension, Islam provides an ethical foundation and the value of monotheism to ensure technology is used humanely and brings benefits to all humanity. In the historical dimension, Islamic education demonstrates high adaptability to changing times. In the practical dimension, Islamic educational institutions have begun implementing innovations such as blended learning, digital literacy, and artificial intelligence (AI). Thus, Islam contributes to shaping character-based, competitive, and spiritually oriented education in the Industry 4.0 era.

Keywords: *Islamic Contribution, Islamic Education, Industrial Era 4.0, Digital Era.*

INTRODUCTION

Technological developments in the Industry 4.0 era have had a significant impact on various aspects of life. This era is also known as the digital era, marked by the widespread use of digital technology in all aspects of life, including education. Hirzulloh & Annadhif (2024) explain that the Industrial Revolution 4.0 is an era of major transformation marked by the integration of digital technology, the Internet of Things (IoT), artificial intelligence (AI), and big data into various aspects of life. These changes impact people's mindsets, work practices, and learning styles.

In the context of education, particularly Islamic education, this era demands adjustments to learning strategies that are relevant to societal needs, adaptive to technology, and remain value-oriented. According to Irfan Ismail and Hasan Marwiji (2023), internalizing sociocultural values within the Islamic Education curriculum is crucial for integrating technology and modernity without diminishing moral, spiritual, and social awareness. This approach aligns with Islamic principles that balance the relationship between humans and God (*hablun minallah*) and the relationship between humans and others (*hablun minannas*) (Mualif et al., 2024). Thus, Islamic education has a strategic position in responding to the challenges of social transformation in the digital era, by providing a balance between mastery of technology and strengthening humanitarian and social values based on Islamic teachings.

From a historical perspective, Islam's contribution to scientific civilization has been evident since the Middle Ages. The emergence of scientific centers such as the House of Wisdom in Baghdad, the work of Muslim scholars such as Ibn Sina and Al-Farabi, and the Islamic boarding school tradition in Indonesia demonstrate that Islamic education is deeply rooted in the formation of both religious and critical character. This tradition is now a crucial asset in facing new challenges in modern education.

Entering the era of Industry 4.0, Islamic education is faced with the necessity of integrating digital technology into the learning process. The use of e-learning, digital libraries, and AI-based applications are forms of adaptation that accelerate access to knowledge. However, as Hirzulloh & Annadhif (2024) remind us, Islamic education must remain steadfast in the principles of monotheism and ethics to avoid losing its value orientation. Therefore, technology is merely a means, while its ultimate goal is to develop knowledgeable, faithful, and morally upright individuals capable of contributing to building an Islamic society that is adaptive to social and technological change.

Various studies support this view. Saiful (2023) emphasized the importance of digital literacy in an Islamic education system that maintains moral and ethical values. Research by Khojir et al. (2022) highlighted the importance of digital literacy for Islamic Religious Education teachers to ensure contextual learning. Furthermore, Muadin, Ilyasin, & Saleah (2023) demonstrated the innovation of Islamic boarding schools (pesantren) in utilizing digital technology while maintaining the traditional values and authenticity of Islamic education.

Although numerous studies have addressed the role of Islamic education in the digital era, there remains room for further research into how Islam's contribution as a philosophical, historical, and practical foundation can provide direction for the development of Islamic education that balances spirituality and technological advancement.

Based on this background, this article will discuss Islam's contribution to education in the Industry 4.0 era through a Systematic Literature Review (SLR) approach, highlighting three main dimensions: philosophical, historical, and practical, and their implications for the development of Islamic education.

RESEARCH METHODS

This article uses a Systematic Literature Review (SLR) approach with three main stages: identification, selection, and analysis. Data sources were obtained from national and international scientific publications (Google Scholar, Sinta, DOAJ, Scopus) from 2020–2025. This period was chosen because it represents the most representative period for the actual implementation of the Industrial Revolution 4.0, during which there was a surge in digital transformation in education (especially due to the pandemic and advances in AI), and is still relevant and up-to-date for a systematic analysis of the integration of Islamic values in digital education. Keywords used included contributions of Islam, Islamic education, the Industry 4.0 era, and the digital era.

The data were analyzed using thematic synthesis techniques to group the findings into three main themes: philosophical, historical, and practical contributions. A total of 30 articles were identified, and 20 of these were analyzed based on the relevance of the main theme to the topic of Islam's contribution to the development of Islamic education in the Industry 4.0 era. This approach allows for the identification of patterns of Islamic contributions and their

implications for the development of Islamic education in the digital era.

RESULTS AND DISCUSSION

Islam's Contribution to Islamic Education in the Industrial Revolution 4.0 Era

Islam's contribution to the development of Islamic education in the Industry 4.0 era can be seen through three mutually reinforcing dimensions: philosophical, historical, and practical. Within the philosophical dimension, various studies emphasize the importance of a foundation of values and morals as the basis for technology integration. Mukhamad Ilyasin and Akhmad Muadin (2024) developed the concept of character building based on religious traditions, which serves as the basis for technology implementation in the learning process. Fahrurrozi and Ichsan (2024) emphasized Muhammad Iqbal's view on the need for adaptive Islamic education that integrates morals with science. Sodik (2024) highlighted the use of artificial intelligence (AI), which demands ethical preparedness and multidisciplinary collaboration, while Nafsaka et al. (2023) highlighted Ibn Khaldun's thoughts on character education relevant in the modern era. The wasathiyyah approach studied by Maghfiroh and Nursikin (2024) also emphasized the importance of balance and moderation, so that technology remains a means, not an end. This principle not only shapes people who are knowledgeable, faithful, and have noble morals, but also encourages the formation of an Islamic society that is adaptive, digitally ethical, and civilized amidst the currents of modernization.

Historically, the long history of Islamic education demonstrates its strong adaptability to various social and political changes. Holilah (2022) and Anis (2020) highlight the role of madrasas and mosques as centers of knowledge during the classical period, including the decentralized educational system of the Umayyad Dynasty that strengthened scholarly networks. Selamat et al. (2023) and Zaeni (2024) describe the evolution of the Islamic education curriculum from independence to the reform era, while Ummah (2023) highlights the tradition of philanthropy that underpins the sustainability of educational institutions. The contributions of local figures such as Rivai Abdul Manap, described by Hasibuan (2020), and the Ulama Tiga Serangkai (Three Musketeers), studied by Ahmad (2021), demonstrate how Islamic education consistently finds ways to remain relevant and play a vital role in shaping society.

Practically, Islamic education is now introducing various innovations to meet the demands of the Industrial Revolution 4.0. Habibi et al. (2022) and Jamiilah (2023) emphasize the application of blended learning, which combines conventional and digital methods to improve learning effectiveness. Hadiati et al. (2024) highlight the importance of information literacy, while Setyaningsih et al. (2024) emphasize the role of Islamic education in strengthening moral values and resolving social problems. Institutions such as Ma'arif Nahdlatul Ulama (Kholil et al., 2024) and madrasas (Purba & Naldo, 2024) provide concrete examples of the integration of Islamic values into general education, while Maghfiroh and Mas'ud (2023) and Dahuri and Wantini (2023) highlight curriculum updates and Islamic psychology approaches to shaping the character of the millennial generation.

Islam's contribution to Islamic education in the Industry 4.0 era can be summarized and visualized in the following diagram:



Figure 1. Islam's Contribution to Islamic Education in the Industrial Era 4.0

These three dimensions emphasize that Islamic education has a strong bargaining power to balance technological advancement with the strengthening of morals and spirituality. The philosophical dimension provides a solid foundation of values, the historical dimension provides evidence of continuous adaptation, while the practical dimension delivers tangible innovation in the realm of learning and institutions. With the combination of these three dimensions, Islamic education is strategically positioned to balance technological advancement with the strengthening of humanitarian and spiritual values. This confirms that Islam contributes to maintaining moral values, encouraging contextual learning, and maintaining competitiveness in the era of Industry 4.0.

Implications of Islam's Contribution to the Development of Islamic Education in the Industrial Revolution 4.0 Era

Referring to the previous discussion, Islam's contribution to the development of Islamic education in the Industry 4.0 era encompasses three main, complementary dimensions: philosophical, historical, and practical. Within the philosophical dimension, Islam provides a foundation of values and ethics for the use of technology so that digital progress is not merely oriented towards efficiency but also strengthens morality and human well-being. Within the historical dimension, Islamic education demonstrates its ability to adapt to changing times without losing its core values. Meanwhile, the practical dimension is evident in various relevant and characteristic innovations in Islamic education, such as the application of learning technology based on Islamic values. Through these three dimensions, Islamic education is able to survive amidst digital disruption and has the potential to become a model for future education that balances spirituality and technological advancement. By developing individuals with character and knowledge, Islamic education plays a role in realizing a civilized society in the digital age.

The following description will further discuss the implications of Islam's contribution through several aspects, including the development of education, institutions, functions, and the competence of teachers and students.

Development of Islamic Education

Through its philosophical dimension, Islam provides a clear foundation of values and direction for educational transformation in the digital age. Values such as monotheism, adab (ethics), and welfare (benefit) play a crucial role in ensuring that the use of technology remains aligned with humanitarian goals and the moral development of students. In practice, many Islamic educational institutions have

begun implementing these values through digital ethics-based curricula, learning that encourages self-reflection, and strengthening digital-based moral literacy, namely the ability to use technology wisely and ethically.

Research by Syafaruddin (2024) explains that the use of technology in Islamic education is not limited to a learning tool, but also serves as a means to enrich students' spiritual experiences and critical thinking. This is reinforced by the findings of Djazilan et al. (2024), which show that artificial intelligence (AI) has been used in several madrasas (Islamic schools) to adapt the learning process to each student's needs while maintaining the teacher's role as a moral guide. Thus, technology in Islamic education is not seen as a threat, but rather as a strategic tool to strengthen Islamic values, morals, and humanity in the learning process.

This is a direct implication of the contribution of Islamic values to the development of education in the digital era, where the principles of monotheism, morality, and welfare provide direction for the transformation of ethical and humanistic learning.

Islamic Education Institute

Historically, Islamic institutions such as Islamic boarding schools (pesantren) and madrasahs (Islamic schools) have demonstrated a capacity for adaptation to social, political, and technological changes. This pattern of adaptation is now reflected in efforts to modernize institutional infrastructure, such as the development of digital management systems, online libraries, and artificial intelligence (AI)-based Learning Management Systems, while simultaneously maintaining the integrity of Islamic values. The integration of Islamic values and technology has been the focus of various studies on the application of AI in Islamic education, including analyses of its ethical and technical challenges (Hakim & Anggraini, 2023; Mukarom et al., n.d.).

At the institutional level, Islamic educational institutions are also positioned as centers of digital governance, serving to bridge the gap between technological needs, moral values, and institutional sustainability.

Objects of Islamic Education Work

The object of Islamic education encompasses students, teachers, curriculum, and the learning environment, which has now expanded into the digital space. This transformation broadens the focus of Islamic education to include aspects of Islamic digital literacy, media ethics, and the relationship between humans and technology as part of the learning experience. This change demands a shift in the role of teachers from traditional instructors to digital mentors (digital murabbi) who assist students in using technology reflectively and based on Islamic values.

Research by Abas (2025) shows that integrating digital technology into Islamic Religious Education (PAI) learning through contextual learning resources can expand access, increase interactivity, and strengthen local relevance while maintaining Islamic principles. Therefore, the object of Islamic education in the digital era is not only oriented towards teaching content, but also towards developing ethical awareness and spiritual literacy in digital interactions. This development of ethical awareness and spiritual literacy will be evident in improved abilities to sort information, avoid hate speech, and use digital media responsibly.

The Function of Islamic Education in the Current of Modernization

In the context of modernization and technological development, the function of Islamic education has evolved from mere adaptation to a reflective

and evaluative role in responding to digital social change. Islamic education serves as a filter for social and moral values, guiding the use of technology so that it remains pro-human. With Islam's position as a critical ethical framework for technological advancement, educational institutions play a role in maintaining the continuity of Muslim society's moral values amidst the expansion of digitalization.

The study "Islam, Big Data, and Digital Ethics" by Saputra & Asbi (2025) revealed that the use of artificial intelligence and big data can impact individuals' spirituality and faith, necessitating Islamic value guidance in responding to the dynamics of algorithmic and data-driven learning. From the perspective of Islamic AI ethics, according to Elmahjub (2023), the principles of justice, transparency, and algorithmic responsibility serve as conceptual foundations for ensuring that technology operates within Islamic values. Thus, the function of Islamic education in the Industry 4.0 era expands into an arena for fostering digital ethical awareness and strengthening moral values within learning systems and technology governance.

Islamic Religious Education Teacher Competencies (GPAI)

The transformation of Islamic Religious Education (GPAI) teacher competencies in the Industry 4.0 era demonstrates a shift from a predominance of content mastery to strengthening digital competencies, adaptive pedagogy, and Islamic ethics in the use of technology. Numerous studies indicate that the application of artificial intelligence in learning, such as systems for personalized materials, content adaptation, and learning achievement analysis, can increase the effectiveness of the teaching process and broaden students' learning experiences (Ali et al., 2025).

The study Artificial Intelligence in Teaching Islamic Studies demonstrates that AI has significant potential to accelerate students' academic development and support data-driven teaching practices, despite challenges related to privacy, algorithmic bias, and ethical implications. In this context, international literature on Islamic-based AI ethical frameworks, such as the concept of trusteeship ethics, can serve as a conceptual reference for Islamic Religious Education (PAI) teacher professionalism in the increasingly digitalized education ecosystem. Thus, Islamic Religious Education (PAI) teacher competencies in the Industry 4.0 era are no longer limited to traditional pedagogical domains but extend to reflective skills in managing the interaction between Islamic values and digital technology (Hakim & Anggraini, 2023).

Student Competencies

For Muslim students in the Industry 4.0 era, the development of artificial intelligence (AI) and digital technology presents new needs for Islamic digital literacy, critical thinking skills regarding algorithms, and ethical awareness based on monotheism. These changes demonstrate that technological mastery is inseparable from character building and moral responsibility.

The paper, "Impact of Artificial Intelligence on Islamic Education," (Salim & Rajabiyah, 2025), shows that the application of AI has a moderate but significant impact on learning effectiveness, pedagogical innovation, and sociocultural dynamics, including adaptation to local values and culture in the context of Islamic education. These findings emphasize that student engagement in digital environments needs to be directed toward reflective and ethical use of technology, where AI is positioned not simply as a learning tool but as part of the process of developing digital moral and spiritual intelligence.

By developing digital competencies grounded in Islamic values, students

develop into individuals with character who actively participate as agents of social change. The social implications of Islam's contribution will be evident in the emergence of a generation of Muslims who are adept at utilizing technology while possessing ethical awareness and social responsibility in managing digital advancements for the common good.

Thus, overall, the implications of Islam for Islamic education in the Industry 4.0 era demonstrate that Islam, as a value system and historical heritage, plays a strategic role in maintaining the balance between technological advancement and the steadfastness of human values. The transformation of Islamic education today demonstrates a shift in orientation from mere technology adoption to a reconstruction of values that synergistically integrates curricula, institutions, educators, and students, integrating modernity and spirituality. This synthesis confirms that a value- and technology-based Islamic education model has the conceptual potential to become an alternative paradigm in responding to the dynamics of digital globalization.

CONCLUSION

Based on the results of this study, it can be concluded that Islam has made a significant contribution to the direction of Islamic education development in the era of the Industrial Revolution 4.0. This contribution encompasses three main aspects: philosophical, historical, and practical. In the philosophical dimension, Islam provides direction on values, ethics, and humanitarian principles in interpreting technology, so that digital transformation in education is inseparable from moral and spiritual orientation. In the historical dimension, Islamic education demonstrates continuity and high adaptability to social, political, and technological changes, as seen in the evolution of Islamic boarding schools (*pesantren*), *madrasas* (*madrasas*), and religious institutions that have successfully maintained their value identity amidst modernization. Meanwhile, in the practical dimension, various innovations such as blended learning, the use of artificial intelligence (AI), and Islamic digital literacy demonstrate that Islamic education is capable of presenting relevant, reflective, and character-based learning models. These three dimensions emphasize that Islam plays a balancing force between technological progress and the strengthening of humanitarian values and spirituality.

Several development directions can be taken to strengthen Islamic education in the Industry 4.0 era. Educational institutions need to strengthen digital governance based on Islamic values to align with the Islamic vision. Islamic Religious Education (PAI) teachers need to improve digital competency and reflective pedagogy that integrates technology with Islamic ethics. Students need to be equipped with Islamic digital literacy and digital moral intelligence to enable ethical interactions in cyberspace. Meanwhile, researchers and policymakers need to develop Islamic AI-based learning models and ethical and sustainable digital curricula.

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