



Generative AI and the Development of Adaptive Islamic Education Teaching Materials for 21st Century Learning

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Abstract:

The rapid development of Generative Artificial Intelligence (Generative AI) has created new opportunities for developing more adaptive and personalized teaching materials in 21st-century learning. In the context of Islamic Religious Education (IRE), this technology is essential for addressing diverse student needs while fostering critical thinking, creativity, communication, collaboration, and digital literacy skills. This article aims to analyze the role of Generative AI in developing adaptive IRE teaching materials and its relevance to 21st-century learning. The study employed a qualitative approach using a library research method through the analysis of relevant academic journals, books, and scholarly documents. The findings indicate that Generative AI can support personalized learning content, multimodal instructional materials, and flexible assessment development tailored to students' characteristics. However, its implementation also presents challenges, including the risk of religious misinformation, technological dependency, academic plagiarism, and the weakening of spiritual and humanistic dimensions in learning. Therefore, teachers remain essential as facilitators, value validators, and pedagogical guides to ensure that AI utilization remains aligned with Islamic values and educational objectives

Keywords: *Generative AI, Adaptive Teaching Materials, Islamic Religious Education, 21st-Century Learning, Artificial Intelligence*

INTRODUCTION

The rapid development of Artificial Intelligence (AI) over the last decade has brought fundamental changes across various sectors of society, including education.¹ One of the most prominent forms of AI today is Generative AI (GenAI), a technology capable of producing new content such as text, images, audio, and video by learning patterns from large-scale training data.² The emergence of GenAI has opened new possibilities in education, particularly in creating learning experiences that are more personalized, adaptive, and interactive.

In the context of twenty-first-century education, the competencies expected of students have become increasingly complex. Critical thinking, creativity, collaboration, and communication commonly referred to as the 4Cs along with digital literacy, are now considered essential skills for contemporary learners.³ Amid these demands, Islamic Religious Education (IRE) faces a dual challenge: maintaining its relevance to technological and societal developments while preserving the authenticity of Islamic teachings and values.

The development of adaptive IRE teaching materials represents a strategic response to these challenges. Adaptive teaching materials are designed to accommodate students' diverse learning needs, preferences, and abilities.⁴ Through the integration of GenAI, the development of such materials no longer depends solely on human effort but can be enhanced through intelligent systems capable of generating, processing, and modifying content automatically and in real time.

Recent studies have highlighted the transformative potential of GenAI in education. Research published in *SAGE Open* by Shahzad et al. demonstrated that GenAI-based systems can improve student learning outcomes through adaptive learning pathways and immediate feedback mechanisms.⁵ Similarly, a study published in *Frontiers in Education* found that

¹ Richa Sucianingtyas et al., "Telaah Ragam Artificial Intelligence (AI) Dalam Pendidikan" 3 (February 2025): 232–243.

² Cao et al., "A Comprehensive Survey of AI-Generated Content (AIGC): A Survey of Generative AI in AIGC Era," *Journal of Data and Information Quality* 15, no. 2 (2023): 1–36; lihat juga: Pengyuan Liu et al., "Bringing Generative AI to Adaptive Learning in Education," arXiv preprint arXiv:2402.14601 (2024), <https://arxiv.org/abs/2402.14601>.

³ Hoeruman, Moh. R., Mudore, S. B., & Sari, A. N., "Pendidikan Agama Islam di Era Pembelajaran Abad 21," *Dialektika: Jurnal Pendidikan Agama Islam* 3, no. 2 (2025): 35–46, <https://doi.org/10.35905/dialektika.v3i2.12707>.

⁴ Eka Putra, "Penerapan Metode Adaptive Learning untuk Pengembangan Pembelajaran pada Mata Pelajaran Sains SD Berbasis Multimedia," *KILAT* 10, no. 1 (2021): 120–127, <https://doi.org/10.33322/kilat.v10i1.1156>.

⁵ Muhammad Farrukh Shahzad, Shuo Xu, Xin An, dan Muhammad Asif, "Are Generative AI Technologies Transforming Education for the 21st Century? Research Trends, Challenges, and Benefits," *SAGE Open* 15, no. 1 (2025), <https://doi.org/10.1177/21582440251368594>.

GenAI contributes to students' cognitive and metacognitive development while providing particular benefits for learners from diverse linguistic and cultural backgrounds.⁶

In the Indonesian context, several studies have explored the relevance of AI in Islamic education. Maulidiyah et al. found that AI technologies, particularly ChatGPT as a form of Generative AI, have the potential to enhance the effectiveness of IRE instruction through personalized learning materials and support for the development of twenty-first-century competencies such as critical thinking, creativity, and collaboration.⁷ Nevertheless, the integration of AI into Islamic education also raises ethical and theological concerns that require careful consideration by Muslim educators.

Although numerous studies have examined the application of Artificial Intelligence in education, research specifically addressing the integration of Generative AI in the development of adaptive Islamic Religious Education teaching materials remains limited. Most previous studies have focused primarily on AI as a general educational tool for personalized learning, content generation, or the enhancement of twenty-first-century skills,⁸ without thoroughly examining the pedagogical, ethical, and spiritual dimensions of IRE. Yet, Islamic Religious Education extends beyond cognitive learning outcomes, emphasizing character formation, the internalization of Islamic values, and the preservation of Islamic scholarly authority. Furthermore, little attention has been given to how Generative AI can be integrated into the development of adaptive and personalized IRE teaching materials while remaining grounded in Islamic principles within the framework of twenty-first-century learning. Addressing this gap, the present article offers a conceptual contribution by integrating perspectives from educational technology, adaptive learning, and Islamic education in developing a framework for Generative AI-based adaptive IRE teaching materials.

This article aims to analyze the role of Generative AI in the development of adaptive Islamic Religious Education teaching materials for twenty-first-century learning. It seeks to provide a conceptual contribution to the discourse on AI integration in Islamic education and to serve as a reference for educators in designing innovative, adaptive, and value-oriented IRE learning experiences that remain aligned with Islamic principles.

⁶ Frontiers in Education, "Generative AI Use and Self-Learning in Higher Education: The Role of Learning Difficulties," *Frontiers in Education* 10 (2025), <https://doi.org/10.3389/feduc.2025.1737928>.

⁷ Maulidiyah, N. R., Lutfiyah, & Cahyadi, A. "Artificial Intelligence dan Transformasi Pembelajaran Pendidikan Islam: Peluang, Tantangan Etika, dan Implikasinya," *Jurnal Pengabdian Masyarakat dan Riset Pendidikan* 4, no. 3 (2026): 17726–17735

⁸ Abd Rahman Saleh et al., "ChatGPT Sebagai Asisten Pengajar : Pemanfaatan Generative AI Untuk Efisiensi Pembuatan Materi Ajar Dan Soal Evaluasi," *Journal of Humanities, Social Sciences, And Education (JHUSE)* 1, no. 9 (2025): 25–36.

METHOD

This study employed a qualitative approach using a library research design that focused on examining the use of Generative AI in developing adaptive Islamic Religious Education (IRE) teaching materials to support twenty-first-century learning. The research primarily analyzed the opportunities, challenges, and relevance of AI integration in IRE learning while still considering students' pedagogical, moral, and spiritual dimensions. A library research approach was selected because the topic required conceptual exploration through various relevant and credible scholarly sources.⁹

The data sources in this study consisted of primary and secondary data. Primary data were obtained from international journals, indexed national journals, and academic books discussing Generative AI, adaptive teaching materials, twenty-first-century learning, and Islamic education. Meanwhile, secondary data were collected from research articles, conference proceedings, research reports, and relevant educational policy documents. The selection of sources also considered the aspect of recency by prioritizing references published within the last five years to ensure relevance to current developments in educational technology.

Data collection was conducted through documentation and literature study techniques by reading, recording, reviewing, and classifying various relevant scholarly sources..¹⁰ The collected data were then analyzed using content analysis to systematically identify patterns, concepts, and relationships among the information.¹¹ The analysis process involved stages of data condensation, categorization, interpretation, and conclusion drawing, resulting in a comprehensive study of the development of Generative AI-based adaptive IRE teaching materials in twenty-first-century learning.¹²

LITERATUR REVIEW

Generative AI is a branch of artificial intelligence capable of generating new content, including text, images, audio, and video, through the utilization of Large Language Models (LLMs) based on machine learning and deep learning technologies.¹³ In the educational sector, this technology has been increasingly employed to support personalized learning, instructional material

⁹ M Zed, *Metode Penelitian Kepustakaan* (Yayasan Obor Indonesia, 2025).

¹⁰ John W Creswell and J David Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 5th ed. (Los Angeles: SAGE Publications, 2018).

¹¹ K Krippendorff, *Content Analysis: An Introduction to Its Methodology*, Content Analysis: An Introduction to Its Methodology (Sage, 2004).

¹² M B Miles, A M Huberman, and J Saldana, *Qualitative Data Analysis* (SAGE Publications, 2014).

¹³ Yogesh K Dwivedi et al., "Opinion Paper: 'So What If ChatGPT Wrote It?' Multidisciplinary Perspectives on Opportunities, Challenges and Implications of Generative Conversational AI for Research, Practice and Policy," *International Journal of Information Management* 71 (2023): 102642.

development, and the provision of rapid and adaptive feedback to learners.¹⁴ The emergence of Generative AI demonstrates that digital transformation has not only altered learning media but has also reshaped how educators design more effective and flexible learning experiences. Within the context of Islamic Religious Education (IRE), this technology is increasingly regarded as an innovative tool that enables teachers to design learning experiences aligned with the needs of the digital generation while preserving Islamic values and principles. Nevertheless, the use of AI still requires human supervision, as these systems lack moral and spiritual consciousness and may therefore generate biased or inaccurate information.

The integration of Generative AI into education has facilitated various forms of adaptive and interactive learning practices. This technology can automatically generate learning modules, assessment items, instructional summaries, and multimodal learning resources.¹⁵ Furthermore, AI systems can adjust educational content according to students' abilities and learning needs, thereby creating more personalized learning experiences. In IRE instruction, Generative AI can be utilized to develop Islamic case studies, visualize Islamic history, and design problem-based learning activities that foster students' critical thinking skills. Consequently, the advancement of Generative AI has contributed to the emergence of adaptive teaching materials that are more flexible and responsive to students' diverse characteristics.

Adaptive teaching materials refer to learning resources that are dynamically designed according to students' needs, abilities, and characteristics.¹⁶ This concept originates from the differentiated learning approach, which places learners at the center of the educational process. In digital education, adaptive teaching materials are often developed through the integration of AI technologies and learning analytics, enabling automated personalization of learning experiences. Within IRE, adaptive teaching materials play an important role in accommodating differences in students' religious literacy levels, thereby making learning more inclusive, contextual, and meaningful. Therefore, the development of adaptive teaching materials is not merely oriented toward technological utilization but also toward creating learning experiences capable of addressing the demands of contemporary education.

The need for adaptive teaching materials is closely aligned with the paradigm of twenty-first-century learning, which emphasizes the development of critical thinking, creativity, communication, and collaboration as essential

¹⁴ Enkelejda Kasneci et al., "ChatGPT for Good? On Opportunities and Challenges of Large Language Models for Education," *Learning and Individual Differences* 103 (January 2023): 102274.

¹⁵ Ahmed Tlili et al., "What If the Devil Is My Guardian Angel: ChatGPT as a Case Study of Using Chatbots in Education," *Smart Learning Environments* 15 (February 2023): 1–24.

¹⁶ C A Tomlinson, *How to Differentiate Instruction in Academically Diverse Classrooms, Third Edition* (ASCD, 2017).

competencies for learners in the digital age.¹⁷ Twenty-first-century learning requires student-centered educational processes that are effectively integrated with digital technologies. In the context of IRE, this paradigm can be implemented through discussions of contemporary Islamic issues, project-based learning activities, and the utilization of AI technologies for both independent and collaborative exploration of learning materials.¹⁸ Accordingly, the integration of Generative AI in the development of adaptive teaching materials represents a significant transformation in IRE learning, making it more relevant to the needs of twenty-first-century digital learners while continuing to promote the cultivation of students' moral and spiritual values.

RESEARCH RESULTS

Generative AI in the Development of Adaptive Islamic Religious Education Teaching Materials

The rapid advancement of Generative Artificial Intelligence (Generative AI) has significantly transformed the paradigm of instructional material development in education.¹⁹ Its emergence has not only accelerated the production of learning resources but has also reshaped the way educators design learning experiences that are more flexible, personalized, and responsive to students' needs.²⁰ In contemporary education, Generative AI is understood as an artificial intelligence system capable of generating various forms of new content, including text, images, audio, video, and learning simulations through the utilization of machine learning techniques and Large Language Models (LLMs).²¹ These capabilities position Generative AI not merely as a technical support tool but as an integral component of pedagogical transformation in twenty-first-century learning.

In educational settings, this transformation is reflected in the shift from static instructional material development toward more dynamic and adaptive approaches.²² Traditionally, Islamic Religious Education (IRE) teaching materials have often been designed uniformly, with limited consideration for differences in students' academic abilities, learning preferences, and socio-

¹⁷ Partnership for 21st Century Learning, "Framework for 21st Century Learning," 2019.

¹⁸ M C Yarriswamy, "Integrating 21st Century Skills in Teacher Education: A Comprehensive Thematic Review on Pedagogical Innovation, Digital Competence, and Professional Development," *Asian Journal of Basic Science & Research* 07 (January 2025): 28–39.

¹⁹ Aras Bozkurt et al., "The Manifesto for Teaching and Learning in a Time of Generative AI: A Critical Collective Stance to Better Navigate the Future," *Open Praxis* (November 2024).

²⁰ Micheal Wilson, Edwin Frank, and Jane Owen, "Importance of Using Generative AI in Education: Dawn of a New Era" (December 2024).

²¹ M S Hasibuan, *Buku Gen AI*, 2025.

²² Rustam Ibrahim, "Pemanfaatan Artificial Intelligence Sebagai Model Pendukung E-Learning Dalam Pendidikan Islam Siswa," *Jurnal Budi Pekerti Agama Islam* 3, no. 6 (2025).

digital backgrounds.²³ As a result, IRE instruction has frequently been delivered in a textual manner that lacks contextual relevance to the needs of contemporary digital learners. However, twenty-first-century learning requires educational experiences that are personalized, interactive, and capable of fostering students' critical and reflective thinking skills.²⁴

From the perspective of adaptive learning theory, instruction should be designed according to learners' individual needs through differentiated content, instructional strategies, and assessment practices.²⁵ This approach places students at the center of the learning process, ensuring that educational content is no longer standardized and uniform.²⁶ It is within this context that Generative AI becomes highly relevant. AI technologies enable teachers to create diverse instructional materials rapidly and flexibly according to students' specific needs. Through AI-based systems, educators can develop learning summaries, differentiated assessment items, visual illustrations, contextual case studies, and interactive learning media within a relatively short period.²⁷ These capabilities demonstrate how Generative AI contributes to the development of instructional materials that are more personalized and responsive to learner diversity.

Within the context of Islamic Religious Education, the application of Generative AI presents a more complex dimension than in many other subject areas. IRE is concerned not only with the transmission of cognitive knowledge but also with the cultivation of morality, spirituality, and the internalization of Islamic values.²⁸ Consequently, the development of adaptive IRE teaching materials must consider not only technological effectiveness but also pedagogical and ethical dimensions. On the one hand, Generative AI offers significant opportunities for educators to present Islamic content in more engaging and contextualized ways.²⁹ Eachers can utilize AI to generate visualizations of Islamic history, case-based learning simulations, and reflective learning materials tailored to students' levels of understanding.³⁰

²³ Risma Sulistia Aini, Muslim Afandi, and Mhd.Subhan, "Model Gaya Belajar Dan Tipe-Tipe Individu Dalam Pembelajaran Pendidikan Agama Islam," *Al-Zayn : Jurnal Ilmu Sosial & Hukum* 3, no. 3 SE-Articles (June 2025): 1652–1658.

²⁴ Partnership for 21st Century Learning, "Framework for 21st Century Learning."

²⁵ Tomlinson, *How to Differentiate Instruction in Academically Diverse Classrooms, Third Edition*.

²⁶ Zanyar Ghafar, "The Teacher-Centered and the Student-Centered: A Comparison of Two Approaches," *International Journal of Arts and Humanities* 1 (August 2023): 18–23.

²⁷ Elsa Sabrina et al., "Peran Kecerdasan Buatan (AI) Dalam Meningkatkan Efektivitas Pembelajaran Di Era Digital," *QISTINA: Jurnal Multidisiplin Indonesia* 4 (December 2025): 2072–2078.

²⁸ Farida Jaya, "Konsep Dasar Dan Tujuan Pendidikan Dalam Islam: Ta'lim, Tarbiyah Dan Ta'dib," *Jurnal Tazkiya* IX, no. 1 (2020): 63–79.

²⁹ Hermanto et al., "Pemanfaatan Artificial Intelligence (Ai) Dalam Meningkatkan Kualitas Pembelajaran Di Lingkungan Sekolah Berbasis Digital," *Abdi Laksana : Jurnal Pengabdian Kepada Masyarakat* 5 (September 2024): 574–582.

³⁰ Okky Putra Barus, Pujiyanto Yugopuspito, and Jefri Junifer Pangaribuan, "Generative AI for Students : Inovasi Pembelajaran Digital Untuk Peningkatan Pemahaman Dan Manfaatnya Bagi Mahasiswa" 5, no. 2 (2025): 486–494.

Such applications make IRE learning more interactive and relevant to the realities of today's digital generation.

Nevertheless, the use of Generative AI in the development of IRE teaching materials should not be approached from a purely technocentric perspective. Despite its ability to generate content automatically, AI systems possess epistemological limitations because they operate based on data patterns rather than moral or spiritual consciousness.³¹ In some cases, AI may produce religious information that is biased, oversimplified, or inconsistent with authoritative Islamic sources. Therefore, the role of the teacher remains central in the development of AI-assisted IRE materials. Teachers serve not only as users of technology but also as value validators, pedagogical facilitators, and guardians of Islamic scholarly authority within the learning process.³²

From a pedagogical standpoint, the integration of Generative AI in IRE teaching material development signifies a shift from a knowledge-transmission model toward a more constructive and adaptive learning paradigm. Students are no longer positioned as passive recipients of information but rather as active learners who explore, analyze, and construct religious knowledge reflectively. From the perspective of Vygotsky's social constructivism, learning becomes more effective when learners receive appropriate scaffolding that corresponds to their developmental level and learning needs. Generative AI facilitates this process by providing personalized learning resources that can be adjusted according to individual students' abilities and progress.³³

In conclusion, the use of Generative AI in the development of adaptive Islamic Religious Education teaching materials represents not only a technological innovation but also a transformation of pedagogical paradigms in contemporary Islamic education. AI has the potential to become an important instrument for creating learning experiences that are more flexible, contextualized, and responsive to students' needs.³⁴ However, the effectiveness of its implementation ultimately depends on teachers' ability to integrate pedagogical, ethical, and spiritual considerations into the learning process. In this regard, Generative AI should be viewed not as a substitute for educators but as a pedagogical tool that supports the realization of more humanistic and adaptive Islamic education in the digital era.

³¹ Sucianingtyas et al., "Telaah Ragam Artificial Intelligence (AI) Dalam Pendidikan."

³² Fadhilah Rahmawati et al., *AI DAN PENDIDIKAN Adaptasi Guru Dan Siswa Dalam Pembelajaran Berbasis Kecerdasan Buatan*, 2025.

³³ Lev S Vygotsky, *Mind in Society: The Development of Higher Psychological Processes* (Harvard University Press, 1978).

³⁴ Hermanto et al., "PEMANFAATAN ARTIFICIAL INTELLIGENCE (AI) DALAM MENINGKATKAN KUALITAS PEMBELAJARAN DI LINGKUNGAN SEKOLAH BERBASIS DIGITAL."

1. Transformation of Islamic Religious Education Teaching Material Development through Generative AI

Aspect	Conventional Approach	Generative AI-Based Approach
Learning Model	Uniform and Text-Based	Adaptive and Personalized
Material Development	Manual and Time-Consuming	Automated and Flexible
Form of Teaching Materials	Predominantly Text-Based	Multimodal (text, visual, audio, and interactive content)
Student Role	Information Recipient	Active Learning Participant
Learning Assessment	General and Uniform	Differentiated and Tiered
Contextualization of Content	Limited	More Responsive to Students' Needs
Teacher's Role	Primary Source of Information	Value Validator, Facilitator, and Pedagogical Guide

Relevance of Generative AI to Twenty-First-Century Learning

The rapid development of Generative Artificial Intelligence (Generative AI) has brought significant changes to the field of education, particularly in supporting twenty-first-century learning, which emphasizes critical thinking, creativity, communication, collaboration, and digital literacy collectively known as the 4Cs. The emergence of Generative AI tools such as ChatGPT, Gemini, and other AI-powered platforms has enabled learning processes to become more adaptive, interactive, and personalized according to students' individual needs. In contemporary education, these technologies function not only as information retrieval tools but also as learning support systems that help students develop deeper understanding and greater autonomy in the learning process.

Twenty-first-century learning places students at the center of the educational process through a student-centered learning approach. Learners are expected to actively seek information, construct knowledge, and solve problems independently and creatively. In this regard, Generative AI is highly relevant because it provides rapid and extensive access to information. Through AI-based platforms such as ChatGPT, students can obtain explanations of learning materials, practice exercises, lesson summaries, and even simulated discussions that support their understanding of academic

concepts.³⁵ As a result, learning becomes more personalized, allowing students to adapt learning activities according to their abilities, preferences, and pace of learning.

Beyond facilitating content comprehension, Generative AI also contributes to the development of critical thinking and problem-solving skills. In twenty-first-century education, critical thinking is considered a fundamental competency that enables learners to analyze information objectively and make informed decisions. The use of AI can encourage students to explore ideas, compare information from multiple sources, and critically evaluate AI-generated responses.³⁶ Therefore, AI should not merely be viewed as a tool for obtaining immediate answers but rather as a medium for fostering analytical thinking when used appropriately and under proper guidance.

Furthermore, Generative AI plays an important role in enhancing students' creativity. Twenty-first-century learning requires learners to generate new ideas, create innovations, and employ creative approaches to problem-solving. AI technologies enable students to produce various forms of academic work, including presentation designs, articles, visual illustrations, and interactive learning media. The integration of AI into educational activities provides students with opportunities to express their ideas in more diverse and innovative ways. This demonstrates that AI can serve as a catalyst for creativity when utilized productively and within an educational framework.³⁷

The relevance of Generative AI to twenty-first-century learning is also evident in its contribution to the development of digital literacy. Digital literacy is an essential competency that enables individuals to use, understand, evaluate, and interact with digital technologies responsibly and effectively. The incorporation of AI into learning activities helps students become familiar with emerging technological developments while strengthening their ability to operate and critically assess digital tools. Through regular engagement with AI technologies in academic contexts, learners are better prepared to meet the demands of increasingly digital workplaces and social environments.³⁸

For educators, Generative AI offers numerous opportunities to design and enhance learning experiences. Teachers can utilize AI to develop instructional modules, generate assessment instruments, create interactive learning resources, and design more engaging and adaptive educational materials. The use of AI can reduce the time required for routine administrative tasks,

³⁵ Putu Zyra Aurelia Putri et al., "Literatur Review Konsep Dan Implementasi AI Serta Transformasi Digital Dalam Pembelajaran Abad 21," *Edukasi: Jurnal Pendidikan Dasar* 6, no. 3 (2025).

³⁶ U Usman et al., "Implikasi Kecerdasan Buatan (AI) Terhadap Keterampilan Pembelajaran Abad 21," *Jurnal Basicedu* 9, no. 4 (2025): 1042–1049.

³⁷ Fitri Amaliyah et al., "Kontribusi Artificial Intelligence Dalam Peningkatan Kemampuan Komunikasi, Presentasi, Dan Diskusi Siswa," *Jurnal Studi Guru dan Pembelajaran* 8, no. 2 (2025): 511–521.

³⁸ Putri et al., "Literatur Review Konsep Dan Implementasi AI Serta Transformasi Digital Dalam Pembelajaran Abad 21."

allowing educators to focus more on character development, competency enhancement, and the implementation of innovative pedagogical strategies.³⁹ Moreover, AI facilitates differentiated instruction by enabling teachers to tailor learning experiences according to students' diverse needs and characteristics.

Despite its considerable benefits, the implementation of Generative AI in education must be accompanied by a strong emphasis on character education and digital literacy. Educators have a responsibility to guide students in using AI technologies responsibly, critically, and ethically. AI should be positioned as a learning support tool rather than a substitute for teachers or for students' independent critical thinking abilities. When implemented appropriately, Generative AI can become a powerful educational innovation that supports effective, creative, collaborative, and relevant learning experiences aligned with the demands of the twenty-first century. Consequently, the integration of AI into education should be viewed as an opportunity to enhance educational quality while preparing learners to navigate future technological developments and societal challenges.⁴⁰

Challenges and Implications of the Use of Generative AI in Islamic Education

The rapid development of Artificial Intelligence (AI) in today's digital era has brought significant changes to various aspects of life, including the learning process in Islamic Education.⁴¹ The use of Generative Artificial Intelligence (Generative AI) in Islamic Education is like a double-edged sword that offers great opportunities while also presenting challenges that cannot be underestimated. When used wisely, this technology can make the learning process faster and more interactive. However, on the other hand, it also raises serious concerns.

One of the major challenges in the use of Generative Artificial Intelligence lies in the accuracy of knowledge and the authenticity of Islamic teachings. In the context of Islamic Education, the use of AI in searching for learning materials may lead to misinterpretations of Islamic sources. This can potentially result in misinformation regarding the principles of Islamic knowledge, including aspects of *dalil* (religious evidence), *aqidah* (creed), and *shari'ah* (Islamic law).⁴²

³⁹ Restu Rahayu, Sofyan Iskandar, and Yunus Abidin, "Inovasi Pembelajaran Abad 21 Dan Penerapannya Di Indonesia," *Jurnal Basicedu* 6, no. 2 (2022).

⁴⁰ Brezto Asagi Dewantara and Lazaro Kumala Dewi, "Generative AI Dalam Pembelajaran Mahasiswa: Antara Inovasi Pendidikan Dan Integritas Akademik," *JIP-Jurnal Ilmiah Ilmu Pendidikan* 8, no. 7 (2025): 8209–8217.

⁴¹ Aunur Shabur Maajid Amadi and Khizanatul Hikmah, "Persepsi Mahasiswa Tentang Pemanfaatan Teknologi AI Dalam Pembelajaran Bahasa Arab Di Perguruan Tinggi Islam Indonesia," *Journal of Education Research* 6, no. 2 (2025): 291–301.

⁴² Moh Mauluddin, "Kontribusi Artificial Intelligence (AI) Pada Studi Al Quran Di Era Digital; Peluang Dan Tantangan," *Madinah: Jurnal Studi Islam* 11, no. 1 (2024): 99–113.

Another challenge arising from the use of Generative Artificial Intelligence is that students may place greater trust in AI-generated answers, which are easily accessible, rather than consulting teachers, ustadz, or classical Islamic texts. This condition has the potential to weaken the sanad (chain of knowledge transmission) and the tradition of Islamic learning, which emphasize the continuity of scholarly transmission and the process of tabayyun (verification) in seeking knowledge.⁴³

Furthermore, another challenge concerns plagiarism and academic integrity. It is undeniable that AI's ability to generate answers quickly often becomes an attractive shortcut for completing assignments without engaging in deep thinking and reflection. As a result, the values of honesty, which should be an essential part of the educational process, may decline. Students may become more dependent on technology rather than developing analytical skills and independent understanding.⁴⁴

The massive use of Generative Artificial Intelligence may also create dependency, leading to a decline in learning motivation and critical thinking skills. The convenience of obtaining instant answers can cause learning to no longer be understood as an intellectual effort requiring perseverance and reflection, but merely as an activity of acquiring information practically and efficiently. Such dependency also contributes to the weakening of critical thinking because students tend to accept AI-generated responses without further examination or analysis.⁴⁵

Another impact that often goes unnoticed is the epistemological shift in the way people acquire and perceive the truth of religious knowledge. In the Islamic intellectual tradition, knowledge is not merely a collection of data, but something that carries blessings through a clear chain of transmission known as sanad. The emergence of AI creates a paradox of authority: on the one hand, it facilitates access to knowledge, but on the other hand, it risks disrupting the teacher-student relationship that has long served as a pillar in preserving the authenticity of Islamic teachings.⁴⁶

The widespread use of Generative Artificial Intelligence also has the potential to shift the spiritual, ethical, and transcendental values that form the essence of Islamic Education. In principle, Islamic Education does not merely

⁴³ Naila Rahmah Maulidiyah, Lutfiyah Lutfiyah, and Ani Cahyadi, "Artificial Intelligence Dan Transformasi Pembelajaran Pendidikan Islam: Peluang, Tantangan Etika, Dan Implikasinya: Penelitian," *Jurnal Pengabdian Masyarakat dan Riset Pendidikan* 4, no. 3 (2026): 17726–17735.

⁴⁴ Maulana Fathir Hidayat et al., "Plagiarisme Digital Mahasiswa PPKn Kelas 41 Sebagai Krisis Nilai Kemanusiaan Dalam Perspektif Pancasila Era AI," *Jurnal Multidisiplin Ilmu Akademik* 2, no. 6 (2025): 611–617.

⁴⁵ Ummu Hanifah and Novebri Novebri, "Ketergantungan Penggunaan Aplikasi AI Dalam Keefektifitasan Belajar Pada Mahasiswa Manajemen Pendidikan Islam," *Jurnal Manajemen dan Pendidikan Agama Islam* 3, no. 1 (2025): 265–273.

⁴⁶ Syaiful Hadi and Camila Fatah Suroyya, "Tantangan Dan Strategi Pendidikan Agama Islam Dalam Merespons Perkembangan Artificial Intelligence," *Pendas: Jurnal Ilmiah Pendidikan Dasar* 11, no. 02 (2026): 278–292.

emphasize cognitive aspects, but also the strengthening of morality, spirituality, and human relationships within the learning process. The excessive dominance of AI may reduce meaningful human interaction between teachers and students, thereby weakening educational relationships that are rich in role modeling, empathy, and moral development. Moreover, the massive use of Generative Artificial Intelligence may produce a generation that is technologically skilled yet lacking in empathy and spiritual awareness, as the learning process becomes increasingly dependent on automated systems rather than direct human interaction.⁴⁷

DISCUSSION/ANALYSIS

Generative AI in the Development of Adaptive Islamic Religious Education Teaching Materials

Research findings indicate that the use of Generative Artificial Intelligence (Generative AI) in the development of Islamic Religious Education (IRE) teaching materials has brought about significant changes to learning patterns in the digital age. This technology enables teachers to create teaching materials that are more flexible, personalized, interactive, and tailored to students' needs. Generative AI not only assists in the creation of text-based learning materials but is also capable of automatically generating multimodal learning media such as images, illustrations, audio, video, practice exercises, and even learning simulations. This capability makes the learning process more adaptive, as materials can be tailored to students' varying ability levels, learning styles, and characteristics. In the context of Islamic Education (PAI) learning, this is particularly important because, until now, PAI teaching materials have tended to be uniform, text-based, and more focused on knowledge transfer rather than the development of contextual and reflective learning experiences.

These findings align with Tomlinson's theory of adaptive learning, which posits that instruction should be designed based on students' needs, interests, and abilities through the differentiation of both instructional materials and strategies.⁴⁸ In this theory, students are positioned at the center of the learning process, requiring teachers to provide flexible learning experiences tailored to students' developmental levels. Additionally, Vygotsky's social constructivism theory emphasizes that the learning process is more effective when students receive scaffolding or learning support appropriate to their developmental level.⁴⁹ Generative AI can serve as a digital scaffolding tool because it can quickly provide personalized materials,

⁴⁷Muh Farhan, Nurdin Nurdin, and Mohammad Djamil M Nur, "Menggagas Pendidikan Islam Humanistik Di Era AI: Antara Modernisasi Dan Tradisi," *Prosiding Kajian Islam dan Integrasi Ilmu di Era Society (KIIIES)* 5.0 4, no. 1 (2025): 93–97.

⁴⁸ Carol A Tomlinson, *How to Differentiate Instruction in Academically Diverse Classrooms* (Ascd, 2017).

⁴⁹ Vygotsky, *Mind in Society: The Development of Higher Psychological Processes*.

exercises, and feedback tailored to students' needs. Thus, the integration of Generative AI in the development of PAI teaching materials strengthens the implementation of student-centered and adaptive learning in the digital age.

These findings are also supported by various previous studies. Research by Maulidiyah, Lutfiyah, and Cahyadi indicates that Artificial Intelligence, particularly ChatGPT, has the potential to enhance the effectiveness of Islamic education through the personalization of instructional materials and the development of 21st-century skills.⁵⁰ Another study by Sabrina et al. also explains that the use of AI in education can improve learning effectiveness because this technology helps teachers provide more engaging, varied, and interactive materials.⁵¹ Furthermore, research by Hermanto et al. confirms that the use of AI in digital educational environments can support the transformation of learning to become more innovative and relevant to the needs of today's digital generation.⁵² These various studies demonstrate that Generative AI is not merely a technological tool but has evolved into an integral part of pedagogical innovation in modern learning.

Based on the findings and theories supported by previous research, it can be interpreted that Generative AI in the development of Islamic Education teaching materials serves not only as a tool for learning automation but also as an instrument of pedagogical transformation capable of bridging the needs of Islamic education with the demands of 21st-century learning. The use of AI technology enables PAI learning to become more contextual, reflective, and closely aligned with the realities of digital learners' lives without compromising Islamic spiritual and moral values. However, this study's new interpretation indicates that the success of Generative AI in PAI remains heavily dependent on the teacher's role as a validator of values, a pedagogical guide, and a guardian of Islamic scholarly authority. AI technology cannot replace the humanistic dimension in Islamic education because the formation of character, exemplary behavior, and the internalization of spiritual values still require direct interaction between teachers and students. Therefore, Generative AI should be positioned as a pedagogical support tool that enhances the quality of PAI learning, not as a substitute for the teacher's role in the educational process.

Relevance of Generative AI to Twenty-First-Century Learning

Research findings indicate that Generative AI is highly relevant to 21st-century learning because it supports the development of students' critical

⁵⁰ Maulidiyah, Lutfiyah, and Cahyadi, "Artificial Intelligence Dan Transformasi Pembelajaran Pendidikan Islam: Peluang, Tantangan Etika, Dan Implikasinya: Penelitian."

⁵¹ Ni Putu Raka Martina Dewi et al., "Peran Artificial Intelligence (AI) Dalam Pembelajaran Berbasis Teknologi Di Era Digitalisasi Pendidikan," *Prosiding Pekan Ilmiah Pelajar (PILAR)* 5 (2025).

⁵² Irwan Adhi Prasetya Hermanto et al., "Pemanfaatan Artificial Intelligence (AI) Dalam Meningkatkan Kualitas Pembelajaran Di Lingkungan Sekolah Berbasis Digital," *Abdi Laksana: Jurnal Pengabdian Kepada Masyarakat* 5, no. 3 (2024): 574–582.

thinking, creativity, communication, collaboration, and digital literacy skills. The availability of AI-based platforms such as ChatGPT and Gemini enables students to access learning that is faster, more extensive, and personalized to their individual learning needs. This technology helps students understand the material independently through summaries, simulated discussions, practice questions, and simpler, more interactive explanations. These findings indicate that Generative AI is no longer viewed merely as a tool for information retrieval, but as an integral part of the digital learning ecosystem that supports active and self-directed learning.

These findings align with the 21st-century learning theory developed by the Partnership for 21st Century Learning (P21), which emphasizes the importance of mastering the 4C (critical thinking, creativity, communication, and collaboration) in modern learning processes.⁵³ This theory views learners as individuals who must be able to think analytically, solve problems, collaborate, and utilize digital technology effectively. From a constructivist perspective, effective learning occurs when students actively construct their own knowledge through the exploration of information and meaningful learning experiences. The presence of Generative AI supports this process because this technology provides space for students to explore knowledge more broadly, quickly, and interactively according to their individual learning needs.

The findings of this study are also supported by previous research conducted by Putri et al., which states that Artificial Intelligence contributes to the transformation of 21st-century learning through improved digital literacy and more personalized learning.⁵⁴ Research by Usman et al. also shows that AI has positive implications for the development of 21st-century skills, particularly students' critical thinking and problem-solving abilities.⁵⁵ Furthermore, research by Amaliyah et al. explains that the use of AI in learning can improve students' communication, presentation, and creativity skills through the use of more innovative digital media.⁵⁶ Research by Rahayu, Iskandar, and Abidin also emphasizes that 21st-century learning innovations require the integration of digital technology to make learning more effective, contextual, and relevant to the needs of the current generation.⁵⁷

Based on these findings, theories, and previous research, it can be concluded that Generative AI has become a vital component of the

⁵³ E Ossiannilsson and A Kaur, "Partnership for 21st Century Learning.(2019)," *Framework for 21st century learning. BoD–Books on Demand* (n.d.).

⁵⁴ Putri et al., "Literatur Review Konsep Dan Implementasi AI Serta Transformasi Digital Dalam Pembelajaran Abad 21."

⁵⁵ Usman et al., "Implikasi Kecerdasan Buatan (AI) Terhadap Keterampilan Pembelajaran Abad 21."

⁵⁶ Amaliyah et al., "Kontribusi Artificial Intelligence Dalam Peningkatan Kemampuan Komunikasi, Presentasi, Dan Diskusi Siswa."

⁵⁷ Rahayu, Iskandar, and Abidin, "Inovasi Pembelajaran Abad 21 Dan Penerapannya Di Indonesia."

transformation of education in the 21st century. This technology not only facilitates access to information but also shapes new learning patterns that are more independent, flexible, and digital technology-based. In the context of Islamic Religious Education, Generative AI can be utilized to create more contextual and dialogic learning experiences, ensuring that students not only understand religious materials textually but are also able to connect them to social realities and modern technological developments. New insights from this research indicate that Generative AI holds great potential to bridge Islamic education with the needs of the digital generation without compromising Islamic values. However, the use of this technology must be balanced with the strengthening of digital literacy, ethics, and character education so that students are not only technologically proficient but also possess the moral responsibility to use AI wisely.

Challenges and Implications of the Use of Generative AI in Islamic Education

Research findings indicate that the use of Generative AI in Islamic Religious Education not only presents opportunities but also raises various pedagogical, ethical, and spiritual challenges. One of the main challenges is the potential for religious disinformation due to AI inaccuracies in interpreting Islamic teachings. Furthermore, excessive use of AI also has the potential to lead to technological dependency, the weakening of scholarly traditions, increased academic plagiarism, and a decline in students' critical thinking skills. These findings indicate that the use of AI in Islamic Education (PAI) has more complex implications compared to general subjects because Islamic education is not only oriented toward cognitive aspects but also concerns the moral, spiritual, and ethical development of students.

These findings align with Islamic educational theory, which emphasizes that the purpose of education is not merely to transfer knowledge but also to holistically shape the personality and character of students. Farida Jaya explains that the concept of Islamic education encompasses the dimensions of ta'lim, tarbiyah, and ta'dib, which emphasize moral and spiritual development in addition to the mastery of knowledge.⁵⁸ From this perspective, learning cannot be entirely replaced by technology because the Islamic educational process also requires exemplary behavior, character development, and humanistic relationships between teachers and students. Furthermore, humanistic theory in education also asserts that the learning process must take into account the emotional, moral, and social aspects of students so that education does not lose its humanistic value.

⁵⁸ Farida Jaya, "Konsep Dasar Dan Tujuan Pendidikan Dalam Islam: Ta'lim, Tarbiyah Dan Ta'dib," *Tazkiya: Jurnal Pendidikan Islam* 9, no. 1 (2020).

Previous research also supports the findings of this study. Mauluddin explains that the use of AI in the study of the Qur'an and Islamic education has the potential to lead to misinterpretations of religious sources if not accompanied by validation from experts.⁵⁹ Research by Maulidiyah et al. indicates that the use of AI in Islamic education can undermine the tradition of scholarly transmission (sanad) because students rely more on instant answers from AI than on the process of learning directly from teachers.⁶⁰ Research by Hanifah and Novebri also reveals that reliance on AI applications has the potential to reduce students' motivation to learn and their critical thinking skills because the learning process becomes too practical and instant.⁶¹ Additionally, research by Hidayat et al. shows that the unwise use of AI can increase academic plagiarism, which impacts the crisis of integrity in education.⁶²

Based on these findings and previous research, it can be interpreted that the challenges of using Generative AI in Islamic Education are not merely technical issues but are also linked to an epistemological and humanistic crisis in Islamic education. While AI does provide easier access to knowledge, it also has the potential to shift the meaning of learning away from a process of seeking knowledge that is rich in values, etiquette, and spiritual connection. A new interpretation from this study suggests that the integration of AI in Islamic education must be directed toward a human-centered AI approach—that is, the use of technology that continues to place humans, moral values, and spirituality at the center of learning. Thus, AI is not positioned as the sole authority in learning but rather as a tool that supports the creation of innovative, reflective Islamic education that remains focused on shaping students' character. In this context, teachers hold a highly strategic position as mediators of technology and guardians of Islamic values to ensure that digital transformation in education does not eliminate the moral and spiritual dimensions of the learning process.

CONCLUSION

Based on the findings of this study, Generative Artificial Intelligence (Generative AI) demonstrates significant potential in supporting the development of Islamic Religious Education (IRE) teaching materials that are more adaptive, personalized, interactive, and relevant to the demands of twenty-first-century learning. The integration of this technology enables IRE

⁵⁹ Mauluddin, "Kontribusi Artificial Intelligence (AI) Pada Studi Al Quran Di Era Digital; Peluang Dan Tantangan."

⁶⁰ Maulidiyah, Lutfiyah, and Cahyadi, "Artificial Intelligence Dan Transformasi Pembelajaran Pendidikan Islam: Peluang, Tantangan Etika, Dan Implikasinya: Penelitian."

⁶¹ Hanifah and Novebri, "Ketergantungan Penggunaan Aplikasi AI Dalam Keefektivitasan Belajar Pada Mahasiswa Manajemen Pendidikan Islam."

⁶² Hidayat et al., "Plagiarisme Digital Mahasiswa PPKn Kelas 41 Sebagai Krisis Nilai Kemanusiaan Dalam Perspektif Pancasila Era AI."

learning to move beyond uniform and text-based approaches toward more flexible instructional practices that accommodate students' diverse characteristics, abilities, and learning needs. Furthermore, Generative AI contributes to the enhancement of essential twenty-first-century competencies, including critical thinking, creativity, communication, collaboration, and digital literacy, through the provision of more contextualized and innovative learning materials and experiences.

At the same time, the implementation of Generative AI in IRE presents a number of pedagogical, ethical, and spiritual challenges. Issues such as religious misinformation, the weakening of traditional chains of Islamic scholarly transmission (*sanad*), technological dependency, academic plagiarism, and the decline of human-centered interactions in the learning process require careful consideration. Therefore, the role of teachers remains indispensable as facilitators, value validators, and pedagogical guides to ensure that the use of AI remains aligned with Islamic principles and educational objectives.

This article contributes conceptually to the integration of educational technology, adaptive learning, and Islamic education in the development of Generative AI-based IRE teaching materials. The study highlights that AI can serve as a valuable pedagogical instrument for fostering more innovative and adaptive Islamic learning environments without neglecting the moral, spiritual, and humanistic dimensions of education.

Nevertheless, this study is limited by its reliance on a library research approach and therefore does not provide empirical evidence regarding the implementation of Generative AI in actual IRE learning settings. Future research is recommended to conduct empirical investigations into the effectiveness of Generative AI in the development of IRE teaching materials, examine teachers' and students' responses to AI-assisted learning, and develop AI-based instructional models that continue to uphold ethical considerations, sound pedagogical principles, and Islamic values.

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