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INNOVATION IN QURANIC LEARNING AT ELEMENTARY SCHOOL LEVEL (SD) THROUGH THE USE OF ARTIFICIAL INTELLIGENCE (AI) -BASED TECHNOLOGY

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ABSTRACT

This study discusses the innovation of Qur'anic learning at the elementary school level through the use of Artificial Intelligence (AI)-based technology. The background of this research lies in the low level of students' Qur'anic literacy, which is mainly caused by the limitations of conventional teaching methods and the lack of learning media variations. The research method applied is library research by analyzing various literature related to the implementation of AI in education. The findings show that AI has the potential to enhance the effectiveness, interactivity, and personalization of Qur'anic learning. Examples include speech recognition technology to improve recitation, tahfidz applications to monitor memorization progress, and gamification features to increase students' learning motivation. However, challenges such as limited infrastructure, teachers' readiness to master technology, and curriculum adaptation remain significant issues. In conclusion, the application of AI in Qur'anic learning is a strategic solution to improve students' Qur'anic literacy while supporting the formation of a Qur'anic generation that is religious, adaptive, and technologically literate.

Keywords: Qur'anic Learning, Artificial Intelligence (AI), Elementary School Education

INTRODUCTION

The rapid development of digital technology, particularly Artificial Intelligence (AI), has significantly transformed various aspects of education, including the teaching and learning of the Qur'an at the elementary school level. However, Qur'anic learning in many Islamic elementary institutions is still predominantly conducted through conventional methods, which often face challenges in improving students' engagement, pronunciation accuracy, and overall learning effectiveness, especially among learners who grow up in a digital environment. The integration of AI-based technology offers new opportunities to innovate Qur'anic learning through features such as speech recognition for correcting recitation, automated feedback on tajwid rules, and adaptive learning systems that adjust to students' individual abilities. Previous studies indicate that AI in education can enhance personalized learning, increase student participation, and improve learning outcomes through intelligent tutoring systems and data-driven instructional support (Luckin et al., 2019; Holmes et al., 2022). In the context of Islamic education, these technological innovations are essential to address contemporary educational challenges while maintaining the quality and authenticity of Qur'anic instruction from an early age. Therefore, investigating the innovation of Qur'anic learning through AI-based technology at the elementary school level is important to explore its potential in enhancing the effectiveness of Qur'anic education and supporting the development of students' Qur'anic literacy in the digital era.

Technological developments in today's era are advancing rapidly. Along with the advancement of science and technology, technology has penetrated various fields, including education. Those involved in the world of education must be able to keep pace with and follow these technological advancements. Indonesian education today is about producing a young generation that understands the knowledge taught, not just memorizes information. Students are required to understand and be able to use technology in the learning process. In this regard, teachers are required to guide, educate, direct, train, and assess and evaluate students (Tari &

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Hutapea, 2020). Education in Indonesia, which has traditionally relied on textbooks, is starting to be replaced by digital products, such as *e-books*.

According to Nurmadiah and Asmariani (2019), educational technology is the development of tools designed to facilitate human work. Technology can also be used to leverage knowledge. Technology also penetrates various aspects of human life to improve production quality and user activities. The world of education also uses technology to make learning more efficient and effective. The use of technology in the learning process significantly improves the quality of learning. Preparing teachers who are able to utilize technology is one of the challenges in education today. Improving teachers' abilities and skills in using the latest technology to achieve current educational goals is also a challenge (Hadi & Afandi, 2021) .

Quranic education plays a very strategic role in shaping the spiritual, moral, and ethical foundations of the younger generation, especially elementary school-aged children. The cognitive, affective, and psychomotor abilities of elementary school-aged children are still very young. Therefore, learning the Quran not only teaches reading, writing, and memorization, but also teaches its values. However, Quranic learning still faces many challenges, mainly due to the limitations of conventional methods. Today's elementary school-aged children, also known as the "digital generation," a generation dependent on digital technology, are often uninterested.

The advent of artificial intelligence (AI) is a sign of the rise of digital technology. AI has transformed learning methods, such as teaching the Quran in elementary schools. *Artificial Intelligence* (AI) encompasses "computer programs, machine learning, hardware, and software," and encompasses "Industry 4.0 and Industry 5.0" (Zahara et al., 2023). AI utilizes software and hardware science inspired by the neocognitron patterns found in the human brain. These Industry 4.0 products are widely used in development and everyday applications across various fields, including education. AI can make learning more interactive, personalized, and adaptive, tailored to each student's abilities and needs. AI-based systems, for example, can help students improve their Quranic recitation by providing instant feedback. This certainly has the potential to accelerate mastery of Tajweed and letter pronunciation.

Mass media, especially electronic media, have begun to become a source of knowledge and a learning tool, demonstrating the importance of technology in education. This has had several impacts, such as teachers becoming the sole source of knowledge, the emergence of new learning methods that make the learning process easier for both teachers and students, and learning systems that no longer require face-to-face interaction (Effendi & Wahidy, 2019). With the development of technology, the learning process now involves not only teachers and students but also the use of the internet and various other methods. Education is truly a social process that continues to change with the times. Learning does not always occur in the classroom; teachers can also utilize the internet and various technological applications to help their students learn.

Furthermore, artificial intelligence-based applications can also assist Quran memorization programs by offering automatic repetition features, tracking memorization progress, and suggesting verses for repetition. This method makes Quran learning more organized, effective, and in line with contemporary educational technology. For example, the application of artificial intelligence in Quranic learning at Buahati Islamic Elementary School (SDIT Buahati) shows that AI can help teachers monitor students' memorization more accurately and efficiently. Teachers act not only as instructors but also as guides who combine Islamic values with contemporary technology. [5]

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This demonstrates that AI can be a strategic partner for Islamic Religious Education (PAI) teachers in improving the quality of education. The fact that today's generation of children is so close to digital devices makes the use of AI-based technology increasingly important. This trend actually has great potential to improve Quranic literacy rather than hinder it. AI can tailor material to each student thanks to its ability to analyze learning data. Children who struggle in certain areas can be provided with appropriate remedial materials, while students who are able to grasp the material more quickly can be directed to the next level of learning.

Furthermore, AI-assisted Quran learning can help with both digital literacy and religious literacy. This aligns with the national education vision, which prioritizes technological dominance while preserving the nation's cultural and religious values. By utilizing artificial intelligence technology, Quran learning not only teaches reading skills but also fosters students' enthusiasm for creative, critical, and independent learning in elementary school. Teachers in the digital era no longer merely serve as transmitters of material, but as facilitators capable of integrating technology into the learning process to improve the quality and relevance of educationSadriani et al., 2023) . This demonstrates that the use of AI in Quranic learning also requires a transformation in teacher competency to enable them to balance Islamic values with technological innovation. Furthermore, the use of Artificial Intelligence in education has been proven to increase the effectiveness of learning through adaptive systems, real-time learning data analysis, and the provision of fast and measurable feedback (Harianto et al., 2025) . Thus, the application of AI in Qur'an learning in elementary schools is not only innovative but also has an empirical basis in improving the quality of the process and student learning outcomes.

However, there are unavoidable challenges when using AI to teach the Quran. Several factors must be considered: limited technological infrastructure, teachers' ability to run AI-based applications, and curriculum readiness. Therefore, to ensure the best use of this innovation, educational institutions, the government, and parents must fully support it. With further development and research, artificial intelligence may become a key driver for a Qur'anic generation that is wise in using technology and skilled in reading and memorizing the Quran. This is relevant to today's demands, which require the younger generation to remain steadfast in religious principles and remain prepared for technological advancements.

Quranic learning in Indonesia, especially at the elementary school level, plays a crucial role in shaping a generation that can master the Quran from an early age. Unfortunately, Indonesia faces significant challenges in improving the quality of Quranic learning, as it has the world's largest Muslim population. A survey conducted by the Indonesian Ministry of Religious Affairs shows that many elementary school students struggle to read the Quran correctly, particularly in understanding tajweed and letter pronunciation. This is due to differences in teacher abilities, the use of traditional learning methods, and a lack of innovation in media use.

Another obvious phenomenon is the high level of enthusiasm among parents to send their children to Islamic schools or madrasas that focus on Quranic learning from an early age. Despite this enthusiasm, students are still unable to fully understand the Quran. Many students in their final year of elementary school still struggle to read the Quran fluently. This demonstrates the disparity between what schools teach and the expectations of their parents. On the other hand, digital technologies such as AI are beginning to enter the world of education in Indonesia. Several Integrated Islamic Elementary Schools (SDIT) and Islamic schools in major cities have tried using AI

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applications to help students learn the Quran. For example, one application can listen to students' voices, identify errors in their recitation, and then provide immediate feedback. This feature is highly innovative because it can help students learn to read the Quran without the need for constant teacher assistance. At SDIT Buahati Islamic School in Jakarta, AI technology is being implemented in a Quran memorization program. This application helps teachers digitally monitor students' memorization progress, send automatic reports to parents, and ensure a more efficient learning process. This change demonstrates the shift from traditional Quran learning methods to a more modern approach utilizing technology.

In general, the phenomenon of Quranic learning in Indonesia demonstrates the need for innovation. Indonesia should be a pioneer in developing artificial intelligence technology for teaching the Quran, as it has the largest Muslim population. Factors driving this include the difficulties of traditional learning methods, the increasing use of digital technology, and parental awareness of the importance of religious education. Therefore, the use of AI in teaching the Quran at the elementary school level is not only a form of innovation but also a strategic solution to address the challenges of improving Quranic literacy today.

Therefore, research on innovations in Quranic learning based on AI technology at the elementary school level is crucial. This research aims to shape Islamic character and improve the quality of Quranic education in the digital era. This innovation is expected to produce more effective, interactive, and context-based learning methods. This research is also expected to provide an overview of learning and the phenomena occurring in Indonesia related to the application of AI-based digital innovations in Quranic learning.

METHODS

This study employed a qualitative approach using a literature review method to analyze the development of Qur'anic learning innovations at the elementary school level through the use of Artificial Intelligence (AI)-based technology. A literature study is a systematic process of collecting, reviewing, and analyzing various academic sources relevant to the research topic, including books, scientific journals, conference proceedings, and official reports. Through this approach, researchers synthesize previous research findings and theoretical perspectives to develop a comprehensive understanding of the phenomenon being studied (Hadi & Afandi, 2021).

The data collection process was conducted through several systematic stages. First, the researchers identified and selected relevant literature sources related to AI in education and Qur'anic learning innovation. Second, a working bibliography was compiled to organize selected references according to the research focus. Third, the collected literature was categorized and analyzed based on themes related to AI technology, digital learning innovation, and Qur'anic education at the elementary school level. Finally, the selected sources were critically reviewed to identify patterns, conceptual frameworks, and research gaps relevant to the study (Adlini et al., 2022).

Data analysis in this research used a descriptive qualitative analysis technique, which involves interpreting and synthesizing information obtained from the literature to explain the current trends and developments in AI-based Qur'anic learning. This approach allows the researchers to explore how AI technologies, such as speech recognition, adaptive learning systems, and intelligent tutoring tools, are utilized to support Qur'anic learning processes in elementary

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education contexts. By applying this method, the study aims to provide a conceptual overview and analytical interpretation of the integration of Artificial Intelligence in Qur'anic learning within Indonesian elementary schools.

RESULT AND DISCUSSION

Learning methods that prioritize students as the center of the learning process are becoming increasingly popular with technological advances. Technology enables students to acquire knowledge more actively and enhances their critical thinking skills. Currently, digital-based learning is heavily influenced by technology. Technology can also play a significant role in the learning process. Heryani et al. (2022) state that technology plays a crucial role in the implementation of digital-based learning through media, applications, and devices. Several common problems occur in elementary schools. These include teachers' limitations in implementing appropriate learning methods for each student and differences in student abilities in understanding material (Putra et al., 2024). AI can also assist teachers in completing administrative tasks such as calculating final grades based on assessment results (Putra et al., 2024).

John McCarthy stated that the ability to understand and imitate human thought processes and create machines that can imitate human behavior is the definition of artificial intelligence. Artificial intelligence consists of moral competence, comprehensive knowledge and experience, and reasoning abilities (such as decision-making and action) (Rayendra et al., 2021). Therefore, artificial intelligence is crucial for improving primary education. However, many barriers remain to the use of AI in primary education. One major issue for teachers is their ability to understand and master the technology. Many educators do not fully understand how AI can help education, thus limiting its utilization. To maximize the use of AI in primary schools, teachers must better understand how AI is helping transform digital education.

AI has penetrated many aspects of everyday life, such as intelligent customer service and autonomous vehicles capable of driving themselves. Furthermore, in the business world, AI is used to analyze data quickly and efficiently, which helps companies make smarter and more informed decisions. In education, Artificial Intelligence (AI) is used to provide teachers with better feedback and improve students' learning experiences. With technological advancements, AI is also being used to solve environmental problems and climate change by providing data-driven solutions. Increasingly powerful, AI is transforming the world by bringing efficiency and innovation to many aspects of human life. The ability of a system to plan, learn, solve problems, and perform activities similar to human intelligence is known as artificial intelligence (Dedi Harianto et al., 2025) . Artificial intelligence can aid learning and teaching in schools.

The use of artificial intelligence (AI) technology in student-centered learning has become a crucial component in supporting a more interactive educational process that meets the needs of today's digital age. The use of this technology can be seen in several ways, such as the following (Fajriati et al., 2024):

Use of Learning Platforms

Digital learning platforms have significantly expanded the scope of educational practices by supporting not only formal instructional activities but also independent and informal learning opportunities for students. Through various digital features such as discussion forums, multimedia resources, and access to external educational content including video tutorials and scholarly

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articles students are able to explore knowledge beyond the material delivered in the classroom. These platforms also facilitate project-based learning, enabling learners to engage in collaborative or individual projects aligned with their interests and abilities, thereby fostering critical thinking, creativity, and real-world problem-solving skills (Bond et al., 2020; Krouska et al., 2022). In recent years, many Learning Management Systems (LMS) have integrated Artificial Intelligence technologies to personalize learning experiences by adapting learning materials, assessment tasks, and feedback according to students' learning progress and cognitive levels. This adaptive learning capability allows teachers to monitor student performance in real time, analyze learning analytics, and provide timely pedagogical interventions when necessary (Holmes et al., 2022; Zawacki-Richter et al., 2019). Furthermore, the integration of mobile technologies has increased the flexibility of digital learning environments, enabling students to access educational resources anytime and anywhere, thereby promoting continuous and self-directed learning in both formal and informal contexts (Crompton et al., 2021).

Interactive Tools and Gamification

Not only does learning become more enjoyable, but gamification also motivates students to learn. Through features like leaderboards, badges, and points, gamification encourages competition and active engagement. Furthermore, gamified interactive tools support a variety of kinesthetic, visual, and auditory learning styles, allowing each student to adapt their learning style to their own preferences. Due to more active learning and continuous review of material, students who engage in gamification tend to retain the material better. Ruskandiet et al. (2021) found that gamified interactive tools can increase student engagement by up to 30% compared to conventional learning approaches.

Gamification can be used to evaluate soft skills such as adaptability, collaboration, and leadership, as well as to assess higher levels of participation. Gamification-based educational platforms, for example, allow teachers to monitor their students' academic and non-academic progress. This is crucial for building students' overall character. Gamification can also be used in competency-based assessments. Here, students are awarded badges or certificates in recognition of specific achievements. This can inspire students to continuously improve their skills. As stated by Nurjanah et al. (2024), targeted gamification can improve students' social and emotional skills. Learning with others is crucial. The way students interact with lessons has been influenced by the use of interactive tools such as Socrative, Kahoot, and Quizizz.

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Gamification has emerged as an effective pedagogical approach to enhance students' motivation and engagement in digital learning environments. By integrating game elements such as leaderboards, points, badges, and reward systems, gamification creates a more interactive and

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enjoyable learning experience that encourages students to participate actively in the learning process. Research indicates that gamified learning environments can stimulate healthy competition and sustained engagement while supporting various learning styles, including visual, auditory, and kinesthetic modalities, allowing students to adapt learning activities to their individual preferences (Dicheva et al., 2020; Subhash & Cudney, 2021). In addition, gamification promotes deeper learning and better retention of material because students repeatedly interact with the content through challenges, quizzes, and feedback mechanisms embedded in the learning system. Empirical studies have shown that the use of gamified learning tools can significantly increase student participation and engagement compared to conventional instructional approaches (Toda et al., 2022).

Beyond enhancing academic engagement, gamification also contributes to the development of soft skills and socio-emotional competencies, such as collaboration, adaptability, and leadership. Gamification-based educational platforms enable teachers to monitor both academic achievements and behavioral indicators of learning progress through analytics and performance dashboards. In competency-based learning environments, students may receive digital badges or certificates as recognition of specific accomplishments, which encourages continuous improvement and self-directed learning. Recent studies demonstrate that well-designed gamification strategies can positively influence students' social interaction, emotional engagement, and collaborative learning experiences (Zainuddin et al., 2020; Nurjanah et al., 2024). Furthermore, interactive tools such as Kahoot, Quizizz, and Socrative have been widely adopted to support gamified learning activities, allowing teachers to conduct formative assessments in real time while fostering an engaging and collaborative classroom atmosphere.

Collaborative Learning

Technology-enabled collaborative learning doesn't just look at results; it also looks at how people communicate and collaborate. Students can now explore the world with today's technology and collaborate with people from different countries (Ibrahim et al., 2024). Collaborative platforms allow for recording and access to group work activities, which facilitates assessment and deliberation. Digitally enabled collaborative learning enhances students' creativity, problem-solving, and critical thinking.

This study uses AI to teach religion, specifically the Quran. Artificial intelligence has the ability to search and analyze the Quranic text comprehensively. Imagine an AI-powered tool that allows users to input a specific verse and have the AI algorithm analyze the verse's structure, meaning, and context. The AI algorithm can also identify themes and topics within the text and compare them to other texts, such as hadith and tafsir. This tool shows the relationships between verses and their history. Researchers and scholars can utilize artificial intelligence to examine various aspects of the Quran, such as history, theology, and Islamic law. The ability of artificial intelligence to analyze the Quranic text provides researchers with new opportunities to understand the Quran's meaning more deeply and comprehensively.

Every individual has a different learning style, needs, and goals when studying the Quran. AI technology provides solutions to create personalized, more effective learning experiences for each user. Imagine a Quran learning platform that uses artificial intelligence to assess users' initial abilities, recommend appropriate learning materials, test understanding through interactive quizzes, and provide personalized feedback.

Learning the Quran doesn't have to be boring or monotonous. Imagine an artificial

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intelligence-driven application that acts as a Quran game where users can play while learning the content and meaning of the Quran. AI has the ability to create engaging and interactive learning experiences, especially for children and the younger generation. To increase user interest and motivation, the application can use gamification features such as points, levels, and rewards. AI makes this interactive education more fun and engaging for users. This has the potential to increase children's curiosity, especially those who are often bored with conventional learning methods.

There are many options for addressing this issue. First and foremost, our understanding of the context and meaning of the Quran must be improved by artificial intelligence algorithms. This can be achieved through the use of more sophisticated natural language processing techniques and the use of more diverse and high-quality data to train AI. Second, it is crucial for AI development to collaborate with Quran experts, such as academics and religious scholars. By working together, experts can help AI understand the context and meaning of the Quran more deeply and ensure that its interpretations are accurate and impartial. Third, experts must thoroughly examine and verify AI interpretations of the Quran. In terms of understanding the Quran, AI can be a useful tool, particularly by creating additional algorithms, collaborating with Quran experts, and conducting in-depth evaluations. However, it is important to remember that AI can only function as a tool to assist humans in the process of understanding and interpreting the Quran.

Several options can be considered to overcome the challenges of applying AI to Quranic research. Improving the understanding of AI algorithms to better understand the context of Quranic verses is crucial. This can be achieved through the use of more sophisticated natural language processing techniques and training AI to utilize deeper contextual data. Furthermore, collaborating with Quranic scholars is crucial for AI to better understand verses. A deep understanding of Arabic, Islamic principles, and the related historical and cultural context is crucial for Quranic scholars to use AI correctly, respect the sanctity of the Quran, and produce correct interpretations. Furthermore, they have the ability to encourage AI developers to use this technology more wisely.

Oversight by Quran experts has many benefits. First, it is likely to make interpretations of this holy book more accurate and objective, thus improving human understanding of the Quran. Being under the strict supervision of experts helps the public trust the use of artificial intelligence in Quranic studies and prevents the misuse of AI technology, such as the spread of erroneous or confusing interpretations. Furthermore, this oversight can encourage Quran experts, Islamic ethicists, and AI developers to collaborate to create a peaceful and sustainable working environment.

It is crucial to avoid relying solely on artificial intelligence for Quranic study. Instead, AI should be used as an aid in the learning process, not to replace humans. Machines cannot understand the Quran like humans. Consequently, there is a strong possibility of significant benefits from using AI in Quranic study (Mauluddin, 2024). However, the various challenges that may arise when implementing it need to be considered. Artificial intelligence can be a useful tool for Quranic study and help Muslims better understand and apply Islamic teachings if it successfully overcomes these challenges. To use AI in Quranic study morally, much remains to be learned and developed.

CONCLUSION

Artificial Intelligence -based technology (AI) in Quranic learning at the elementary school level shows significant potential to increase the effectiveness, interactivity, and personalization of

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learning. These advantages help students understand the Quran in a more enjoyable and adaptive way. However, the implementation of AI also faces various challenges, such as limited infrastructure, teachers' ability to operate the technology, and curriculum readiness. The role of teachers as educators and guides remains irreplaceable and must keep pace with technological developments. Support from educational institutions, the government, and parents is crucial to maximizing the benefits offered by AI.

Important for increasing infrastructure in the institution's education with method improve and enhance access to technology, as well as build supporting facilities for learning AI- based. In addition, training programs and workshops for teachers are essential. To increase understanding and skills in operating technology, so that they can integrate it into the learning process in an effective. Development responsive curriculum to modern technology is also very much needed, so that method AI - based teaching can be customized to the needs and interests of students. Encourage cooperation between the government, educational institutions, and parents to create a supportive environment for the use of AI, making innovative education easier to implement.

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