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Analysis and Potential of Artificial Intelligence in Making Interactive Teaching Materials for Muhammadiyah Elementary School Teachers in Yogyakarta

Shindy Maulinda[1]*, Lovandri Dwanda Putra[2]

shindy1900005174@webmail.uad.ac.id[1*]

Abstract: *The background to this research is that in the digital era, education requires innovative approaches to improve the quality of teaching. AI can be used to customize teaching materials according to individual student needs, increase interactivity, and provide more accurate feedback. Teachers can utilize AI to save time when preparing teaching materials, which in turn increases efficiency in the teaching process. This research aims to explore the potential of using AI to provide relevant, interactive teaching materials for teachers. This type of research is qualitative descriptive research. The subjects in this research were school principals and class teachers. This research was conducted in three schools, namely: 1) SD Muhammadiyah Karangbendo, 2) SD Muhammadiyah Karangkajen II, and 3) SD Muhammadiyah Condongcatur. The object of this research was to determine the potential of AI in creating interactive teaching materials. Data collection techniques included interviews, observation, and documentation. Data were then analyzed using the Miles and Huberman model, namely the stages of data collection, data reduction, data presentation, and conclusion drawing. Meanwhile, the data validity was tested using source triangulation. The results of research conducted in three schools, i.e., SD Muhammadiyah Karangbendo, SD Muhammadiyah Condongcatur, and SD Muhammadiyah Karangkajen II, concluded that AI technology provides significant benefits and potential for teachers in various aspects. Overall, the use of AI technology in education, especially in creating interactive teaching materials, provides benefits that can increase the efficiency and quality of learning in the education 4.0 era. AI technology also helps teachers improve the quality of learning and teaching, making learning more interesting, interactive, and effective.*

Keywords: *Potential, Artificial Intelligence, Interactive Teaching Materials, Elementary School Teachers*

Abstrak: Latar belakang penelitian ini adalah di era digital, pendidikan memerlukan pendekatan inovatif untuk meningkatkan kualitas pengajaran. AI dapat digunakan untuk menyesuaikan materi pengajaran sesuai dengan kebutuhan individu siswa, meningkatkan interaktivitas, dan memberikan umpan balik yang lebih akurat. Guru dapat memanfaatkan AI untuk menghemat waktu dalam penyusunan bahan ajar, yang pada akhirnya meningkatkan efisiensi dalam proses pengajaran. Tujuan dari penelitian ini adalah untuk mengeksplorasi potensi penggunaan AI dalam menyediakan bahan pengajaran yang relevan dan interaktif bagi guru. Jenis penelitian ini adalah penelitian deskriptif kualitatif. Subyek dalam penelitian ini adalah kepala sekolah dan guru kelas. Penelitian ini dilakukan di tiga sekolah, yaitu: 1) SD Muhammadi Karangbendo, 2) SD Muhammadi Karangkajen II, dan 3) SD Muhammadi Condongcatur. Objek penelitian ini adalah untuk mengetahui potensi AI dalam pembuatan bahan ajar interaktif. Teknik pengumpulan data adalah wawancara, observasi, dan dokumentasi. Data kemudian dianalisis dengan menggunakan model Miles dan Huberman yaitu tahap pengumpulan data, reduksi data, penyajian data, dan penarikan kesimpulan. Sedangkan untuk menguji keabsahan data digunakan triangulasi sumber. Hasil penelitian yang dilakukan di tiga sekolah yaitu SD Muhammad Karangbendo, SD Muhammad Karangkajen II, dan SD Muhammad Condongcatur, menyimpulkan bahwa teknologi AI memberikan manfaat dan potensi yang signifikan bagi guru dalam berbagai aspek. Secara keseluruhan, pemanfaatan teknologi AI dalam pendidikan khususnya dalam pembuatan

[1] *Universitas Ahmad Dahlan, Indonesia*
[2] *Universitas Ahmad Dahlan, Indonesia*

bahan ajar interaktif memberikan manfaat yang dapat meningkatkan efisiensi dan kualitas pembelajaran di era pendidikan 4.0. Teknologi AI juga membantu guru meningkatkan kualitas pembelajaran dan pengajaran, menjadikan pembelajaran lebih menarik, interaktif, dan efektif.

Kata Kunci: Potensi, Kecerdasan Buatan, Bahan Ajar Interaktif, Guru SD

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INTRODUCTION

In every subject, teachers need the help of learning media to convey teaching materials and support the learning process. Material in learning can be interpreted as information formed in teaching materials prepared by the teacher in accordance with the learning objectives (Sadewa et al., 2022). In comparison, interactive communication is two-way communication. One thing that involves action and reaction is mutually active and reciprocal to each other (Yanto, 2019). Hence, interactive teaching material is information in the form of learning material to be delivered to students to achieve learning objectives that can adapt to two-way communication between students (Sadewa et al., 2022). It can be concluded that interactive teaching materials are a combination of images, audio, video, and active components that constitute interactive multimedia.

According to Fajri (2018), the importance of teaching materials is to help learn individually, offer freedom of introduction to short and long-term learning, facilitate the delivery of learning materials with a system approach, and facilitate teaching and learning activities during class in which systematic design of teaching materials has a big influence on students.

On the other hand, modern times and the rapid development of technology have a massive impact on everyday life, especially in the field of education. Consequently, technology is very important. The world is currently facing technology, which is often referred to as the Industrial Revolution 4.0. One of its characteristics is automation and information exchange, where a person searches, borrows and analyzes data and information and accesses cloud services via the Internet (Rahadiantino, 2022). With the progress and development of technology, it produces new things, particularly in the world of education. One of the many examples is the emergence of AI (hereinafter abbreviated as Artificial Intelligence) technology. AI is a development of technology and communication that has gained prominence in the last ten years. AI is also a representation or replica of human intelligence made in the form of a machine that can think like a human (Heiden & Tonino-Heiden, 2021). Every process in AI applies a system of learning, reasoning, and self-correction, which is a process similar to humans before making or giving a decision (Sobron & Lubis, 2021); (Sobron & Lubis, 2021). (Zebua, & et al, 2023, p. 9) explain that there are several types of AI based on its capabilities and functions. Based on capability, i.e., a system learns. How far the system applies its knowledge, there are three types of AI, namely Artificial Narrow Intelligence, Artificial General Intelligence, and Artificial Super Intelligence.

Furthermore, at this time, information exchange is no longer limited to fellow humans; it can now be done between humans and machines, and even between machines and machines can exchange information. The concept of Industry 4.0 includes four main components, including connections between the real world and the virtual world (Cyber-physical systems), the Internet of Things (IoT), the Internet of Services (IoS), and smart factories (Ridwana, 2019). In 2019, Public Relations was invented by implementing a Chatbot on the front page of the website to increase interaction with the public (customer engagement) through the medium of website communication (Maulidiyanti & Suciati, 2019). Specifically, the world of education really needs more technological innovations that support learning in

the current era, improving the quality of human resources that compete in the global arena; learning requires advanced educational institutions and creative and innovative teachers (Rahadiantino, 2022).

This is in line with (P, Malays, & Sakti, 2023) (P, Malays, & Sakti, 2023), who stated that with the digital platform, students can actively participate in online discussions, exchange ideas, and collaborate with students and teachers. This can increase student interest in the involvement of the learning process. It can be concluded that with these interaction activities, students feel more cared for, and their enthusiasm for learning increases.

In this case, the use of AI in the world of education is one of the characteristics of the application of learning intelligence that many countries have successfully applied in schools, from elementary schools to universities (Manongga & et al, 2022). This can be seen from the preparations made, such as developing a curriculum supporting artificial intelligence or AI learning, the ability of teachers in the field of AI, facilities and infrastructure to support AI-based learning, student readiness in AI learning experiences, and others (Klarisa & et al, 2023).

Additionally, increasing students' enthusiasm for learning needs to be done in several ways. According to (Braneva & et al, 2021), the involvement of learning media in teaching and learning activities can have a significant impact on teaching effectiveness and be one of the steps to achieve planned learning objectives. In every subject, teachers require the help of learning media to convey teaching materials and support the learning process. The term "materials in learning" refers to instructional resources compiled by the instructor in alignment with the intended learning outcomes (Sadewa & et al, 2022). Interactivity, meanwhile, is defined as two-way communication. An entity in which action and reaction are involved is reciprocal and mutually active (Yanto D, 2019).

Interactive teaching materials refer to educational resources that are presented in a format that facilitates two-way communication among content experts with the intention of assisting students in attaining their learning objectives (Sadewa & et al, 2022). In conclusion, interactive teaching materials consist of active components, audio, video, and images, which collectively comprise interactive multimedia.

With the advancement of technology, the potential of learning media can increasingly be utilized. It is not only focused on educators but also directed to broader learning resources with tools, accelerating broad-based learning resources (Faiz & Kurniawaty, 2023). In such conditions, technology becomes a discipline that is necessary for learning opportunities for teachers and students to face 21st-century learning (Alwi Hilir, S. K. M. P., 2021). In the context of 21st-century learning, there are several aspects that teachers must pay attention to. First, the role of the teacher changes from transmitter to facilitator, guide, and consultant. Second, the teacher is no longer only a source of knowledge but a friend in the learning process. Third, the assessment that was previously normative is now developing into a more comprehensive measurement. Fourth, the learning approach that was previously monotonous is now directed to be more creative and innovative. Fifth, the use of media in learning, which was originally an object of learning, has turned into a learning tool.

However, with the existing media, the teacher should not remain silent. The teacher must also be a mediator who provides instructions on how to use it so that students do not misuse it. The purpose of this technological media is only to achieve curriculum goals, namely by learning the material better and linking it to real life (Khulsum & et al, 2018).

For this study, the results of pre-observation with several teachers on June 19, 2023, during preliminary research at SD Muhammadiyah Karangbendo revealed that grade 6 still used the 2013

curriculum, while grades 1-4 applied the independent curriculum. The learning methods used were different for each class teacher. Interaction between teachers and students when learning was taking place was also still limited; sometimes, students were active and inactive. In addition, the learning media utilized were in the form of PPT learning videos, but books such as LKS (student worksheet) were more often used. Often, learning materials were obtained from books and archives. Besides, the ability and understanding of teachers have not fully understood and included AI in the form of ChatGPT in making teaching materials.

According to (Mambu J & et al, 2023), AI can provide personalized tutoring, conduct automatic assessments, create game-based learning, analyze data obtained from students, and support distance learning. Therefore, there is a need for assistance using AI that can help teachers improve the effectiveness of teaching and learning in the classroom, especially in making interactive teaching materials. This aligns with (Saputra, 2023) with the results of his research explaining that the use of ChatGPT-based AI in lesson planning has proven to be very effective, particularly at the stage of preparing the lesson plan (RPP) and assessment tools. One of the advantages of using ChatGPT is time efficiency. This aims to overcome a problem related to the lack of time for teachers to prepare lesson plans. Also, the use of AI will not eliminate the learning stages that teachers must carry out.

RESEARCH METHODS

The type of research used in this research is descriptive with a qualitative approach. According to Moleong (2018: 6), qualitative research is research that is natural in nature. This research was conducted in three schools: 1) SD Muhammadiyah Karangbendo, 2) SD Muhammadiyah Karangkajen II, and 3) SD Muhammadiyah Condongcatur. The subjects in this research were Muhammadiyah elementary school teachers in Yogyakarta. The researchers took three samples in this study, with the following criteria: 1) Schools that have already utilized IT, 2) having complete school facilities, 3) accustomed to using laptops during teaching and learning activities, and 4) have already used digital teaching materials. Meanwhile, the object of this research was AI in making interactive teaching materials.

According to (Moleong, 2018), the collection techniques used in qualitative research are observation, interviews, and documentation. Data collection techniques are a strategic way of conducting a study because they have the main purpose of research, namely, to obtain information (Iii, 2018). This data analysis was used to sort the data and organize the main descriptions into categories. Then, with the data collected, the researchers attempted to analyze it to draw the right conclusions. Following Miles and Huberman (Sugiyono, 2017, p. 246), there are three types of stages in interactive analysis: data reduction, data display, and conclusion drawing/verification.

RESULTS AND DISCUSSION

In the field of education, the application of AI technology in teaching, learning, and management has become a very valuable asset, especially for teachers. This is useful to support the learning process in the current era by improving the quality of education so that the formation of quality human resources can later compete in the global world (Maufidhoh & Maghfirah, 2023). Therefore, technological advances must be balanced with the existence of creative teachers who utilize technology to support learning.

The integration of AI technology has created a positive attitude among teachers towards its use (Aldosari, 2020). AI also introduces interactive teaching strategies as it enriches the teacher's view of student learning (Jaiswal & Arun, 2021). In addition, AI provides professional development for teachers with interactive content and recommendations to increase teacher creativity in creating teaching materials (Aldeman & et al., 2021).

Moreover, AI has the potential to transform systems and processes to complement and enhance educational opportunities. Some facts obtained from the research results that have been done are that the application of AI in learning, particularly the creation of interactive teaching materials, has proven to provide convenience and exert a positive effect on the process. Both teachers and students can feel this simultaneously. The convenience felt by teachers is that it can facilitate the creation of interactive teaching materials that can be used in learning activities. This corroborates with (Jaiswal & Arun, 2021), stating that teachers have plenty of time to address student ambiguity, emphasize deep learning, evaluate difficult cases, and work with diverse students to achieve better teaching results.

Based on the analysis results of the interviews conducted, information on the potential of AI in making interactive teaching materials was obtained. Fundamentally, the benefits of using AI for teachers are that it provides teachers with experience in using AI for making teaching materials, teachers' interest in making teaching materials through AI, and its usefulness (Suarifqi, 2023). From the interview results, the teacher's experience in using AI revealed that the teacher became creative when developing interactive teaching materials. With the help of AI technology, the teaching materials were much more interesting and comprehensive, helping students better understand the material. Here, AI provides an attractive visual design that can influence student engagement. This technology is also seen as a valuable tool for improving the quality of education and learning experiences. According to a study (Jaiswal & Arun, 2021), one of the main benefits of using AI technology is that it improves teacher's teaching skills.

Figure 1. Application of AI-based teaching materials (Kahoot)

Based on the figure above, one of the uses of technology-based teaching materials in learning was the Kahoot application. According to (Karyadi, 2023), Kahoot is an interactive learning platform based on AI that can be used to create an interesting and interactive game-based learning experience. By analyzing student behavior and progress while playing educational games, AI can adjust the level of difficulty and challenge according to student abilities. This is in line with (Mustikawati, 2019), who stated

that AI in this application provides automatic scoring and ranking of students, thus creating a competitive and fun learning atmosphere. Here, teachers can take advantage of the features in Kahoot, such as attracting students' attention from the beginning of learning activities to the end as an evaluation of learning activities. Teachers can also find out how to create learning activities; for example, students are asked to write down their ideas or choose the topics that they are most interested in learning and the actions of these students so that learning becomes more creative. This agrees with (Permana, 2021), who asserted that using AI technology-based teaching materials can motivate students to learn the material being studied so that they are motivated to get the highest possible score.

Based on the interview results, teachers' interest in making teaching materials through AI created interest in developing interactive teaching materials, a development with the potential to produce significant improvements in the quality of learning presented by teachers. AI technology allows teachers to create more creative and relevant teaching materials. This can include the use of interactive elements, such as simulations or educational games, which make the material more engaging. Also, teachers can utilize AI technology to present more interesting teaching materials, which can then stimulate students' interests and skills. This aligns with research (Gunawan & et al, 2021), showing that AI technology increases teachers' sense of interest by providing a teaching evaluation model and recommendations for improving teaching practices using interactive teaching materials based on AI.

Established on the interview results, AI provides benefits to teachers, i.e., helping to create teaching materials more quickly, efficiently, and interactively. With AI technology, it can generate exam questions, summarize material, and create interactive teaching materials. To make students enthusiastic and active during learning activities. AI technology can present innovative teaching methods. This encompasses the use of simulations, games, educational, and virtual reality in the learning process. Thus, teachers utilize this technology to make teaching more interesting and interactive. The utilization of AI can also improve teachers' abilities and expand teachers' knowledge of information technology. In line with research (Maufidhoh & Maghfirah, 2023), the implementation of AI in education provides many benefits, and AI plays a role in many aspects, which can help teachers facilitate their performance, specifically in administrative matters; for instance, the final grade can be determined based on the assessment weight. AI also makes it easier for teachers to carry out teaching and learning activities and other learning activities (Hanifah & et al, 2022)(Hanifah et al., 2022).

Table 1 Conclusion of Analysis in Each School Regarding AI Utilization

No.	SD Muhammadiyah Karangbendo	SD Muhammadiyah Condongcatur	SD Muhammadiyah Karangkajen II	Conclusion
1	The use of AI technology in the school is good, and the existence of AI technology itself can facilitate teachers in finding information, especially in making interactive teaching materials so that students are active and enthusiastic	At SD Muhammadiyah Condongcatur itself, the use of AI technology is very good, and the teachers are quite aware of what products AI has. In each class, from grades 1-6, there are LCDs and smart computers, adequate internet networks, and	SD Muhammadiyah Karangkajen II is still in the process of implementing AI in the school and has not yet fully used it; due to human resources factors, some teachers still do not understand IT, especially older teachers.	It can be concluded that the use of AI technology at SD Muhammadiyah Karangbendo and SD Muhammadiyah Condongcatur is good. Teachers in these schools have adopted AI technology well, utilized it in making

	during teaching and learning activities.	intranet networks. System-wise, hopefully, it is fulfilling.		interactive teaching materials and provided facilities such as LCDs and smart computers in each classroom, as well as adequate network infrastructure. However, at SD Muhammadiyah Karangkajen, the application of AI is still in process and not yet fully integrated. The main obstacle is the lack of understanding of IT, especially among older teachers.
2	With the existence of AI itself, teachers are interested in participating in its use. Apart from the need, AI technology also very easy to make everyone creative.	With the current AI, everything is more structured because the AI explanation is neat and detailed. Moreover, this AI is very helpful for teachers who only browse. This AI helps teachers be more innovative and creative.	Making teaching materials is faster, more complete, interesting and cool. Furthermore, increasing creativity, of course, is by developing interesting ideas in making interactive teaching materials.	Teachers respond that they are interested because AI technology facilitates them in various aspects of learning and creates greater creative opportunities. AI technology provides neat and detailed explanations, assists teachers in information retrieval, and encourages innovation and creativity in the creation of interactive teaching materials. In addition, the use of AI makes the creation of teaching materials faster, more complete, interesting and creative. This improves the quality

				of education and helps teachers develop more interesting ideas in the learning process.
3	Very useful for teachers in finding information and making it easier for teachers to find ideas, especially in making their teaching materials	Currently, AI technology is very helpful. With this technology, teachers can work or create modules more practically and find interesting ideas.	It is very helpful and makes it easier for teachers to make teaching materials, especially finding many interesting ideas and inspiration for making teaching materials.	AI technology is very useful for teachers in finding information and generating creative ideas, especially in making teaching materials. With AI technology, teachers can work more practically and find many interesting ideas. AI technology provides valuable assistance in creating quality and inspiring teaching materials.

CONCLUSIONS AND RECOMMENDATIONS

Based on the research results conducted in three schools, namely, SD Muhammadiyah Karangbendo, SD Muhammadiyah Condongcatur, and SD Muhammadiyah Karangkajen II, it can be concluded that AI technology provides significant benefits and potential for teachers in various aspects. Overall, the use of AI technology in education, especially in making interactive teaching materials, provides benefits that can improve the efficiency and quality of learning in the education 4.0 era.

With AI technology, teachers felt more efficient in creating teaching materials, more motivated and creative in preparing the learning process, and more productive in carrying out their tasks. AI technology also helps teachers improve the quality of learning and teaching, making learning more interesting, interactive, and effective. In addition, AI technology motivates teachers to continue learning about technological advances in learning.

Based on the conclusions drawn, the following suggestions can be given: 1) For schools, it is expected to provide training for teachers to use IT in schools as a step in improving the quality of technology-based teaching and learning. 2) For teachers, it is expected to provide a good experience for students in applying AI technology in learning activities, especially in making interactive teaching materials. 3) For further research, it is hoped that it can be used as a reference for the next stage of research, such as the development and implementation of AI-based teaching materials based on the study of relevant issues.

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