



The Role of Artificial Intelligence ChatGPT in Learning Planning in the Era of Industrial Revolution 4.0

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ABSTRACT: Artificial intelligence allows computers to process vast amounts of information and data, providing computer-based conclusions in a relatively short and fast time. The use of artificial intelligence in education is one of the hallmarks of the Industrial Revolution 4.0 era, characterized by automation and data exchange, where people seek, cite, analyze data and information, and access cloud services via the internet. This journal article will review various aspects of the utilization of Chat GPT in academia and education. Through an analytical and evaluative approach, we will investigate important issues that need to be understood and addressed in the use of this technology. Additionally, we will provide recommendations and guidelines to ensure the ethical and responsible use of Chat GPT within academic and educational settings. This research was conducted using a qualitative approach and a literature review method. ChatGPT has become an artificial intelligence tool capable of attracting over 100 million active users per month in a relatively short time. The use of ChatGPT in education offers numerous benefits for students, including increased engagement, motivation, and 21st-century skills. ChatGPT positively impacts the anxiety experienced by students, helping them develop confidence and skills necessary for success in academic life. For teachers, the use of ChatGPT brings significant changes to teaching practices, enhancing teaching skills, providing support in student assessment, and reducing administrative workload. Additionally, projections for the hardware and AI services market indicate substantial growth potential in the future. Overall, the development of ChatGPT and the utilization of AI technology promise various benefits that can enhance the efficiency and quality of education in the era of Education 4.0.

KEYWORDS: Artificial intelligence, ChatGPT, Education, Industrial revolution 4.0, Technology

INTRODUCTION

Artificial intelligence (AI) is a new technical discipline that studies and develops theories, methods, technologies, and application systems to simulate, enhance, and expand human intelligence. As a comprehensive and interdisciplinary subject, AI involves numerous scientific fields such as computer science, physiology, philosophy, psychology, and mathematics. The short-term goal is to develop intelligent applications using advanced technology. As an intelligent system, the core of AI lies in the activity of various complex conditioned reflex neural circuits formed through adaptive training during the learning process (Javaid et al. 2023) ^[1]. The main task of AI is to build behavioral systems that can mimic human brain functions and be controlled by human-computer systems. The application of this technology expands the types of educational resources available and provides more diverse learning systems (Rane, 2023) ^[2].

The development of artificial intelligence (AI) technology in recent years has brought significant changes in various fields, including academics and education. One increasingly popular AI application is the use of ChatGPT (Generative Pre-trained Transformer) in human-computer interactions. Chat Generative Pre-Trained Transformer (ChatGPT) is a currently popular AI chatbot developed by OpenAI, a California-based artificial intelligence research and implementation company. This latest AI model is based on the transformer neural network, with its core ability to generate human-like text by understanding contextual cues in conversations (Kaur et al., 2024) ^[3].

In the context of the academic and educational world, the utilization of Chat GPT can contribute to enhancing learning effectiveness by providing access to a wider range of information and materials that are easier to understand (Arman, 2023) ^[4]. The use of Chat GPT in academia and education offers significant potential benefits, such as increasing efficiency in learning, providing individual support for students, and assisting educators in delivering more personalized instruction. However, alongside these benefits, various questions arise regarding data privacy, bias in generated results, and the responsibility of users in using this technology wisely.



Artificial intelligence enables computers to process vast amounts of information and data, providing computer-based conclusions in a relatively short and fast time. Bukar et al. (2024) ^[5] simply define artificial intelligence as the intelligence displayed by a system, machine, or program. The use of artificial intelligence in education is a hallmark of the Industrial Revolution 4.0 era, characterized by automation and data exchange, where people seek, cite, analyze data and information, and access cloud services via the internet. Meanwhile, Society 5.0 is defined as a human-centered society where technological and economic advancements are used to solve problems through a system that integrates virtual and physical spaces (Maita et al., 2024) ^[6].

In primary and secondary education, which serve as centers of learning and teaching, students are required to develop independent learning by being directly involved in the learning process. One of the main challenges faced by educators is how to help students take responsibility for their own learning process. An independent learner must go through stages of increasing awareness, changing attitudes, and transferring roles. Rane (2023) ^[7] add that a technology-based approach can foster independent learning. The interaction between humans and artificial intelligence is one solution or collaboration to assist humans in various fields (Javaid et al., 2023) ^[1]. Therefore, AI technology should be utilized at various levels of education, as it can motivate both students and educators to become more actively engaged in the teaching and learning process, with a focus on achieving learning independence. This journal article will review various aspects of the utilization of Chat GPT in academia and education. Through an analytical and evaluative approach, we will investigate important issues that need to be understood and addressed in the use of this technology. Additionally, we will provide recommendations and guidelines to ensure the ethical and responsible use of Chat GPT within academic and educational settings.

MATERIALS AND METHODS

The research method used in this research is a literature study. According to Snyder (2019) literature study is a research method whose data processing is descriptive or narrative. Literature sources used include journal articles, books and scientific writings that are relevant to the topics discussed. The sources used are sinta indexed journals and books. The completion steps include: the source collection stage, the source determination stage, analyzing and drawing conclusions until this article is intact into the use of artificial intelligence in learning and assessment in the digitalization era and is useful for readers.

RESULTS AND DISCUSSION

The Development of Artificial Intelligence in the Era of Industrial Revolution 4.0

Education 4.0 represents a new era in the educational landscape, characterized by the integration of advanced technologies such as Artificial Intelligence (AI), machine learning, and the Internet of Things (IoT) into the learning process (Maita et al., 2024) ^[6]. This educational approach has the potential to meet the demands of the 21st century by equipping students with the skills and knowledge needed in an increasingly rapidly evolving digital world (Mariska et al., 2021) ^[9]. Technology-based educational interventions also play a crucial role in achieving the goals of Education 4.0, as they involve the design, development, and implementation of products, services, and processes by applying scientific knowledge to meet needs, seek new solutions, or add value. Through these interventions, students can be exposed to advanced technologies and digital tools that can be used to enhance the learning experience, foster collaboration and creativity, and improve student learning outcomes (Mhlanga, 2023) ^[10].

The era of the industrial revolution 4.0 is a development of the industrial revolution 1.0 which began in the 18th century to the early 19th century. The industrial revolution 1.0 was characterized by the emergence of changes in various fields, especially in the production stage. Before the industrial revolution 1.0, the industrial sector was carried out by human labor, but after the era of the industrial revolution 1.0 human labor was replaced by machines. The development of this industrial revolution increased to 2.0 in the late 19th century to the early 20th century. The development of the industrial revolution 2.0 was characterized by the production of high-quality steel, distribution through railroad networks, electricity networks, and the development of medical science. Technological developments in the era of the industrial revolution 2.0 advanced to the industrial revolution 3.0 in the mid-20th century. Industrial development in the 3.0 era is characterized by renewal of energy sources, digitalization, and business networks based on digital technology. This revolution presents production on a global scale based on digital technology. Industrial revolutions 1.0, 2.0, and 3.0 is an excellent foundation for the presence of the 4.0 industrial revolution (Iqbal et al., 2021) ^[11].

The development of AI in the era of the industrial revolution 4.0 is the result of the foundation of the industrial revolution from the late 18th century until now. Infrastructure and technological developments are very supportive for the presence of artificial intelligence with almost infinite data access. In this regard, Yi Chen and Yun Li explain, "With i4, design for manufacture is shifting



to a new paradigm, targeting innovation, lower costs, better responses to costumers needs, optimal solutions, intelligent systems, and alternatives towards oneman production.” One of the parts mentioned by Chen and Li is the presence of intelligent systems, namely intelligent systems supported by the development of artificial intelligence (AI). However, it must be understood that AI does not necessarily come without the background of the invention of computers (Chen et al., 2023) ^[12].

The utilization of AI in education has also begun. Weiwu Ye et al in their article, Application of Artificial Intelligence Technology in Martial Arts Education Governance showed that AI can be used to analyze human body coordinate algorithms in martial arts, so that learners' inappropriate movements will be immediately recognized. If AI can be used to detect movements that are not in accordance with programming language algorithms, then it should also be used in education such as to plan lessons, and even to help educators analyze students' written work (Lase, 2019) ^[13].

ChatGPT at a Glance

ChatGPT was released by an AI company called OpenAI in November 2022. OpenAI explains, “We’ve trained a model called ChatGPT which interacts in a conversational way. The dialogue format makes it possible for ChatGPT to answer follow-up questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests.” Based on this introduction, it can be understood that ChatGPT is an artificial intelligence categorized as a chatbot. AI in the form of a chatbot allows users to engage in dialogue with AI. This dialogue can range from initial questions to follow-up questions, commonly referred to in programming as users' prompts (Haleem, 2022) ^[14]. Cameron Cashman explains it this way, “ChatGPT is an AI chatbot. That means a user can enter a text prompt and receive an intelligently-generated output, allowing for a back-and-forth conversation. While similar platforms have existed for a few years now, what makes ChatGPT so impressive is its detail and versatility.” Therefore, the results obtained from ChatGPT are highly dependent on the user prompt or input command. The more detailed the prompt provided, the more accurate the results will be in meeting the user's expectations (Snyder, 2019; Chen et al., 2023) ^{[8][9]}.

Since the emergence of ChatGPT, the world has been flooded with various similar applications that leverage AI. Examples include DALL-E 2, Notion, Steve AI, Synthesia, Uberduck, Jasper, Grammarly, Frase, Benchmark, and Soundful. Each of these AI-based applications has its own specific uses. Some can be used to regenerate images, videos, sounds, or music, while others assist humans in restructuring sentences in various languages provided. ChatGPT, in particular, is capable of generating text that closely resembles human-to-human conversations (Rane, 2023) ^[7]. The ChatGPT AI uses architecture and programming languages that make it highly useful for a variety of tasks, such as language translation, text summarization, and, most popularly, answering various user questions. It is worth noting that, at the time this article was written, the International Baccalaureate curriculum had already permitted the use of ChatGPT in essay writing. Considering ChatGPT as an AI with strong data analysis capabilities and responsive to user inputs, it is reasonable to see it as a valuable tool for teachers in planning lessons (Lase, 2019) ^[13].

Lesson planning is one of the aspects often overlooked in education. This is unfortunate because teachers serve as both instructional designers and managers of learning activities. Teachers should pay special attention to lesson planning, as it allows them to determine what will be done and achieved through the learning process. Sudjana similarly states that planning is essentially a systematic process for deciding on actions to be taken in the future. Therefore, it can be stated that lesson planning is an essential part of teaching. This is evident from the purpose of lesson planning, which is to ensure that learning objectives are achieved effectively and efficiently (Bukar et al., 2024; Mariska et al., 2021) ^{[5][9]}.

Referring to the steps in lesson planning mentioned above, not all steps can utilize ChatGPT. Steps such as aligning the plan with the curriculum must be done by the teacher themselves. Similarly, when it comes to summarizing teaching materials, teachers need to independently summarize the materials to ensure they are tailored to the characteristics of the students. However, some steps where ChatGPT can be utilized include (a) drafting the lesson plan and (b) designing assessment instruments. These steps are aligned with the challenges teachers face, particularly the lack of time for lesson preparation. In other words, the use of ChatGPT in lesson planning should be reserved for emergency situations (Aydin & Karaarslan, 2023) ^[2].

Artificial Intelligence for Students

The use of artificial intelligence (AI) has become a hot topic in the field of education. ChatGPT, as an AI tool, offers a number of benefits, including enhanced student engagement, collaboration, and accessibility (González-Calatayud et al., 2021) ^[15]. One of the key advantages of AI language models is that they provide a platform for asynchronous communication. This feature can significantly boost student engagement and collaboration, as it allows students to send questions and discuss topics without needing to be present



at the same time (Dhara et al., 2022) ^[16]. Another benefit of ChatGPT is its ability to facilitate collaboration among students. For instance, ChatGPT can be used to form student groups, enabling them to work together on joint projects and assignments (Esteves et al., 2019) ^[17].

For students, one of the primary outcomes of implementing artificial intelligence (AI) is increased motivation and engagement (Chassignol et al., 2018) ^[18]. AI enhances their interest in learning (Chen et al., 2023) ^[12] and facilitates an interactive learning environment through specialized tools like Smart Sparrow, which boosts learner engagement with educational content (Lase, 2019) ^[13]. Numerous studies have also shown significant improvements in academic achievement through the support of AI technology. AI significantly enhances learning outcomes and student happiness, maximizing students' learning abilities and achievements (Clarizia et al., 2018). One reason behind this high motivation and achievement might be the promotion and enhancement of personalized learning experiences (Estevez et al., 2019) ^[17]. Ultimately, ChatGPT can be utilized to support distance learning, which is particularly beneficial for students who are unable to attend classes due to physical or mental health issues.

The use of AI technology also equips students with 21st-century skills, including critical thinking and creativity, thereby facilitating the assessment of complex skills (Mhlanga, 2023) ^[10] and encouraging deep thinking through AI (Snyder, 2019) ^[8]. Artificial intelligence (AI) supports continuous dialogue and helps students enhance their communication abilities in the context of language learning, as it fosters collaborative learning (Dhara et al., 2022) ^[16] and improves peer communication skills (Iqbal et al., 2021) ^[11]. These findings indicate that AI has the potential to play a significant role in supporting students with learning disabilities and helping them reach their full potential.

In the affective domain of students, the use of AI technology can help boost confidence in learning outcomes (Maita et al., 2024) ^[6] because AI allows students to learn in an engaging and comfortable environment (Roeein, 2019), thereby increasing confidence and reducing learning anxiety (Arman, 2023) ^[4]. Human-robot interaction can assist low-achieving students in feeling more confident, valued, and less embarrassed (Kaur et al., 2024) ^[3]. A study conducted by Crompton and colleagues (2019) found that AI-based educational interventions are effective in reducing anxiety among high school students. Therefore, AI has the potential to positively impact students' anxiety levels, helping them develop the skills and confidence needed to succeed in their academic lives.

Artificial Intelligence for Teacher

In the context of education, the implementation of artificial intelligence (AI) technologies for teaching, learning, and administration has become an invaluable asset for teachers. The integration of AI technology has fostered a positive attitude among teachers toward its use (Bukar et al., 2024) ^[5]. One of the main benefits of using AI technology is the enhancement of teaching skills and teaching competencies by providing inspiration and encouraging self-reflection. AI technology also introduces adaptive teaching strategies as it enriches teachers' understanding of the student learning process and offers ways to support learners (Celik et al., 2022) ^[19]. AI operates adaptively by considering students' actions and emotions (Sun et al., 2021) ^[20]. Additionally, AI technology contributes to professional development for teachers by providing teaching evaluation models and offering suggestions to improve teaching practices (Popenici & Kerr, 2017) ^[21].

In terms of student assessment, AI technology offers performance-based evaluations. AI-supported chatbots are used to create automated and intelligent systems that allow teachers to analyze and assess students' learning abilities. Additionally, AI technology enables the monitoring of students' learning processes and the collection of data about student learning (Rospigliosi, 2023) ^[22]. Various multimodal data, such as physiological sensing, eye tracking, and electroencephalography, have been employed to understand complex student comprehension, allowing for high-quality predictions of their learning performance (Sun et al., 2021) ^[20]. Advanced AI features, such as voice recognition and pronunciation correction, also have the potential to facilitate foreign language acquisition (Celik et al., 2022) ^[19].

Furthermore, AI technology can replace much of the repetitive work, reducing the workload for teachers and administrators. Chatbots alleviate administrative burdens by grading assignments, assigning grades, and providing feedback to students. For instance, AutoGradr and Repl.it automatically grade assignments and tests, saving teachers significant time that can be redirected towards lesson planning, providing student support, and professional development. Additionally, AI-based learning management systems offer numerous benefits for both students and teachers. Some universities have started using chatbots to answer student questions and assist them outside of office hours. Chatbots are also used in libraries, student affairs, school cafeterias, and academic programs to provide personalized learning, support students, facilitate tasks, and aid in evaluation (Dhara et al., 2022) ^[16]. As AI technology continues to advance, more sophisticated learning management systems are expected to emerge in the future (AI Darayseh, 2023) ^[23].



Although ChatGPT promises various benefits for assessment in higher education, there are several key challenges that ChatGPT and other AI language models may face in this context. One major challenge is the risk of plagiarism. AI-based essay writing systems are designed to generate essays based on specific parameters or prompts. As a result, there is a possibility that students might misuse these systems to deceive in their assignments by submitting essays that are not their own work (Sun et al., 2021; Rospigliosi, 2023) [20] [22].

CONCLUSION

The use of ChatGPT in lesson planning, particularly in the stages of creating Lesson Plans (RPP) and developing assessment instruments, has proven to be very effective. However, the use of ChatGPT must still align with the principles and ethics of lesson planning. One of the key advantages of using ChatGPT is its time efficiency, addressing the issue of teachers' limited time for preparing lesson plans. The use of ChatGPT in education should be considered as an alternative tool, with its outputs needing to be tailored to the specific format and requirements of the learning context.

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