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Use of Artificial Intelligence in Teaching and Learning Environment: A case of using Chat GPT

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Abstract

This paper review and analyzed research paper to examine how artificial intelligence (AI) is incorporated into teaching and learning environment. The integration of Artificial Intelligence in teaching and learning environments offers significant opportunities to enhance educational experiences for both students and educators. AI technologies, such as adaptive learning systems, intelligent tutoring, and automated administrative tools, are transforming traditional teaching methods by providing personalized, data-driven learning experiences. The results demonstrate AI's innovatory impending to improve teaching strategies, elevate student interest, and make difficult subject matter easier to understand and perform their duty and response. Intellectual tutoring systems, robotics, and generative AI models like Chat GPT are some of the solution; AI technologies that have been investigated. These solutions address long-standing issues in teaching and learning by enabling interactive problem-solving settings, real-time feedback, and individualized learning experiences. It has also point out certain drawbacks, such as moral dilemmas, difficulties in putting the plan into practice, and contextual restrictions in various learning environments. The purpose of this paper is to identify the use of artificial intelligence in academia especially in teaching and learning environment. In order to gain optimize the advantages of artificial intelligence in educational field while minimizing its drawbacks, the study emphasizes the significance of a well-

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rounded strategy that blends technological innovation with flourishing pedagogical approaches. This thorough analysis lays the groundwork for further study and real world implementations, especially in underserved areas, to promote the widespread use of AI in educational learning and teaching.

Keywords: Artificial intelligence, educational system, emphasize, modified learning, teaching

Introduction

With its revolutionary potential to improve teaching and learning processes, artificial intelligence is transforming a number of industries, including education. AI technologies have greatly enhanced mathematics instruction, a field that has historically been seen as difficult. These developments allow students to acquire important problem-solving skills while assisting teachers in designing individualized, dynamic, and captivating learning environments. The use of AI in teaching and learning activities in formal education is examined in this paper, with an emphasis on how it might be able to solve persistent problems in instruction and raise student achievement. Teachers can offer individualized learning experiences that meet the requirements of a wide range of students by utilizing technologies as Chat GPT, robotics, and intelligent tutoring systems. The qualitative method has been applied in this paper by using purposively selected related articles. The main thrust of this paper is to analyze the utility of Chat GPT in teaching and learning environment in formal education system in the contemporary academia. The use of AI in education is examined in this paper, with an emphasis on how it might be able to solve persistent problems in instruction and raise student achievement. Teachers can offer individualized learning experiences that meet the requirements of a wide range of students by utilizing technologies as Chat GPT, robotics, and intelligent tutoring systems. This paper focused on use of Chat GPT in teaching and learning in education field in contemporary academic society.

Chat GPT for Teaching and Learning

Teaching and learning is a continuous process, in addition to formal education system being covered in traditional and digital media, and new innovation should required in natural language processing system. Chat GPT, which was debuted in 2022, has generated heated discussions regarding both its disruptive promise and difficulties. Hailed as a possible black swan event, this technological advancement has reignited debates about the societal ramifications of artificial intelligence, especially in the fields of academia and education.

Some people applaud Chat GPT's ease of use and adaptability, while others worry about its erratic behavior and potential abuse (Tashtoush et al., 2023). Launched in 2022, Chat GPT is a cutting-edge natural language processing technique that has gained attention in both traditional and digital medium. AI can help tailor educational content to individual students' needs, enabling self-paced learning and improving student outcomes. Moreover, AI-powered platforms facilitate teachers by automating repetitive tasks, thus allowing them to focus more

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on instruction and student engagement (Firat, 2023). Despite its potential, the use of AI in education raises concerns regarding equity, data privacy, and the role of teachers. Ensuring equitable access to AI tools, maintaining ethical standards, and safeguarding student data are critical considerations for the successful implementation of AI in education. Additionally, while AI can support academic learning, it cannot replace the social and emotional development fostered through human interaction (Tashtoush et al., 2023).

While AI can enhance academic learning, it is less effective in fostering social and emotional development. The human aspect of teaching, including emotional support, mentorship, and social interaction, cannot be replaced by AI (Seckel, et al., 2021). It's important to strike a balance between technology and human interaction to promote well-rounded student development. The use of AI in education involves the collection and analysis of student data, raising concerns about privacy and data security. Educational institutions must ensure that they have strong data protection policies in place and that AI systems adhere to ethical standards, especially regarding student information (Firat, 2023). AI should not replace teachers but rather complement their work.

Teachers will continue to play a crucial role in guiding, mentoring, and fostering emotional intelligence in students. To fully benefit from AI, teachers need adequate professional development, training, and support to integrate AI tools effectively into their teaching. Intelligent tutoring systems, AI-powered chat bots, and virtual assistants can provide students with continuous support, answering questions, explaining concepts, and offering feedback outside of traditional classroom hours (Lin, et al., 2023). This encourages independent learning and deeper understanding.

Debates have been triggered by its unforeseen potential, with some considering it a black swan event. Notwithstanding earlier debates about artificial intelligence, the rise of Chat GPT has rekindled interest in the technology's possible advantages and disadvantages for society (Firat, 2023). Some early adopters and inventors praise its usefulness and accessibility, while others voice concerns that are reminiscent of dystopian depictions, as those in the Terminator movies. Although Chat GPT has many uses, its effects on academics and education have been especially noteworthy because of its capacity to generate writing that is human-like, which calls into question how it should be used in the classroom activities and actions.

AI's potential for disruption is highlighted by its transformation from a perceived novelty to a game-changing technology. Understanding Chat GPT's benefits, drawbacks, and ethical issues is crucial because its use is unavoidable (Hidayat et al., 2021). Assessing Chat GPT's effects, especially in the field of education, can assist teachers in creating plans to optimize its advantages while minimizing any potential disadvantages (Firat, 2023). Resistance to change frequently wanes as stakeholders become accustomed to this technology, opening the door for its incorporation into daily life (Alkaissi & McFarlane, 2023).

AI is a quickly developing area of computer science that has uses in anything from self-driving automobiles and educational software to medical diagnostics. Artificial Intelligence of Things was created by fusing AI with cutting-edge technologies like the Internet of Things

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, allowing for more developments (Deng et al., 2019; Tashtoush et al., 2023). One notable example is Chat GPT, which uses natural language processing and deep learning to mimic human-like interactions and cover a wide range of topics (Lin et al., 2023).

Significant advancements have been made in a number of disciplines, including law (Arrabal Platero, 2022), medical (García-Peñalvo et al., 2021), and education (Qu et al., 2022). The worldwide AI activities are expected to reach a valuation of over $450 billion by 2023 (Jyoti & Kuppuswamy, 2022). This advancement is demonstrated by Chat GPT, which uses huge language models to improve user engagement. However, it also draws attention to the so-called "AI effect," which is the undervaluation of sophisticated AI skills since they are thought to be simple (Walker & Noorden, 2023).

AI tools such as Chat GPT are changing the way that education is taught. Generative Artificial Intelligence (GAI) facilitates the production of synthetic content for a variety of applications through machine learning frameworks like Generative Adversarial Networks (GANs) and Generative Pre-trained Transformers (GPTs) (Brown et al., 2020; Guo et al., 2023). GPT models, such as Chat GPT, are excellent at producing logical and contextually relevant text for customer service, teaching, and other purposes, but GANs are specialized in producing realistic data through adversarial training (Rudolph et al., 2023).

The goal of artificial intelligence is a quickly developing branch of computer science, is to build intelligent machines that can carry out tasks that are normally associated with human intellect. Applications for this include driverless cars, medical diagnostics, and instructional resources (Lin et al., 2023). In particular, Chat GPT, which offers conversational features that mimic human interaction, is a milestone in AI-powered chat bots. Chat GPT is a promising tool for a variety of applications, including mathematics education, thanks to its extensive 175 billion parameters, which allow it to produce responses that are human-like and are based on the GPT-3 framework (Rudolph et al., 2023).

Chat GPT has enormous educational potential, especially in the area of mathematics. By creating customized content, assisting with problem-solving and raising student engagement, it helps teachers (Guo et al., 2023). Furthermore, Chat GPT's usefulness is further demonstrated by its capacity to support evaluations and feedback (Crust, 2023). Its user-friendly layout helps students understand difficult mathematical ideas with ease. But like every tool, Chat GPT has drawbacks, such as sporadic errors and a failure to completely understand contextual nuances. It must therefore be used in conjunction with conventional teaching techniques rather than in place of them. Referring to studies, Chat GPT should be responsibly included into educational settings to optimize its advantages and avoid its risks (Shahriar & Hayawi, 2023).

Teaching and learning procedures have been completely transformed by the incorporation of AI technologies like Chat GPT into the classroom. Chat GPT has the potential to improve student engagement and academic accomplishment by enabling tailored learning experiences, offering immediate feedback, and making difficult learning ideas accessible (Guo et al., 2023). Its acceptance is not without difficulties, though. A balanced strategy that blends

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technology innovation with human oversight is required because to limitations in accuracy, contextual knowledge, and the ethical consequences of its use (Shahriar & Hayawi, 2023). While optimizing its advantages and resolving its drawbacks, Chat GPT can be properly included into educational environments (Frieder et al., 2023).

The use of artificial intelligence in the Teaching and Learning environment especially in mathematics, in recent years, has drawn a lot of attention and changed how mathematics is taught and learned, among other subjects. AI is a significant advancement in using cutting-edge technologies to improve learning outcomes. Recent research highlights AI's enormous potential to help students at all levels improve their cognitive and mathematical skills (Cope et al., 2020). Through the use of cutting-edge technologies, artificial intelligence facilitates quicker information access and autonomous learning, enabling students to learn outside of the conventional classroom (Popenici & Kerr, 2017).

AI's contribution to education goes beyond just helping pupils. By adding resources like teachable agents and robotics, which produce dynamic and captivating learning environments, it also supports educators' efforts (Song, 2017). Although AI increases the effectiveness of education, it does not take the place of teachers; rather, it supports them by resolving issues with conventional teaching (Cope et al., 2020). Notwithstanding these benefits, there are drawbacks to using AI in education, including the need for resources, moral dilemmas, and problems with public opinion (Popenici & Kerr, 2017).

Particular advantages of using AI in math education include enhanced conceptual comprehension and problem-solving skills thanks to technologies like robotics and machine learning algorithms (Harper et al., 2021). However, there are plenty of opportunities to investigate AI's wider impact in mathematics education, given the majority of current research has concentrated on engineering contexts. By offering a thorough examination of AI's application in mathematics education, with a focus on its benefits, approaches, and thematic trends, this systematic literature review seeks to close these gaps. The results advance our knowledge of how AI can revolutionize teaching methods and stimulate more study in this area.

AI has been investigated using a variety of conceptual frames. As Poole et al. (1998) highlight, one of the most difficult aspects of defining AI is specifying the boundaries of artificiality and how computer intelligence differs fundamentally from human cognition. In general, AI represents the convergence of advances in computer science, machine learning, and information communication technologies, allowing computers to do activities that are similar to human capabilities (Chen et al., 2020).

Regarding the problem solving, Baker and Smith (2019) describe artificial intelligence as systems capable of performing cognitive processes such as problem solving and learning, which are typically associated with human intelligence. AI technologies include data mining, natural language processing, neural networks, and algorithms, all of which have important consequences for educational decision making (Hasanein &Abunasar, 2018).

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AI promotes an innovative approach to mathematics teaching by incorporating tools and approaches that help students enhance their cognitive and problem-solving abilities. Students can develop their imagination and critical thinking skills by using animation and digital technologies (Tashtoush et al., 2023). AI technologies, such as intelligent tutoring systems and robotics, have converted classrooms into environments that promote dynamic and interactive learning experiences, thus boosting teaching methods. These technologies also meet AI researchers' long-held objective of replicating human-like thinking, emotion, and problem-solving in computers while constantly pushing the bounds of machine autonomy (Chesani et al., 2017).

The significance of robots, a popular AI application, is especially noteworthy in mathematics teaching. Robotics has extended into a variety of fields, providing considerable benefits for student engagement and motivation. Children were given hands-on chances to learn various topics in an engaging manner. The research, robotics can improve middle school for learning instruction by encouraging deeper engagement as compared to standard teaching techniques (Casler, 2021). Despite these advantages, practical difficulties like as classroom space and teacher-to-student ratios limit the mainstream use of robotics in early education (Seckel et al., 2021).

The use of artificial intelligence also encourages the creation of tailored learning paths. Models such as Ouyang and Jiao's (2021) framework divide AI's educational roles into three categories: AI-directed to learner-as-recipient, AI-supported to learner as collaborator, and AI empowered. This concept supports many AI systems, highlighting their ability to adapt to different learning demands and improve student outcomes.

Research confirms the good influence of AI on students' academic performance, innovative problem solving abilities, and learning attitudes (Min et al., 2021). From kindergarten to higher education, AI tools like virtual assistants and AI-powered classroom environments have shown promise in improving conceptual understanding and incorporating sophisticated educational approaches (Ma & Siau, 2018). In early education, for example, AI can transform classrooms into "wisdom classrooms," where pupils receive personalized learning experiences based on their developmental stages.

Imitation is the most extensively utilized method for incorporating artificial intelligence into mathematics education, outperforming other methods such as systems, tools, teachable agents, autonomous agents, and comprehensive approaches. This is consistent with Zhong and Xia (2020), who noted the possibility for quick, evidence-based research in teaching subject matter's content understanding using fake expression. With nine studies highlighting the employment of intelligence, research reveals a largely positive influence, as noted by Seckel et al. (2021), who discovered that primary school instructors like the incorporation of robots in learning instruction.

Systems and tools are the second most prevalent AI technique in teaching. Various systems have been used in research, intelligent teaching systems that mimic the behavior of human educators (Hasanein & Abu, 2018), as well as integrated systems that combine micro worlds

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and intelligent support mechanisms. However, integrated systems have a limited reach, as stated by Rojano and Garcia Campos (2017), who discovered that such systems can fail to accommodate various student replies, particularly in algebraic or numerical contexts.

The complete approach to AI in mathematics teaching has yielded great results. Research stated that AI-assisted teaching considerably improves foundational of formal education system, which is corroborated by (Tashtoush et al., 2023) who emphasized AI's potential to promote learning analytics. However, difficulties such as privacy concerns and the large amount of data required for these systems exist, underscoring the importance of exercising caution when implementing them. Given these findings, future study should concentrate on maximizing robotics' potential in mathematics and other subject while teaching and the students are also interested to use and habitual for better performance in learning and problem solving activities.

The bulk of examined research was done in the United States and Mexico, with little representation from countries such as the United Kingdom, Sweden, and China (Harper et al., 2021). Some countries, such as Norway, have included programming into mathematics courses to supplement the usage of robots (Frider at el., 2023)). Nonetheless, more international study is needed to understand how AI affects mathematics education in different contexts, particularly in underrepresented places such as Asia. Educators are increasingly realizing the value of robots in developing kids' creativity, problem-solving skills, and mathematical thinking.

Effectiveness appeared as the most investigated issue in AI studies, highlighting its importance in mathematical instruction. Robotics, for example, has been found to increase student involvement and understanding when compared to traditional teaching techniques (Casler, 2018). However, Lopez et al. (2020) emphasize that effective implementation necessitates thorough planning and proper tactics in educational activities and action.

In addition, research has looked on AI tactics, roles, and conceptual understandings in education. Teachers' programming abilities may critical for successfully integrating AI tools into the classroom. In order to provide relevant and interactive learning experiences, educators must also develop a deep conceptual understanding of artificial intelligence. The use of artificial intelligence not only boosts student creativity and critical thinking, but it also prepares students for a technologically enhanced future (Seckel et al., 2021).

Discussion

Artificial Intelligence is a rapidly evolving field that encompasses a broad range of technologies, from machine learning and natural language processing to robotics and computer vision. Its applications span many industries, including healthcare, finance, entertainment, transportation, and beyond. AI refers to the simulation of human intelligence in machines designed to think and act like humans. It involves creating algorithms and models that enable machines to perform tasks that would normally require human intelligence, such as understanding language, recognizing images, making decisions, and solving problems.

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AI is poised to significantly impact many aspects of society, offering both remarkable opportunities and substantial challenges. The potentiality of artificial intelligence lies in balancing innovation with ethical considerations, addressing concerns like bias, job displacement, and privacy, and ensuring that AI is developed and used in a way that benefits humanity as a whole. As AI technology continues to evolve, its future promises to be both exciting and transformative, but also requires careful stewardship to ensure that its development aligns with societal norms and values.

Contemporary society is full of modern innovation and technology, each and every academician need to good command and knowledge of devices for better performance in teaching and learning activities. Artificial intelligence is the replication of human intelligence within machines, designed to think and do jobs that normally require human input. Artificial intelligence systems rely on data and experience to perform effectively, learning and developing on their own through usage. In mathematics teaching, it has various benefits. It encourages students' critical thinking and accountability, increases their comprehension of key ideas in geometry, mathematics, and statistics, and strengthens interpersonal skills and social relationships. AI makes it easier to acquire knowledge and engage with mathematical concepts by building dynamic learning environments.

The researchers emphasize numerous AI implementation methodologies, such as systems, teachable agents, autonomous agents, machine learning models, digital technology tools, and comprehensive frameworks. Robotics emerges as the most popular method among students, professors, and academics because to its hands-on and fascinating applications.

The use of artificial intelligence incorporation into teaching and learning has achieved global traction. Many countries have implemented artificial intelligence to improve educational quality, with the United States leading in research papers over the last five years, followed by Mexico and Canada and all over the world. While numerous aspects of AI such as its benefits, limitations, and implementation strategies are investigated, its effectiveness remains the most commonly studied topic. Understanding this effectiveness is critical for increasing AI's role in education. When proved successful, AI can be used more generally to transform learning experiences.

Particularly, Chat GPT has a lot of educational potential since it allows teachers and students to connect while exploring mathematical ideas. Its implementation, though, needs to be carefully controlled to prevent making students' duties needlessly more complicated. Teachers and students should take advantage of artificial intelligence capabilities to improve teaching and learning comprehension and concentrate on fundamental ideas rather than using it as their only instrument.

Using artificial intelligence simplifies difficult subjects and improves student understanding, making teaching and learning more dynamic, innovative, and effective. Artificial intelligence has the potential to revolutionize mathematics education and spur wider use in classrooms across the globe with more research and careful implementation. Artificial intelligence becomes a strong tool in teaching and learning in formal education system from beginners to

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higher education scholars. To enhance the mental power artificial intelligence have to limited control in formal education system.

Conclusion

The revolutionary potential of artificial intelligence in education system, educational activities, educational actions shown by this systematic review, which demonstrates how it may improve teaching strategies, encourage individualized learning, and raise student engagement. Teachers can overcome conventional difficulties and establish dynamic, interactive learning environments that meet the demands of a wide range of students by incorporating technologies like robotics, intelligent tutoring systems, and generative AI models like Chat GPT. But the study also identifies important obstacles, such as differing technological skill levels among stakeholders, resource limitations, and ethical issues. These drawbacks highlight the necessity of a well-rounded strategy that incorporates cutting-edge AI applications with strong educational frameworks and moral protections.

Artificial Intelligence holds wonderful potential to transform the field of education by enhancing both teaching and learning experiences. The integration of AI technologies in educational settings is already starting to transform traditional approaches, offering a wide array of benefits for students, teachers, and institutions. However, as with any technological innovation, AI in education must be approached thoughtfully to maximize its potential while addressing potential challenges.

The future of AI in education is promising, with the potential to create more engaging, efficient, and equitable learning environments. As AI technologies continue to evolve, their role in education will likely expand, offering even more sophisticated tools to enhance the learning experience. However, to ensure that AI benefits all learners, it will be important to address the challenges of equity, data privacy, and ethical considerations, while maintaining a central focus on the importance of human educators.

The results add to the expanding corpus of work on AI in education and provide useful information for researchers, educators, and policymakers. To guarantee that AI technologies are used responsibly and fairly, future initiatives should concentrate on resolving contextual and cultural differences, investigating scalable solutions, and encouraging interdisciplinary cooperation. By doing this, AI has the potential to be a potent ally in revolutionizing mathematics instruction and furthering international educational objectives. At present use of artificial intelligence is common in teaching and learning environment. Excessive use of artificial intelligence may decrease the mental power and scholars become lead to dependency role in academic field.

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