A Review on Implementation of Artificial Intelligence in Education

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ABSTRACT

Artificial Intelligence (AI) implementation in education is a rapidly growing field that has gained significant attention from educators. AI-empowered systems, such as virtual classrooms, smart campuses, adaptive learning, and teaching evaluation, have the potential to revolutionize the education sector. Virtual classrooms provide a contextual learning environment for students, offering flexibility in course attendance and engaging students' senses. Smart campuses focus on sustainability and energy efficiency, reducing the environmental impact of campus buildings. Adaptive learning allows for personalized learning experiences, addressing individual student needs and improving learning efficiency. AI technology also enhances teaching evaluation by automating tasks such as generating exam questions and evaluating assignments, providing accurate and efficient feedback to students. The benefits of AI in education include personalized teaching and learning, improved teaching efficiency, reduced workload for teachers, and enhanced campus management and services. However, challenges such as ensuring fairness, addressing ethical and safety concerns, and developing students' autonomous learning abilities need to be addressed. The future scope of AI in education is promising, with continuous development in AI technology expected to further improve its implementation and revolutionize the education system.

Keywords: Artificial intelligence, education, benefits, challenges

INTRODUCTION

Artificial intelligence (AI) implementation in different sectors seems the most promising advancement of the digital system. AI combines the intelligence of machines with the intelligence of human groups (Chan & Zary, 2019). Artificial intelligence in Education (AIEd) is one of the emerging fields in the education sector. In recent years, AI implementation in education has received a lot of attention from educators and other stakeholders.

Artificial Intelligence is rapidly developing and becoming more prevalent in our daily lives through various devices and applications, such as Google Duplex and FaceApp. Intelligent appliances like independent and automatic vacuum cleaners are also examples of AI (Tanveer et al., 2020). Similarly, airlines use AI for their basic customer services to collect data and direct it to customers. In addition, automobiles use AI aggressively to provide enhanced customer experience. AI is also being used in education, as seen with humanoid robots like Yuki and Sophia (Huisman et al., 2021).

Over the past ten years, the utilization of artificial intelligence (AI) in higher education has experienced substantial growth in the country. This trend is expected to persist as AI capabilities advance and universities become more accustomed to incorporating and utilizing this technology in their academic and administrative operations (Slimi, 2021). The integration of AI in higher education offers numerous advantages, including improved teaching and learning experiences for students, enhanced administrative

efficiency for universities administrators, and more precise evaluation of student learning outcomes.

Nevertheless, it is crucial for universities to acknowledge and address potential drawbacks associated with AI in higher education in order to fully harness its potential (Maanvizhi et al., 2020).

Universities must possess a holistic comprehension of the possible effects of AI in higher education, encompassing teaching, learning experiences, and administrative tasks and activities. Moving forward, it is crucial to ensure that universities acquire the essential resources and infrastructure to fully leverage AI in higher education (Wang et al., 2023).

Advancements in technology, particularly AI, have greatly transformed educational practices in the twenty-first century. One notable development is the ability to generate realistic and high-quality digital content without human intervention. This is made possible through the use of Generative Pre-trained Transformer (GPT) models, which are part of Generative Artificial Intelligence (GAI). These models utilize vast amounts of publicly available digital content data to produce human-like text in multiple languages (Logan, 2020). They can convincingly generate creative writing, ranging from paragraphs to full research articles, on a wide range of topics.

GPT-3, in particular, has emerged as a fundamental natural language processing engine and serves as the basis for the recently developed language model ChatGPT (Thurzo et al., 2023). This model has gathered attention from various fields, including education, as it is capable of generating human-like text based on given prompts or contexts. It can be utilized for various natural language processing tasks, such as completing text, generating conversations, and translating languages (Rasul et al., 2023).

The integration of Generative AI such as ChatGPT in educational settings has evoked a range of emotions among researchers and educator. This Generative AI advancement has the potential to transform current educational practices, leading to both excitement and concern. While some educators see ChatGPT and similar generative AI as the future of teaching, learning, and educational research, others are apprehensive, fearing that it may undermine traditional educational activities and hinder critical thinking skills in both teachers and students (Rasul et al., 2023).

This is a review paper that focuses on the implementation of AI in education including various effects of AI in education, followed by a discussion on the benefits of AI in education, challenges of AI in education, future scope, and finally conclusion.

Artificial Intelligence in Education

The history of AI goes back to the 1950s when the term "Artificial intelligence" was introduced for the first time. The assumption of studying artificial intelligence is based on the belief that all aspects of learning and intelligence can be precisely described, allowing machines to simulate them (Tahiru, 2021). The goal is to teach machines how to use language, form concepts, solve problems that were previously only possible for humans, and improve their own abilities (Robinson, 2020).

According to Baker and Smith (2019), AI refers to computers that can perform cognitive tasks associated with human minds, such as learning and problem-solving. AI encompasses a variety of technologies and methods, including machine learning, natural language processing, data mining, neural networks, and algorithms (Joshi et al., 2021).

There are two main categories of AI: weak or domain-specific, which addresses specific issues, and another one is strong or general, which can perform intelligent actions in a broad range of areas. AI experts warn that the use of strong AI could potentially replace human teachers. On the contrary, experts also believe that

AI in education will assist the teacher and learner to make their experience better (Nsoh et al., 2023). The increasing amount of research on AI and education is primarily centered around utilizing AI technology to aid in teaching, establish a technologically advanced campus, and achieve intelligent learning, teaching, and management (Huisman et al., 2021). Various AI technologies such as image recognition, face recognition, and adaptive learning are being implemented in the education sector (Zawacki-Richter et al., 2019). These advancements are enhancing the efficiency of teachers' work and improving the learning experience of students. Thus, the strong AI in education can impact and influence various domains including Virtual classroom, smart campuses, adaptive learning, and teaching evaluation.

VIRTUAL CLASSROOM

The integration of AI into virtual classrooms is set to revolutionize the way students learn and interact with their instructors and peers, thanks to the growing demand for online education. Virtual classrooms utilize technology to replicate teaching scenarios that are challenging to explain. They can also present natural phenomena or changes in things that are difficult or impossible to observe in real life. This creates a contextual learning environment for students. The multi-dimensional presentation of learning content engages students' senses, including vision, and hearing, and makes abstract concepts and theories more tangible. This stimulates students' interest in learning and improves teaching effectiveness. The virtual classroom offers flexibility in course attendance, as students can choose to attend lectures on campus or from home (Chagnon-Lessard et al., 2021).

The virtual classroom industry can be greatly influenced by AI in terms of personalizing learning experiences. By analyzing students' learning patterns, strengths, and weaknesses, AI algorithms can create customized learning paths for each individual (Maanvizhi et al., 2020). This personalized approach ensures that students grasp concepts before moving on to more advanced topics, allowing them to progress at their own pace. Consequently, this level of customization can enhance student engagement and improve learning outcomes (Nsoh et al., 2023).

Virtual classrooms may exist in two forms synchronous and asynchronous. Live mode is utilized for synchronous virtual learning, which encompasses online seminars, communication, and mobile connectivity. Demonstrations, discussions, and lectures can be conducted synchronously, enabling learners and mentors to participate in one-on-one and group discussions (Gedera, 2014; Maanvizhi et al., 2020). This system facilitates immediate feedback through just-in-time clarification and information, which aids in assessing student knowledge and directing mentors to focus on areas that require improvement. Video conferencing is used to track attendance in synchronous learning. Whereas the asynchronous mode offers flexible learning methods, learners are able to attain their education at their own convenience and speed (Nsoh et al., 2023). This approach allows for greater control over the order of activities and is not bound by time constraints. Throughout the learning process, individuals can access online materials without the need for downloading. Direct contact with mentors and other participants is optional, as learners can choose to engage with reading resources, video lessons, sessions, and discussions at their preferred time (Sharma et al., 2020). Communication between candidates is facilitated through personal messages and emails, creating an asynchronous form of virtual learning.

In a virtual classroom, students have the option to choose between synchronous and asynchronous learning. If they opt for synchronous learning, they can attend scheduled online classes led by a teacher and interact with their peers in real-time (Gedera, 2014). This can be done using any internet-enabled device. On the other hand, if they prefer asynchronous learning, they can access learning materials at their own pace and convenience from anywhere, without being confined to a physical classroom (Tyrväinen et al., 2021). AI can significantly impact the assessment and feedback process.

Traditional assessment methods, such as quizzes and exams, can be time-consuming for both students and

instructors (Maanvizhi et al., 2020). However, AI-powered assessment tools can analyze student performance in real-time, providing instant feedback and identifying areas where students may require additional support. This immediate feedback helps students understand their areas of improvement, enabling instructors to adjust their teaching strategies accordingly (Tyrväinen et al., 2021).

The incorporation of AI into virtual classrooms has the potential to enhance learning experiences by offering more sophisticated and captivating opportunities. By utilizing artificial intelligence, virtual reality (VR) and augmented reality (AR) technologies can generate interactive and stimulating learning environments that surpass conventional text and video-based materials.

These immersive encounters enable students to grasp intricate concepts more effectively and retain information with greater efficiency (Nsoh et al., 2023).

SMART CAMPUSES

The campus is an important place for talent training, and the application of AI technology to build a smart campus has become a new development trend in the education field. Campus buildings are a significant asset, but they also contribute to almost 40% of energy consumption and emissions in developed nations (Chagnon-Lessard et al., 2021). By utilizing building resources in a smart, sustainable, and responsible manner using AI can result in substantial reductions in energy and environmental footprints can be achieved during construction, use, and end-of-life phases. Smart buildings are typically characterized by their advanced interactivity and connectivity, sustainability, and energy and comfort performance, although various definitions have been proposed over time (Sneesl et al., 2022).

Smart campuses impact the sustainability aspect because buildings construction is responsible for the major global energy consumption. The smart campus is proposed to improve the building's energy efficiency. One of the most popular sustainability actions and initiatives on university campuses is the reduction of building energy consumption (Polin et al., 2023).

Smart campuses may impact the business in five domains, which include smart economy, smart society, smart technology, smart governance, and smart environment. The economy domain is concerned with capital investments that are responsible for the efficient provision of organizations' services (Chagnon-Lessard et al., 2021). Universities need to support entrepreneurial activities while keeping their main role as academic services. The societal domain covers the social issues relating to university campus users. It covers issues relating to health, access to resources, opportunities, and empowering citizens in managing smart campuses. The environmental domain is concerned with improving the natural and built environment (Polin et al., 2023).

ADAPTIVE LEARNING

Adaptive learning allows students to access customized resources and activities to address their unique learning needs. Adaptive learning allows a variety of activities, opportunities, evaluations, and descriptive feedback from the tutor. This mode of study allows more one-to-one student-teacher interaction to develop specific student skills (Zawacki-Richter et al., 2019).

Implementing AI in education supports adaptive learning, which attempts to incorporate all aspects of teaching, learning, and practice to facilitate students' learning experiences. This system collects student learning behavior data and proposes the optimal learning path for students. Implementation of an adaptive learning system in the classroom environment overcomes student-teacher interaction problems and provides a unique learning experience to the student (Alqahtani et al., 2021).

English teaching platforms used AI to analyze the needs and knowledge of students. Thus, AI-based learning systems adjust teaching progress and content through AI algorithms. Using AI in teaching the English language showed significant improvement in students' results (Wang et al., 2023).

TEACHING EVALUATION

Teaching evaluation is defined as a systematic process for reviewing performance and providing constructive feedback to students on their assessments. In traditional teaching, it takes a long time for teachers to complete the assessment task. But AI makes teaching evaluation more efficient and scientific with a high level of accuracy (Zawacki-Richter et al., 2019). AI assists in generating exam questions and automatically corrects test papers and assignments. Using AI in student evaluation improves accuracy and provides a good level of efficiency which is essential to provide timely feedback to students on their assessments (Nsoh et al., 2023). AI assists tutors in not only generating several versions of exams but also automatically correcting assignments which is usually a time-consuming task for teachers. IELTS and TOFEL are very popular examples that use AI in conducting and marking exams. AI-based marking is unbiased and scores intelligent sentences by sentence correction (Joshi et al., 2021).

Students can use AI to improve their English-speaking skills through spoken English assessment which provides complete feedback on student sentence structure, grammar, pronunciation, and overall score (Hamid et al., 2022). The implementation of an AI-powered system for evaluating physical education offers novel strategies for the advancement and growth of contemporary sports technology. Additionally, it furnishes theoretical backing and direction for the continued progress of educational technology in the field of science (Chagnon-Lessard et al., 2021).

Benefits of AI in Education

AI technology has become extensively utilized in various domains, including the education sector, due to its continuous advancements. AI in education is crucial for promoting personalized teaching and learning. It has revolutionized the teaching methods of educators and the learning approaches of students (Zawacki-Richter et al., 2019). By tailoring learning plans to individual student's needs and circumstances, AI ensures a customized learning experience. Additionally, it offers immersive learning opportunities and intelligent tracking systems that enhance students' learning capabilities and effectiveness (Nsoh et al., 2023).

AI has the capability to analyze students' daily and test performance using big data and machine learning. It can then offer personalized teaching guidance to address their areas of difficulty and knowledge gaps (Khosravi et al., 2022). This approach reduces learning time and enhances learning efficiency. Adaptive learning technology facilitates one-to-one personalized teaching between machines and students. Intelligent adaptive learning technology, an AI education technology, replicates the one-to-one teaching process between teachers and students, enabling the learning system to provide personalized teaching (Tanveer et al., 2020).

In addition, AI in education has the potential to alleviate the workload of teachers and allow them to prioritize humanistic experience. Currently, teachers spend a significant amount of time grading homework and exams, which takes away from their teaching, research, and interaction with students (Rasul et al., 2023). However, with the help of intelligent tutor systems, assessment systems, educational robots, and other AI technologies, teachers can delegate these repetitive tasks. This not only reduces the burden on teachers but also allows them to focus on other important aspects of their profession, such as fostering meaningful connections with students and facilitating knowledge transfer without being overwhelmed (Tahiru, 2021).

AI technology can enhance teachers' capabilities, enabling them to provide personalized and precise

teaching guidance to students, which was not possible before. This technology also significantly improves the efficiency of knowledge imparting (Chagnon-Lessard et al., 2021). Moreover, AI allows teachers to allocate more time and energy to communicating with students, enabling them to focus on nurturing students' morality and abilities. It also provides teachers with more time and energy to concentrate on the overall physical and mental development of each student (Tanveer et al., 2020). As a result, teachers' roles have shifted from being knowledge disseminators to facilitators of student learning, aiming to achieve student-centeredness and provide more compassionate care to students.

The introduction of AI technology has revolutionized traditional education and teaching methods, bringing about significant changes. AI technologies such as face recognition, text recognition, human body recognition, voice interaction, and AR have provided valuable technical support for the development of smart campuses (Akinwalere & Ivanov, 2022). These technologies have greatly enhanced campus management and services, including campus safety, classroom monitoring, and attendance tracking. As a result, students and teachers can enjoy a higher-quality teaching and learning experience, while also reducing management costs. In particular, the use of face recognition and human body recognition technology has greatly improved the management of student hostels, as it allows for easier identification of outsiders and enhances overall security (Tahiru, 2021).

In today's digital era, it is crucial to keep pace with educational advancements, and one such advancement is the adoption of Learning Management Systems (LMS). These systems offer a centralized and user-friendly platform for effectively managing all online activities within an educational institute (Rasul et al., 2023). A student can receive assistance by utilizing an intelligent digital tutor powered by AI. This tutor not only aids in solving problems but also provides the correct answers. Artificial Intelligence enables the creation of a learning management system that comprehends students' thought processes and enhances their learning experience (Akinwalere & Ivanov, 2022). Nowadays, LMS systems can assist teachers in content creation, enable parents to monitor their child's progress and evaluate students using AI technology. AI powered LMSs have proven to be beneficial for teachers and students alike. They have significantly reduced classroom management time for teachers, while also helping parents gain a better understanding of their child's progress (Khosravi et al., 2022). Additionally, AI powered LMSs have lightened the workload for teachers.

Challenges of AI in Education

AI in education offers several opportunities and benefits but it also faces some exceptional challenges. Ensuring fairness is crucial when implementing AI in education. The advancement of AI poses a potential risk for developing countries, as it may further widen educational disparities caused by new technologies. Similar to the digital divide that separates those with internet access from those without, the growing algorithmic divide now poses a threat to depriving many individuals of educational opportunities offered by AI. Since most AI algorithms originate from developed nations, they may not adequately account for the unique circumstances of developing countries and cannot be directly implemented. The education sector must overcome this issue for smooth implementation of AI in education (Chagnon-Lessard et al., 2021; Tanveer et al., 2020).

In addition, paying attention to ethical and safety concerns is crucial when it comes to the collection, utilization, and distribution of data. The emergence of AI has brought forth numerous ethical issues, such as delivering personalized guidance to students, gathering personal information, safeguarding data privacy, and determining ownership of responsibilities and data-feeding algorithms. Supervision and management of AI is the ethical responsibility of the administrators (Chan & Zary, 2019). Furthermore, AI-assisted teaching requires teachers to acquire new digital teaching skills in order to effectively utilize it for promoting teaching reform. It aids teachers in their preparation for incorporating AI into their teaching practices (Tahiru, 2021).

The evolving learning styles demand a greater level of autonomous learning ability from students. In the era of AI, learning will revolve around students, placing them in a position of power and control during learning activities (Nsoh et al., 2023). Similarly, students have the ability to create customized learning plans using the intelligent teaching system. They can independently choose what they want to learn, organize their learning schedule, and engage in group collaborative learning (Maanvizhi et al., 2020). In order to meet the demands of individualized learning methods, students need to possess a higher level of self-regulation and self-management (Chan & Zary, 2019). Therefore, teachers should also focus on developing students' independent learning skills during the teaching process.

Future Scope

The implementation of AI in education has a larger number of benefits and creates extra space in instructional delivery system. The potential of AI to revolutionize education is vast. It can personalize learning experiences, automate administrative tasks, enhance accessibility, and offer instant feedback to students and teachers alike. Continuous development in AI technology will also improve its implementation aspect in the education sector which may overcome the current challenges and obstacles. Improvement in AI will allow tutors to prepare lessons and teaching tasks, whereas other administrative tasks can be taken care of by an AI system. AI can help in improving the education system by automating the evaluation process. In addition, AI will offer a high level of flexibility to learners according to their needs and individual needs. It is also argued that by 2030 the education system could be barely recognizable due to transformation (Nsoh et al., 2023).

The advancements in machine learning have enabled Generative Artificial Intelligence (GAI) to produce a wide range of content, including images, videos, music, and even text. This has opened new possibilities for various industries, such as entertainment, advertising, and design, as they can now easily generate unique and customized content to meet their specific needs. Overall, the progress in machine learning and the development of generative artificial intelligence have greatly enhanced the capabilities of digital content generation, paving the way for further innovation and creativity in the future in all industries including education (Rasul et al., 2023). Thus, ChatGPT has the greater potential to be a powerful tool in the field of education.

CONCLUSION

The implementation of artificial intelligence (AI) in education has the potential to revolutionize the way we teach and learn. AI technologies such as virtual classrooms, smart campuses, adaptive learning, and teaching evaluation offer numerous benefits for both students and teachers. However, the implementation of AI in education also faces challenges such as ensuring fairness, addressing ethical and safety concerns, and adapting to evolving learning styles. It is crucial for educational institutions to address these challenges and provide the necessary resources and infrastructure to fully leverage the potential of AI in education. Looking ahead, the future scope of AI in education is promising. Continuous development in AI technology will further improve its implementation and overcome current challenges. AI has the potential to personalize learning experiences, automate administrative tasks, enhance accessibility, and offer instant feedback.

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