Analyzing the Impacts of Artificial Intelligence on Education

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ABSTRACT

Artificial Intelligence (AI) is a rapidly growing field that encompasses various disciplines, including mathematics, engineering, computer science, philosophy, and linguistics. It has significantly impacted various sectors, including education, by addressing issues such as content accessibility and teacher deficiency. AI implementation and adoption are inevitable in the education sector, and it includes technologies such as smart learning, tutoring systems, social robots, virtual facilitators, online learning environments, learning management systems, and learning analytics. As machines gain learning abilities, they may soon become super-intelligent. AI researchers and government authorities should promote further research to improve the pace and rate of human intelligence development through education, ensuring that individuals do not feel inferior or obsolete in the face of AI research and technology advancements. This will prevent individuals from feeling inferior, irrelevant, or obsolete in the face of AI advancements.

Keywords: Effects, Artificial Intelligence, Education, Administration, Learning

INTRODUCTION

Education is one of society's most important industries. It is interconnected with all other industries and has a significant impact on them. Because of this significance, education is essential for all societal cliques, regardless of obstacles. Artificial intelligence is transforming every aspect of society, including education. Many countries, including Singapore, Malaysia, and South Korea, have been compelled by technology to integrate technology consumption in the educational sector. It is possible to argue that the future of education is inextricably linked to technological breakthroughs. The AI sector has piqued the interest of economists, political analysts, military consultants, security specialists, and educators. This study will evaluate AI applications in order to further investigate AI applications in education, their scope in education, and learning.

Artificial Intelligence

Artificial intelligence (AI) refers to intelligence displayed by machines rather than people. Human intelligence possesses consciousness and emotions, but animal intelligence does not. John MsCarthy coined the term AI in 1955, defining it as "making a machine behave in ways that would be called intelligent if a human were so behaving"[1]. Alan Turing popularized the idea that computing machines could one day reason like humans [2]. He felt that in the future, automated computers would perform computations that humans would not be able to complete sensibly. Computing machines use binary digits, and the essential challenge is how binary calculations will have human meanings. Playing games and proving theorems are the first steps toward teaching computer machines to think logically or intelligently like humans. AI is frequently used to refer to machines that can execute cognitive activities associated with the human mind, such as problem solving and learning [3]. An artificial agent is a technology that examines its surroundings and takes decisions in order

to enhance its chances of achieving its goals [4]. With the passage of time and advancement in the fields of AI, tasks requiring intelligence are commonly excluded from AI but have been given the label artificial intelligence effect [5], because the tasks they are performing have become their routine labor and they have become routine technology [6]. AI is the name given to advanced machines that are capable of understanding human speech. Other computers that can be regarded as AI include those that aid in high-level strategic games and self-driving autos [7]. The representation of information, reasoning, planning, learning and processing, and the ability to use things are all important goals of AI research [8].

It is obvious that AI is a rapidly expanding field that spans multiple disciplines ranging from mathematics to engineering and computer science to philosophy and linguistics. Because of its interdisciplinary char*acter, there has been limited agreement among AI professionals on its common definition and interpretation. As the research progresses, it will have several uses in diverse fields. It aids in the process of successful decision making in games, for example, and extends its applications further into the realm of education and learning. Considering the AI tools and services, its presence in higher education has been observed. Surprisingly, many educators are still unaware of its significance, extent, and contents [9].

Artificial Intelligence and Education

As AI applications have become increasingly important in a variety of industries, the education sector has gained special attention in recent years. IT technologies and their uses are highlighted as a significant advance in education. AI technologies are welcomed in education, and their application in learning and teaching is expanding on a regular basis. According to the Horizon research issued in 2018, AI applications would grow by 43% between 2018 and 2022 [10]. According to the same organization's report, the surge in AI technology usage will be significantly more than previously expected. The relevance of AI in education cannot be overstated, and its function in the field is inextricably related to its future. Education has accepted AI in some form or another, but many educators are unsure of what it is [9]. AI is unavoidable in education, and applications exist to help instructors fulfill goals. The topic of how AI will affect education remains unanswered. AI is a branch of machine learning that consists of software capable of pattern recognition, prediction, and learning to create a new pattern or making a choice on its own. In other words, it has the knowledge to respond to the situation, which was not a program with their initial design. AI achieves this through rational agents, which are

responsible for goal-oriented behavior [11]. According to researchers, learning is a social activity that involves collaboration and interaction [12]. In education, there are three main areas of AI applications: personal tutors, collaborative learning, and virtual reality. Online collaboration must be controlled. Intelligent virtual reality could engage and guide students in a game-based environment of learning and reliable virtual reality, where the job of professors, facilitators, and others could be performed by virtual agents in distant virtual labs [13]. AI not only facilitates the process of teaching and learning through virtual rooms, but it may also be utilized in evaluation, particularly if there is a big amount of student data. In contrast to the traditional stop-and-test method, it can generate just-in-time assessment and feedback. Students' learning achievements can be recorded and examined at any time using AI technologies. It features algorithms for predicting students' progress, chances of obtaining grades, and assignment concerns with a high degree of certainty [14]. AI has a surprising impact on schooling. To keep up with the modern advanced world, firms in the education sector must employ AI technology for education and learning.

Impact of Artificial Intelligence in Education

This section looks at how AI affects administration, instruction, and learning.

i. Education Administration

AI use in education, in various forms and for diverse purposes, has had a significant impact on the execution of administrative and management responsibilities in education. It has made it easier for instructors or teachers to undertake administrative tasks like grading and delivering feedback to pupils. Similar capabilities and functionalities are accessible on platforms such as Knewton, which allow teachers to evaluate performance, grade, and provide feedback to students to guarantee ongoing growth in learning [15]. AI has made administrative duties easier to complete, as well as improved teacher or instructor efficiency and effectiveness in offering instructions and direction to pupils.

Intelligent tutoring systems offer a wide range of functions that allow teachers to do a variety of administrative activities, such as grading and providing feedback [16]. Other AI-powered programs, such as Grammarly, Ecree, PaperRater, and TurnItIn, among others, provide instructors with the functionality to perform various administrative functions, such as plagiarism checking, rating and grading, and providing students with feedback on areas for improvement. AI has significantly reduced the paperwork and workload on instructors, particularly in the performance of various administrative functions, allowing them to focus on their core mandate, instruction, and dissemination of content and materials in accordance with the institution's or nationally mandated curriculum [15].

Instruction

An examination of several research publications reveals a quick adoption and use of AI in various forms for educational purposes or as a pedagogical aid by instructors. The use of artificial intelligence (AI) for educational purposes or as a pedagogical tool has had a significant impact on this element of education. According to the various papers studied and assessed, it has improved the efficacy, efficiency, and quality of work done by teachers. Within this context, efficiency and quality are measured by the delivery of relevant content in accordance with the curriculum and in accordance with the learner's specific needs and capabilities, whereas effectiveness is measured by the implied uptake and retention or achievement of learning by the students or learners. Taking these operational definitions and descriptions of efficiency, quality, and effectiveness into account, this study concludes that AI has indeed aided in the realization of quality, effectiveness, and efficiency in education or teaching. AI has made it possible for instructions to be more effective.

According to Rus et al., ITS that leverage evidence-based or empirical-evidence backed methods, such as substantial use of cognition and learning models, have ensured excellent absorption and retention of materials or optimized learning among students [16]. Indeed, programs like DeepTutor and AutoTutor, as discussed by Rus et al., are learner-centered programs that encourage customization and personalized content based on the learner's capabilities and needs, thereby improving the learner's experience and fostering the achievement of the set learning objectives. Pokrivcakova's arguments also show that AI has improved instructional quality and effectiveness because modern systems are technology-based adaptive systems, which means that the materials or content presented are determined by the learners' needs, ensuring an optimized learning experience [17].

AI ensures improved course content dissemination, from curriculum formulation to actual delivery of content or instructions, particularly in online and web-based learning systems. According to Mikropoulos and Natsis, the development and application of AI, particularly integration in online and web-based learning platforms, has resulted in the

realization of advances in instruction because AI has enabled the development and use of better pedagogical tools for these platforms. Peredo et al. discuss the significance of adaptive IWEBS and instructions based on observed and learned learner behavior, which enables platforms to improve the quality of learning and instructional effectiveness due to the customization capabilities of the AI-backed pedagogical methods used [18]. The impact of AI on education, specifically on improving instructional effectiveness and efficiency, is summarized by Roll and Wylie, who observed that AI, particularly tutoring or instructional systems, have been designed with the goal of solving the various challenges eminent in one-on-one teacher-student tutoring, thereby improving the overall quality of instructors' work. Other significant themes or ways in which AI has altered the quality of instructors' work were identified as a result of the investigation. Some studies highlighted the significance of technology, specifically artificial intelligence (AI), in supporting academic integrity, such as the use of plagiarism checkers and proctoring and online supervision of students' actions on platforms such as Grammarly, Turnitin, and White Smoke, among others. Other studies have highlighted the benefits of simulation, team-viewer applications, and gamification, which are closely related to VR and 3-D technologies or even leveraging the technologies to the pursuit of instructional effectiveness and efficiency [19].

Learning

Another aspect of education covered by this research that has been significantly influenced by the implementation and use of AI is students' learning experiences. Indeed, in summarizing the effect of AI on learning, Rus et al. observed that ITS fosters deep learning because working with the conversational agents that form an integral part of the system will probe and prod students until they are able to adequately explain themselves in detail, including the reasoning behind their position, thereby improving the uptake and retention of information [16]. This and other research illustrate the numerous benefits of AI in students' learning experiences in various ways. AI enables the tracking of learning progression, including knowledge and understanding, and uses the findings to improve the system's capabilities to customize content to the students' needs and capabilities, which motivates students and leverages personal capabilities to improve uptake and retention [16]. Pokrivcakova, for example, observed that AI has enabled the development and use of intelligent learning systems and adaptive content customized for each student's learning needs and capabilities, such as intelligent virtual reality and its use in simulation teaching and learning, which has been shown to have a positive impact on learning. The same advantages of simulation and other related technologies to learning are discussed by Mikropoulos and Natsis, who observed that simulation and other related technologies provide students with practical exposure and experiential learning, which improves the quality of learning, with the studies reviewed by the researchers in their article highlighting the key advantages of VR, 3-D technology in learning, such as usability, enjoyment, learner enthusiasm, and so on. Other research, which focused on web-based platforms, showed other benefits of AI and its impact on learning quality. For example, Kahraman found that the key concepts or components of AIWBES, such as adaptive hypermedia, information changing, class monitoring, and collaborative learning, among others, stimulate student participation, interactions, and learning [18]. Peredo et al. explored the association between AIWBE and increased learning quality and emphasized the similar benefits of web-based platforms because the system adjusts and customizes instructions and content to detected and assessed learner behaviors. Student Tracker middleware, for example, will work with online learner information such as completed activities, learning tracking, time, and other

components to adjust pedagogical techniques for the AIWBE [19]. Other advantages of web-based platforms and documented learning outcomes include increased worldwide access to education and cost [20]. In overall, these platforms have provided a better learning experience. Furthermore, AI has been utilized to encourage and foster honesty and academic integrity, as well as to improve studies and learning through the use of revision and writing assistants, such as Turnitin tools, such as revision aid and Pearson's Write-to-Learn tools. Other research, however, have highlighted the potential negative or deleterious consequences of AI on learning. Crowe et al. discovered in their study that AI may induce dishonesty and risk academic integrity by facilitating or enabling students to use paper mills and paper churning sites or platforms. However, as shown in other studies, the benefits of AI for learning outweigh the drawbacks.

CONCLUSION

AI has significantly impacted various sectors, including education, by addressing issues like content accessibility and teacher deficiency. AI implementation and adoption are inevitable in the education sector, with technologies such as smart learning, tutoring systems, and social robots contributing significantly. Other intelligent technologies include virtual facilitators, online learning environments, learning management systems, and learning analytics. As machines gain learning ability, they may soon become super-intelligent. AI researchers and government authorities should promote further research to improve the pace and rate of human intelligence development through education, ensuring that individuals do not feel inferior or obsolete in the face of AI advancements.

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