The Impact of AI on Teaching and Learning in Higher Education Technology

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Thanks to AI, students may now study whenever and wherever they like. Personalized feedback on assignments, quizzes, and other assessments can be generated using AI algorithms and utilised as a teaching tool to help students succeed. This study examined the impact of artificial intelligence in higher education teaching and learning. This study focuses on the impact of new technologies on student learning and educational institutions. With the rapid adoption of new technologies in higher education, as well as recent technological advancements, it is possible to forecast the future of higher education in a world where artificial intelligence is ubiquitous. Administration, student support, teaching, and learning can all benefit from the use of these technologies; we identify some challenges that higher education institutions and students may face, and we consider potential research directions.

Keywords: artificial intelligence, machine learning, higher education technology, teaching, learning analytics

INTRODUCTION

The future of higher education is inextricably linked to the development of new technologies and computing power of new intelligent machines. AI-based applications have become an integral part of our daily life, making it clear that technology is becoming increasingly important (Rodríguez-Hernández et al., 2021). An increasing number of educational applications for artificial intelligence have emerged in the last few years. Due to advancements in artificial intelligence, there are new possibilities and challenges for teaching and learning in higher education that have the potential to fundamentally alter the governance and internal architecture of higher education institutions. The importance of artificial intelligence (AI) and adaptive learning technology systems (ALTS) in education cannot be overstated (Holmes et al., 2021a; Pardamean et al., 2022). Many people have misunderstood or are afraid of AI's power, which will require a fundamental shift in the definition of expertise and the nature of future technological advancements.

To address the question of what constitutes an "intelligent" system created by a human, Alan Turing put forth a solution in the 1950s (Gomede et al., 2018). If a listener cannot tell whether they are hearing a human conversation or one with a machine, then we can say that we have an intelligent system, or artificial intelligence, thanks to Turing's imitation game. McCarthy provided one of the earliest and most influential definitions of artificial intelligence in 1956: "*The study (of artificial intelligence) is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so*

precisely described that a machine can be made to simulate it," he said (Popenici & Kerr, 2017; Seo et al., 2021). The ability of computing systems to engage in human (processes) like learning, adaptation, synthesis, self-correction, and data use for intricate computation duties can be defined as AI.

Higher education's services are already being profoundly altered by the rapid advancement of artificial intelligence.

AI IN CURRENT EDUCATION

The term AI conjures up images of supercomputers, machines with enormous processing power and the ability to adapt to their environment through the use of sensors and other features (Cox, 2021; Popenici & Kerr, 2017). These features give supercomputers human-like cognition and functionality, which in turn enhances their human interactions. In films, artificial intelligence has been used in a variety of ways, including smart buildings, where it can control the temperature, air quality, and music in a space based on its occupants' moods. An increasing number of educational applications of the traditional definition of artificial intelligence as a supercomputer has expanded to include embedded computer systems. Examples include robots that can help students learn from the earliest stages of education, such as in early childhood education, by incorporating AI, computers, and other supporting equipment (Bates et al., 2020; Niemi & Liu, 2021). As Timms claims, children are taught routine tasks using cobots, including punctuation and pronunciation and adapting to the abilities of the students, with the help of robots working in tandem with teachers or cobots. As various studies have demonstrated, web-based and online education have evolved from simply providing materials online or on the web for students to download, study, and complete assignments in order to pass, to intelligent and adaptive web-based systems that learn from instructor and learner behaviour and adjust accordingly to enhance the learning experience. Artificial intelligence is being used in education to assist with administration, instruction, and learning. The scope of this study will be to analyse and understand artificial intelligence in education by focusing on these three areas (Muñoz-merino, 2011).

PURPOSE OF THE STUDY

It is inevitable that education has been impacted in a variety of ways by the continued use or application of information technology. The scope of this study is to ascertain the extent to which various forms of AI have impacted or impacted various facets of education. In particular, the research will look at how AI has impacted the fields of education administration and management, as well as teaching and learning (S. Dadhich et al., 2021; Hiran et al., 2021; Ramasamy & Doshi, 2022). The study is expected to show that AI has improved the efficiency and effectiveness of administrative tasks in education, as well as the overall effectiveness of instruction and learning. This research will be useful to a wide range of people involved in education. Contributing to the growing body of knowledge, theories, and empirical findings on how artificial intelligence (AI) has impacted education will be a major accomplishment for this project's authors. Evidence-based practises in decision-making and leadership will be fostered in Institutions of higher education and the education sector for the benefit of academics, professionals, and policymakers (Hiran et al., 2014; Kakish & Pollacia, 2018). In addition, the findings will be used to enhance the findings of other studies and for government policy and actions to promote the use of information technology, particularly AI, in the educational sector. Additionally, educational institutions and government agencies can develop policies and strategies that promote AI's positive impact on education while mitigating its possible negative impact on education.

TECHNICAL ASPECTS OF AI IN EDUCATION

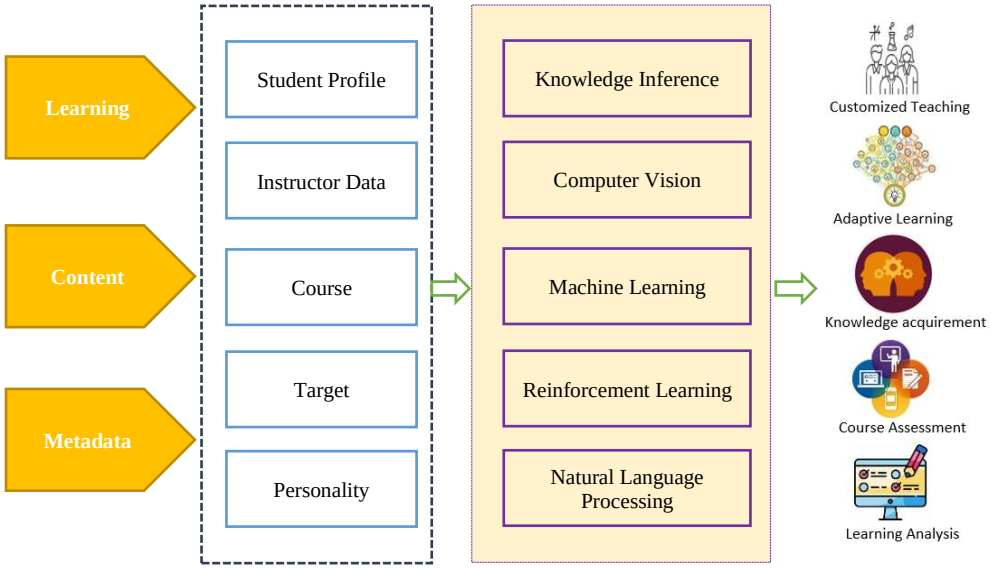
Data analysis and prediction are all components of AI-assisted education. Intelligent education is also part of this category, as is innovative virtual learning. Listed in Table 1 are some of the most common uses of AI in education, as well as some of the most important technologies that support them. It's worth noting

that, as the demand for education rises, learning with the help of AI is becoming more and more important. Instructors and students benefit from timely and personalised instruction from intelligent education systems (Hiran, 2021b, 2021a). Multiple computing technologies, particularly those related to machine learning and the theory of cognitive learning, are used to improve the educational value and efficiency of these tools.

TABLE 1
AI AND EDUCATION

scenarios	techniques
Smart school	face recognization, virtual labs, speech recognition
online and remote education	edge computing, virtual personalized assistant, real time analysis
Individualised and thoughtful instruction	data mining, intelligent teaching system, Learning analytics
Assessment	adaptive learning method, Learning analytics
Grading and evaluation	image recognition, computer vision, prediction system

FIGURE 1
AI IN EDUCATION



Knowledge models, data mining, and Machine learning are used in an AI system to analyse, recommend, understand, and acquire new knowledge. Intelligent technologies and system model are the two main components of an AI education system that includes teaching content, data and an intelligent algorithm. Figure1 illustrates the importance of using a model to help build a data map, which establishes the structure and associational laws for educational information. The model serves as the brain of an AI system, which is powered by various technologies.

INTELLIGENT EDUCATION TECHNOLOGIES

Learning analytics, machine learning, and data mining are all educational technologies that share a lot of similarities. Educational data mining and learning analytics have spawned two distinct communities at this time (Peprah et al., 2020). They share goals and methods and can draw on a wide range of disciplines, along with data mining, machine learning, statistics-based, and data modelling, to achieve their goals.

Learning management systems (LMS) and results from large-scale testing are at the heart of the field of learning analytics. Small-scale cognition is where data mining comes from in the intelligent tutoring systems community (Kakish & Pollacia, 2018).

Machine Learning

"Training data" is a sampling data set that is used to parse and generate meaningful patterns and structured knowledge at the heart of machine learning. Consider the case of creating for students in the process of choosing courses and universities, too, are affected using machine learning. Student achievements, aspirations, preferences, and "match-making" preferences are used to identify the institutions where students can be most successful (Frempong & Hiran, 2014; Hiran & Henten, 2020; Lakhwani, Somwanshi, et al., 2020). Furthermore, teachers can use this technology to get a better sense of how their students are processing information. Students' cumulative records can be used by instructors to fine-tune their teaching methods, which may lead to a better understanding of the material by their students. Using machine learning and image recognition, it is possible to grade student projects and assignments more quickly and accurately than a human being can (Barua et al., 2020; Hiran, K. K., Jain, R. K., Lakhwani, K., & Doshi, 2021). In terms of machine learning, the subfield of deep learning is getting a lot of attention. Techniques like decision trees, inductive logic programming and clustering are among the most commonly used. With deep learning, we focus on creating increasingly meaningful representations from the learning of successive layers. Models known as neural networks are used to extract the layer features, which are organised into stacked layers (Kant Hiran et al., 2014; Yeboah et al., 2015).

Learning Analytics

For learning analytics, students' characteristics and knowledge objects are analysed using learner models and knowledge fields models. New technology, such as machine learning, is introduced to a non-technical world like education through the concept of learning analytics (M. Dadhich, Hiran, et al., 2021; Patel et al., 2021). For example, if a student is at risk, a teacher may intervene or provide feedback and instructional content to help them improve. Machine learning, data visualisation, learning sciences, and semantics all play a role in its development (M. Dadhich et al., 2022; Nankani et al., 2022). Competency learning powered by AI can, for example, help institutions anticipate the skills their students will need in the future. This data allows them to take proactive measures to ensure their students are prepared. Learning analytics make use of AI's capacity to learn in a variety of ways in addition to competency-based education (Hiran et al., 2021; Khazanchi et al., 2021). Those who are on the verge of failing can be categorised using various parameters, informing the institutions with early warning systems and advanced analytics. With a broader focus on interpersonal skills, arts, and literature, learning analytics will have to take on new levels of difficulty when it comes to assessing learners' abilities and progress. When it comes to implementing learning analytics, it can be difficult to find solutions that are both specific to a single learning environment and universally applicable to many different settings (Hiran et al., 2018; Lakhwani, Bhargava, Somwanshi, et al., 2020; Saini et al., 2021). Students, instructors, administrators, and institutions will all benefit from the use of advanced learning analytics techniques in the future.

Data Mining

The goal of educational data mining is to provide learners with automated and systematic responses. Learning data mining using AI aims to build in-built rules of association, and to provide students with knowledge objects that meet their individual needs (Lakhwani, Bhargava, Hiran, et al., 2020; Mehul Mahrishi et al., 2020; Tyagi et al., 2020). A small sample of written assignments was chosen for analysis, for example, students' demographic characteristics and grades can be analysed. It is also possible to predict a student's academic progress using a machine learning regression method. Thus, data mining is becoming a powerful tool for improving learning and knowledge mastery, leading to a better understanding of educational settings and students (Allayarova, 2019; Bakhromovich, 2020). A combination of pattern discovery and predictive modelling can be used to extract hidden knowledge that educators can use to make changes to curriculum development (Acheampong et al., 2018; Priyadarshi et al., 2021). This is how it is

defined. For students to be able to learn at their own pace and choose their own method of study, data mining AI can be used to mine the knowledge field data and produce personalised learning experiences. For students to be able to learn at their own pace and choose their own method of study, data mining AI can be used to mine the knowledge field data and produce personalised learning experiences. This is an important application. Instructors should be able to tailor their courses and methods to the interests of their students when using personalised learning. Machine learning, for example, can be improved with data mining to produce more accurate and reliable results (Holmes et al., 2021a).

THE ROLE OF AI IN EDUCATION

AI has the potential to change many aspects of society, including the education sector, according to Timms. From the numerous studies conducted, it's clear that artificial intelligence is already being used in the education sector, where it has led to advancements in a wide range of areas (Pardamean et al., 2022; Rodríguez-Hernández et al., 2021).

TABLE 2
THE POTENTIAL OF ARTIFICIAL INTELLIGENCE (AI) IN EDUCATION

Administration	• perform dealing with bureaucracy such as exam grading and feedback more quickly than they take up a large portion of the instructor's time. • Identify each student's unique learning style and preferences, allowing them to build customised learning programmes. • Tutors in decision support and data-driven work are expected to provide timely and direct feedback to their students.
instruction	• Students' personal data can be used to determine the best method of teaching for each individual student. • This information should be taken into account: whether a student performs in projects and exercises • analysis of the curriculum and the content of the course materials to come up with content that is specifically tailored to meet the needs of each student fostering a spirit of cooperation
learning	• Identify and address any learning issues that arise in the workplace for students as early as possible. • student-centered approach to course selection at the university level • gather data on each student's study habits and apply intelligent adaptive intervention based on the student's current learning state.

IMPACT OF AI IN EDUCATION

To sum up, the study's goal is to determine the impact of AI on education. AI has been used in education in a variety of ways, but the evaluation of these methods only partially answers the research question at hand. According to Sharma et al., the application of AI in education has the potential to transform a variety of facets of the educational process (Gomede et al., 2018; Niemi & Liu, 2021). An examination of AI's various applications reveals some of the ways in which AI will affect education. Based on the findings from the articles analysed, this section takes a closer look at how AI affects administering, educating, and (educating oneself) learning (Bakhromovich, 2020; Chassignol et al., 2018).

Education Administration

The efficiency of educational administration and management has been greatly improved as a result of the application of artificial intelligence in the field of education. It has made administrative tasks like

grading and providing feedback to students much easier for educators. AIWBE's programmes have added features that teachers can grade students' work and provide feedback more easily with these tools (Bates et al., 2020; Porayska-Pomsta, 2016; Timonen & Ruokamo, 2021). Knewton, for example, has built-in functionalities that allow instructors to ensure that students' progress is monitored by assessing their performance, assigning grades, and giving them feedback. The use of AI has made administrative tasks easier and more effective for teachers and instructors, allowing them to better instruct and guide students. In addition to grading and providing feedback, instructors can use intelligent tutoring systems for a wide range of administrative duties (Muñoz-merino, 2011; Timonen & Ruokamo, 2021). Programs with AI like PaperRater and Grammarly allow instructors options, including plagiarism checking, grading and providing feedback to students on their weaknesses. As a result of AI, instructors have been able to devote more time to their primary responsibilities, such as teaching and disseminating materials and content in accordance with the institution's or the country's curriculum. There was evidence that administrative processes and tasks had improved in quality, as well as the effectiveness and efficiency of instructors or educators in the performance of various administrative tasks despite this topic not being the primary focus of many articles evaluated (L. Chen et al., 2020).

Instruction

The use of artificial intelligence (AI) in education was also examined in this study. A summary of a number of articles revealed that instructors are quickly adopting and utilising artificial intelligence (AI) in various forms as an instructional aid or pedagogical tool. Artificial Intelligence has had a significant impact on this field when used for educational purposes or as a teaching too (Cheng et al., 2020; Steinbauer et al., 2021)l. Various publications reviewed and analysed show that the quality, instructors' productivity, effectiveness, and efficiency have all gone up (Chatterjee & Bhattacharjee, 2020; X. Chen, 2020). Efficiencies and quality are assessed by how well students or learners are able to absorb, retain, or demonstrate what they've learned, while effectiveness is evaluated by how well students or learners demonstrate what they've learned. Because of these operational definitions and descriptions of effectiveness, quality, and efficiency in instruction, the study's findings show that AI has aided in their realisation. Instructions have become more effective thanks to AI (M. Dadhich, Doshi, et al., 2021). According to Rus et al, ITS uses evidence-based or empirical evidence-backed practises, such as the extensive use of cognition and learning models, to achieve optimal learning for students. In fact, programmes like DeepTutor and AutoTutor put the learner at the centre of the process, allowing for the creation of content that is tailored to the individual's specific abilities and interests (Fernández-Martínez et al., 2021; Kandlhofer & Steinbauer, 2021; Popenici & Kerr, 2017). Artificial Intelligence (AI) has improved instructional quality and effectiveness, as Pokrivcakova argues, because modern systems are technology-based adaptive systems, the materials or content presented are determined by the learners' needs, which ensures an optimal learning experience. When it comes to platforms for web-based and online education and the application of AI ensures that course content is better disseminated. In fact, according to Mikropoulos and Natsis, the development and use of AI, particularly in web-based and online education, has led to improvements in instruction because improved educational resources for these platforms have been made possible by AI (Estevez et al., 2019; Holmes et al., 2021b; W. H. Kim & Kim, 2020). Other studies have noted the same advantages or enhancements to learning. Computer-Based Training (CBT), Computer-Aided Learning (CAL), and Individualized Student Training (ITS) all take a generalised put it all on the web approach, which may not address the student's learning needs in the same way as ITS. To improve the quality of education, tutoring and instructional systems have been developed to address the various challenges that face one-on-one teacher/student tutoring, as summarised by Roll and Wylie in their discussion of AI (Cox, 2021; Dogmus et al., 2015; Renz & Hilbig, 2020), particularly in education. An additional important theme that emerged from the research was how AI has impacted the quality of instructors' work. According to a few researches on the topic, academic integrity can be improved through the use of plagiarism checkers, proctoring, or monitoring of students' activities via online platforms like Grammarly, TurnItIn or White Smoke (J. Kim et al., 2022). It's been shown in other studies that team-viewer applications, simulation, and gamification have significant benefits to instructional quality,

alongside being closely linked to VR and 3-D or even using the techniques to increase performance and effectiveness through the use of AI. Another study looked at how humanoid robots that can talk and converse can improve the quality of instruction by increasing student involvement because of human-like appearances, as well as enhanced capabilities (Seo et al., 2021).

Learning

AI has had a significant impact on students' educational experiences, which are included in this study's scope of work. As Rus et al. summarised the impact of AI on learning, they found that ITS fosters deep learning by probing and prodding students until they are able to adequately explain their position and the rationale behind it, thus enhancing the comprehension and retention of the information they are providing (J. Kim et al., 2022; Tedre et al., 2021; Zawacki-Richter et al., 2019a). ITS is an integral component of the system. This and other studies illustrate the numerous advantages that AI can provide to students' educational experiences in various ways. It is possible to track a student's progress in terms of knowledge and understanding thanks to artificial intelligence (AI). In order to better meet the needs of individual students, the system makes use of this data. When it comes to learning, Pokrivcakova noted that adaptive content and intelligent learning systems such as virtual reality have been made possible by AI, and this has been shown to have a positive effect on student achievement. When it comes to learning, Mikropoulos and Natsis point out that modelling and related tools and methods give students the hands-on experience and experiential learning they need, which enhances the quality of their education. The research they cited in their article also points out how VR and 3-D technology can enhance education by enhancing usability and student enjoyment (Celik et al., 2022; S. Raj, 2019). Other studies focusing on web-based platforms highlight the benefits of AI and its impact on learning quality. AI web based components such as Class monitoring, adaptive hypermedia, collaborative learning, and information filtering encourage students to collaborate and interact with each other and to learn, as Kahraman points out. According to Peredo et al, a web-based platform has the same advantages as a brick-and-mortar classroom because it adapts and tailors' instruction to the needs of the learner (Khare et al., 2018; Verdú et al., 2008; Zakirova & Zunnunova, 2020). As an example, the StudentTracker middleware utilises learner-specific data found online, such as completed activities, learning tracker tracking time, and other components, to adapt the AI web based pedagogical approach to learning. Web-based platforms and proven benefits to learning include promoting global access to education and affordability. Overall, these platforms have provided a more enjoyable educational experience (Chaudhry & Kazim, 2021). A number of other studies have demonstrated the benefits and ramifications of artificial intelligence (AI) in the classroom. Academic integrity and honesty have been promoted through the use of TurnItIn tools like revision helper and Pearson's Write-to-Learn tools, as well as other revision and writing assistants like AI. Other studies, on the other hand, have raised concerns about AI's potential negative impact on learning. Because of the ease with which sites that generate a lot of paper and paper mills and can be used by students, Crowe et al. found that AI may promote dishonesty and jeopardise academic integrity. The advantages of AI in education outweigh the disadvantages, as evidenced by a number of other studies (Chaudhry & Kazim, 2021; Khan et al., 2022).

Performance of Instructor and Student

Seeing how artificial intelligence affects both the instructor and student in the classroom as systems with intelligence will be interesting to watch. There is a growing need for AI systems to help teachers deal with the increased workload. Course material and syllabus can be analysed by AI systems to help instructors create personalised content. After analysing, it is also possible to use these systems to create and grade exams (Hwang et al., 2020; Upala & Wong, 2019). Teachers would be able to focus on more pressing issues, such as raising student achievement, if this were to occur. When it comes to individualised instruction and self-directed learning, artificial intelligence (AI) solutions can help instructors better analyse the data they collect from their students. AI bias in education is also becoming an issue because of human bias. To eliminate unfairness, an AI solution can assign grades based on predefined rubrics and benchmarks. Handwritten papers can be read and recognised by AI systems based on computer vision (Aguirre et al., 2021; Kakish & Pollacia, 2018). Additionally, these systems prevent students from cheating and

plagiarising, reducing bias. By analysing student data, AI systems have been able to identify students' learning deficiencies and intervene at an early stage. The majority of students in the traditional educational system are treated in a similar manner. Thus, it is impossible to teach all students using the same method. Based on a student's personality, strengths, and complementary skills, Using AI, teachers could better tailor their instruction to the needs of their individual students (Sruthi & Mukherjee, 2020; Wakelam et al., 2020). As a result, all students will be able to improve their performance and have fun while doing so in this manner. As an outcome, students' ability to learn, develop good study habits, and express their own ideas grows while increasing their knowledge. AI systems are also able to analysis of the student's study habits, which in turn allows universities to tailor their course offerings for each student's specific needs. Individual ability and career path can be taken into account to help students achieve better grades and gain relevant skills. In light of the information presented above, artificial intelligence (AI) holds great promise for streamlining and automating administrative processes at educational institutions and in the classroom. By automating homework and essay evaluation, instructors can spend more time one-on-one time with students (Hatzilygeroudis et al., 2005; Kelly & Tangney, 2006; Nuria, Pedro, 2021). Exams and papers are being graded in new ways as well that are being developed by AI developers. For learning materials, AI creates customizable digital interfaces that can be used by students of all ages and grade levels to learn. According to Brightspace's creator Nick Oddson, AI can help instructors gain insights from students on the basis of all the available learning tools. Based on a learner's struggles with class material, AI systems can help them improve their grades. When students needed help from their professors in the past, they had only a limited amount of time to do so, such as during office hours or by emailing them. Carnegie Learning, for example, is a smart tutoring system that makes use of student data to give personalised feedback and work closely with individual students. Eventually, AI will be able to assist both teachers and students in the classroom, adapting to a wide range of learning styles. To be more specific, it aids educators and students in a wide range of educational endeavours (Ahmad, 2020; Kalmuratov, 2020; Huang et al., 2021; Zawacki-Richter et al., 2019b).

DISCUSSION OF THE RESULTS

Artificial intelligence, which has spread throughout society and could have a significant impact on various industries, has been influenced by computer and computer-related technology advancements, along with other technological advances. For example, AI has had a profound effect on the field of education. A definition and description of artificial intelligence (AI) was deemed necessary in order to understand how AI has affected education. It was found that different definitions of AI yielded different tenets, characteristics, and the nature of AI. It was only recently that computers and computer-related technologies started being used in education to handle a wide range of administrative and instructional tasks, as well as to encourage student learning.

An early sign of AI's future development and application on web-based platforms and online platforms is the use of robots resembling humanoid forms, which can perform a variety of educational tasks either independently or in conjunction with humans. To add to that, it's clear that artificial intelligence (AI) applications in education - no matter what form they take - have given students a more engaging and rewarding educational experience.

As a result, AI has had a remarkable effect on teaching. As a result, artificial intelligence (AI) has had a remarkable effect on teaching., in general, and in particular, on the use of the technology at specific educational institutions. With the help of artificial intelligence (AI), teachers are able to complete administrative tasks, such as grading assignments and providing feedback to students, more quickly and effectively. The quality of instruction can be improved by utilising various forms of artificial intelligence such as cooperative robotic agents (CORA), and chatbots (Chat). A better and richer learning experience is possible for students thanks to AI's ability to assess their abilities and needs, and then develop and distribute personalised or customised content, which ensures greater uptake and retention and thus improves learning.

However, as the needs of students change, AI-enhanced education will play an increasingly important role in the classroom. To date, it only offers courses ranging in difficulty, and it hasn't yet reached the

highest level of intelligence in intelligent education. A probability model and a knowledge map in AI education has been studied. More and more data will be generated by AI systems as they interact with the educational process on a more frequent basis, allowing for more accurate information recommendation. Teachers and students will benefit from high-quality content provided by AI systems, which will be quantified using learner analytics, machine learning, and data mining. At this point, users will be able to choose from a variety of methods to arrive at the correct answer to their query. By analysing students' learning styles, emotional states, and self-direction, the ideal AI system will help students develop their imaginative and creative capacities while also stimulating students' own initiative. Students' natural talents, knowledge deep understanding, level of academic achievement, and career development will all benefit from the increased use of artificial intelligence systems, which is expected to go beyond simply assisting students in grasping specific knowledge.

CONCLUSION

The purpose of this research was to find out how AI will influence education. A qualitative research study based on a literature review was carried out. Magazine articles, Research paper publications, and conference proceedings from professional gatherings were all used in the study's analysis to help achieve its goals. Artificial Intelligence (AI) has been developed and used in a variety of industries thanks to advancements in the field of computer science and technology. With the advent of personal computers and subsequent developments that increased processing and computing power while also allowing for more seamless integration into other devices, platforms, and devices in their various stages of development, artificial intelligence (AI) has seen an uptick in its use across a wide range of industries. AI was already adopted and used in educational institutions, which is the focus of this research. AI's impact on education's administrative, instructional, and learning aspects was examined in depth in order to determine how and what effects it has had. AI education began with the use of computers and computer-related systems, then moved to online and web-based platforms. Now, thanks to embedded systems, teachers and instructors can collaborate with robots in the form of cobots or humanoid robots and chatbots can perform teacher or instructor-like functions. The use of these platforms and tools has improved or enabled the effectiveness and efficiency of teachers, resulting in better or richer educational content. Artificial intelligence (AI) has improved educational outcomes for students by allowing instructors to create lessons that are tailored to the needs and abilities of specific students. An overall impact of AI on education can be seen in administration, instruction and learning at educational institutions as well as in the education sector as a whole.

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