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PROSPECTS AND CHALLENGES OF THE USE OF ARTIFICIAL INTELLIGENCE APPLICATIONS FOR ACADEMIC PURPOSES

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Abstract
This study examines the prospects and challenges associated with implementing artificial intelligence (AI) applications in academic settings, aiming to provide a comprehensive view of AI's potential to transform educational environments and enhance learning outcomes. Using a document study methodology, this research analyzes existing literature on the integration of AI in education, focusing on its contributions to personalized learning, efficient administrative processes, and accessible educational resources. Findings reveal that while AI has the potential to revolutionize academic processes through adaptive learning platforms and data-driven insights, it also presents notable challenges. Key concerns include diminished emotional connection in teacher-student interactions, reduced opportunities for critical thinking development, and the risk of over-reliance on technology, which may compromise students' engagement and creativity. In addition, the study highlights educators' apprehension about AI potentially replacing their roles, alongside AI's limitations in providing the nuanced, individualized support that human teachers offer. To address these issues, it is recommended that educational institutions adopt AI cautiously, ensuring human oversight to balance technological innovation with personalized, human-cantered teaching approaches. Ultimately, a blended model that leverages AI's strengths while preserving the essential human elements in education is advised for optimal academic outcomes.
Keywords: Artificial Intelligence, Academic Applications, Personalized Learning, Teacher-Student Interaction, Critical Thinking, Human Oversight

Introduction

The world has always experienced sudden leaps as a result of the evolution of technology. Artificial intelligence appears to be going beyond creating a leap to bringing about a revolution in every aspect of human life. Its application to the fields of communication, medicine, agriculture, entertainment, engineering, education, etc., has raised much interest and debate as to the role it will play in every area of human endeavour. Artificial Intelligence (AI), a term coined by emeritus Stanford Professor John McCarthy in 1955, was defined as "the science and engineering of making intelligent machines." McCarthy noted that while much research has traditionally focused on programming machines to act intelligently, such as playing chess, the current focus is on developing machines that can learn in ways somewhat similar to human learning (Manning 2020).

Focusing on the application of artificial intelligence to the area of education Al-Tkhayne and Tahat (2023) made reference to the versatile application of AI in teaching and learning. They referred to Al-Omari (2021) who observed that in the sector of education, artificial intelligence provides the potential of changing the way of teaching and learning, where artificial intelligence customizes learning by adapting the content to satisfy the

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individual needs of students. Also, it can automate administrative tasks, such as grades and tabulation, and allow teachers more space to focus on regulations. Furthermore, according to Al-Tkhayne, and Tahat (2023) artificial intelligence can contribute to determining students' behavioral patterns, which, in turn, allows teachers to intervene as early as possible when students have problems. Therefore, it contributes to improving the total quality of education and enhancing the students' learning experience.

Research methodology

The review consulted e-books, journals and other online material to elicit information on artificial intelligence, including its definitions, various applications, the advantages and challenges of the use of AI A synopsis of AI's and their application to education was extracted, adapted and presented to give a panoramic perspective to the work.

Literature review

Definition of Artificial Intelligence (AI)

Artificial Intelligence (AI), a term coined by emeritus Stanford Professor John McCarthy in 1955, was defined by him as "the science and engineering of making intelligent machines". Much research has humans program machines to behave cleverly, like playing chess, but, today, we emphasize machines that can learn, at least somewhat like human beings do.

According to Boucher (2020) the 2018 European Commission Communication, defines AI as systems that display intelligent behaviour by analysing their environment and taking action – with some degree of autonomy – to achieve specific goals. Similarly, Kayssi (2019) defined it as the ability of machines and systems to acquire and apply knowledge and to carry out intelligent behaviour. This means performing a broad variety of cognitive tasks, e.g. sensing, processing oral language, reasoning, learning, making decisions and demonstrating an ability to move and manipulate objects accordingly. Intelligent systems use a combination of big data analytics, cloud computing, machine-to-machine communication and the Internet of Things (IoT) to operate and learn.

According to the European Commission, AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems), or AI can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or Internet of Things applications). Providing a broader perspective Artificial intelligence (AI) refers to systems designed by humans that, given a complex goal, act in the physical or digital world by perceiving their environment, interpreting the collected structured or unstructured data, reasoning on the knowledge derived from this data and deciding the best action(s) to take (according to pre-defined parameters) to achieve the given goal. AI systems can also be designed to learn to adapt their behaviour by analysing how the environment is affected by their previous actions (European Commission, 2018).

Artificial Intelligence in education

According to Al-Tkhayneh, Alghazo and Tahat (2023) in the sector of education, artificial intelligence provides the potential to change the way of teaching and learning, where artificial intelligence customizes learning by adapting the content to satisfy the individual needs of students. Also, it can automate administrative tasks, such as grades and tabulation, and allow teachers more space to focus on regulations. Furthermore, artificial intelligence can contribute to determining students' behavioural patterns

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which, in turn, allows teachers to intervene as early as possible when students have problems. Therefore, in emphasizing its import, they cited Al-Omari (2021) who believes it contributes to improving the total quality of education and enhancing the students' learning experience.

In the opinion of Xu, Wei, and Zhang (2021) the most direct result of the application of artificial intelligence in education is the birth of an intelligent teaching system. The intelligent teaching system emerged based on computer-assisted teaching. It is an open human-computer interaction system formed by student-centred, computer-based, and computer-simulated thinking processes of teaching experts. They added that at present, the intelligent teaching system has become the main form of artificial intelligence application in education. Intelligent teaching systems mainly apply artificial intelligence principles in knowledge representation, reasoning methods and natural language understanding. Because it integrates the activities of knowledge experts, teachers and students

Application of artificial intelligence in education

Artificial intelligence has very broad application. Some applications aid teachers and others are crafted to facilitate learning. Some of the areas of application are being widely used while others are still being developed. A summary of the areas of application of AI are highlighted below as enumerated by Tira (2021):

Virtual Mentor: The function of AI which is currently quite widely applied to various educational technology platforms, especially those based online, is as a virtual mentor. AI can provide feedback on students' learning activities and practice questions, then provide recommendations for material that needs to be re-studied like a teacher or tutor. Tira (2021) cited Zhang (2016), who explains that a Virtual Mentor (VM) is a multimedia-integrated e-Learning environment that stresses interaction, personalization, and intelligence. The implication of this is that the student enjoys a form of educational mentoring from a virtual mentor.

Voice Assistant: This AI technology has similarities with virtual mentors. It is just that Voice Assistant relies more on the voice function as a centre for interaction and communication. Several Edutech platforms have adopted Voice Assistant technology to help students find content and materials more quickly and practically. The warmth of the voice element also makes the educational activity more interesting and motivates the learner.

Smart Content: is an AI technology that functions to share and find programmable digital books and material content more easily and quickly. Common examples of the application of this technology are found in various digital libraries today, both in schools, universities, and public libraries. AI can find and categorize the books we are looking for quickly and structured. We will even be given book recommendations and other content relevant to what you are looking for. Smart Content is a summary of various learning materials, from digital textbooks to interfaces that can be tailored to our needs.

Presentation Translator: AI presents many opportunities to share knowledge around the world. Using Artificial Intelligence solutions, students can study various courses and training programs. There are many platforms with interactive learning materials from the best tutors. AI also provides opportunities for students who speak different languages or have vision or hearing problems.

Global Courses: This AI technology has been widely applied in various fields,

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including education. Simply put, Global Courses users or students can search for and take online courses from all over the world. The course platform can recommend your interests and interests according to the keywords you have previously entered. There are various free and open courses that you can try right now with a variety of interesting, interactive, and structured features and content.

Automatic Assessment: AI is widely used for online automatic assessment and question correction purposes. The use of features like this makes it easier for teachers and tutors to prepare and conduct quizzes and tests easily and practically. Teachers and tutors no longer need to make questions and correct questions manually. The use of features like this makes it easier for teachers and tutors to prepare and conduct quizzes and tests easily and practically.

Personalized Learning: Personalized Learning bears some resemblance to other examples of AI technology. In essence, this AI technology allows students or users to get services like personal assistants. AI technology has a significant impact in improving the quality and learning patterns to be more practical and effective. This has also been proven by various studies and applications by various Edutech platforms, which indeed after using AI technology can have a significant impact on improving the quality and effectiveness of learning.

Educational Games: Educational games are games that are designed to learn but can still offer play and fun. Educational games are all forms of games that are created, to provide an educational experience or learning experience to the players of the game.

Intelligent Tutoring System (ITS): Intelligent Tutoring System (ITS) or commonly known as Intelligent Computer-Aided Instruction is a system to provide teaching that can adapt to students' abilities. ITS is one of the developments of an expert system on artificial intelligence in the field of learning.

Artificial Intelligence (AI) applications in education have been categorized in various ways across recent research. Xuesong Zhai et al. (2021) propose a three-layer classification: development (e.g., classification, recommendation), application (e.g., feedback, adaptive learning), and integration (e.g., affective computing, gamification). Nathan D. Nguyen (2023) suggests three categories: Guidance, Learning, and Teacher. Sruti Mallik & Ahana Gangopadhyay (2023) introduce a novel approach, dividing AI applications into proactive (e.g., admissions, scheduling) and reactive (e.g., knowledge delivery, assessment) engagements. Olaf Zawacki-Richter et al. (2019) identify four areas of AI applications in higher education: profiling and prediction, assessment and evaluation, adaptive systems and personalization, and intelligent tutoring systems. While these categorizations differ, they all highlight AI's potential to enhance various aspects of education, from personalized learning to administrative tasks. However, researchers also note challenges, including ethical concerns and the need for stronger connections to pedagogical theories (Zawacki-Richter et al., 2019; Nguyen, 2023).

Smart Assessment Under the traditional education model, teachers' work content focuses on two aspects, one is classroom teaching, and the other is correcting homework. Among them, teachers need to spend more time and energy to correct students' homework. However, driven by big data technology, text recognition technology, and semantic analysis technology, automatic correction of homework has been realized in reality. Intelligent evaluation can simplify the

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correction process to a large extent. This is also a major change to the traditional evaluation method. It is faster, more efficient, and very accurate. It frees teachers from heavy homework corrections. Make it more energy in classroom teaching, effectively promote the improvement of teaching efficiency.

Smart Tutor System The intelligent tutor system is one of the adaptive learning systems. It is precisely because of the emergence of this system that the one-way instillation mode of teachers to students under the traditional teaching mode has been changed to a large extent, and better teaching results can be obtained. The system can make targeted learning plans according to different students' mastery of learning content, and at the same time highlight students' personalized learning methods, and help students master knowledge points more quickly through richer learning resources to realize specific learning goals. Through the intelligent tutor system, it is even possible to analyze the expressions of the students and understand the learning status of the students from it. Through the feedback mechanism, the teacher can be more aware of the students' mastery of the classroom teaching content, and use an emotional perception to predict and adjust it. In fact, the development of the intelligent tutor system is still immature at this stage.

Educational Simulation Game In modern education concepts, quality education is emphasized. Therefore, the classroom atmosphere should not be lifeless, but should be presented in a more entertaining way. Under the background of the rapid development of artificial intelligence, educational simulation games are not entertainment activities in the traditional sense. They are more targeted. They promote the openness of education and teaching through games, and create some digital games based on the simulation environment. Students can have a higher enthusiasm for learning. Through intelligent simulation games, students can form a new understanding of things, and at the same time, their observation and thinking abilities can also be well exercised, which promotes students to discover and solve problems proactively. Based on the simulation game environment, students can be more involved in learning through playing different roles, and participate in learning activities with great interest to gain new knowledge. The introduction of simulation games in teaching can show some abstract knowledge in concrete forms, so that students can form a more intuitive understanding and feelings, can effectively enhance students' attention, and make students' professional knowledge learning more solid and in-depth.

Educational Robot Educational robots involve many disciplines. The application of multi-disciplinary knowledge and technology, the role of educational robots developed in assisting teaching is obvious. It can effectively add interest in the classroom, stimulate students' innovative ability, and rely on information technology to enhance students' knowledge and the ability to obtain information. In specific teaching applications, educational robots are an intelligent teaching tool that can form a powerful supplement for teachers to carry out teaching activities. Students can also actively seek answers to questions through this human-computer interaction and promote self-learning capabilities. Educational robots can perceive changes in students' emotions. Educational robots can perceive changes in students' emotions. If there are more exchanges with students, they can more accurately grasp the learning effects of students, which is conducive to teaching students in accordance with their aptitude, so that students can feel knowledge from the

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communication with intelligent robots charm.

Advantages presented by the use of Artificial Intelligence in education

Artificial intelligence has presented advantages to both teachers and learners. For teachers, artificial intelligence has reduced the stress associated with generating educational content required for effective teaching. AI tools by their dynamism open up areas of content that would otherwise have been difficult to access via traditional search methods. This makes teachers able to break away from the boredom of using limited content. While much of AI generated material might still be subject to some degree of human scrutiny to ensure that it fits what is needed, the fact that the alternatives are provided by AI makes teachers better equip with content for teaching.

For learners, AI provides an almost unlimited learning support which gives learners alternative routes to comprehending what is taught. The capability of AI to assist learners with necessary hints and provide much needed structure, sometimes in completely new areas makes them an invaluable resource for learning.

Kemal (2021) outlined some more general but comprehensive advantages of artificial intelligence to the educational sector as follows:

Access to Information: In the past, it was complicated to find the information sought among thousands of books by visiting libraries to access information. With artificial intelligence and technology development, it has become much easier and faster to reach the desired information by pressing just a few buttons. Virtual assistants used on phones have provided speedier access to the desired information with voice commands.

Distance Learning: The development of technology and computers has enabled distance education (online). In this difficult COVID-19 process we are in, machines have played a significant role in both the continuity of education and the prevention of the epidemic with distance education.

Personalization in Education: One teacher in the classroom cannot meet the expectations of all students. Artificial intelligence can provide a teacher for every student. Students can listen to the part they do not understand over and over again. Thus, the student can personalize their learning.

Global Knowledge: We do not know the education offered in a different language can be translated into our language with artificial intelligence systems. We can quickly get an education and learn a language that we do not know at all. In addition, we can translate texts written in different languages and adapt them to our language.

Student Attendance Tracking: With intelligent sensors at the entrance and exit of the school, the days of the student's attendance can be easily entered into the system. Absenteeism can be easily tracked without the need for teachers to take attendance.

Digitalization and Environmental Protection: The use of electronic resources has increased while educational resources are now transitioning from paper to digital. In this way, the cutting of trees was prevented, and a significant contribution was made to the environment. Moreover, since the shuttle vehicles used by students for transportation are no longer needed in online education, both the traffic problem and the effect of harmful gases released by the cars have decreased.

Removing Barriers: Artificial intelligence has made it much easier for special (disabled) students to access information. The aim is to ensure the full and equal participation of special (disabled) students in social life. Thus, disabled individuals are integrated into independent and free energy. Visually

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impaired people can receive education with systems that convert text to sound, and hearing-impaired people can receive training with systems that convert audio to text. Individuals with walking disabilities and sick people can attend both classes and meetings from their homes without going to school, and they do not fall behind.

Error Reduction: Artificial intelligence minimizes errors as much as possible. Since artificial
intelligence lacks human emotions, it can make more professional and fairer decisions. For example, a teacher may read the exam paper, project assignments incorrectly and give incorrect grade evaluations. However, artificial intelligence programs minimize the error and make the least amount of error.

Taking on Challenging Explorations: Robotics is also used to search for mining and other energy sources. In dangerous environments where it is difficult or impossible for humans to explore, artificial intelligence robots can easily make discoveries. For example, artificial intelligence robots can search and research oxygen-free places such as the ocean bottom, caves, and mines. Artificial intelligence technology is also used in space exploration. Intelligent robots are loaded with information and sent to explore space. These robots, also called reconnaissance robots, are designed to hover on the surfaces of planets and gather information. These robots are made with metal. Therefore, it is resistant to atmospheres where space and life are impossible.

Medical Applications: Artificial intelligence applications are also applied in the medical sector.

Doctors use artificial intelligence machines to examine the condition of their patients. There are artificial intelligence applications that analyze medical records to help doctors make faster and more accurate decisions. There are also artificial intelligence applications that enable medical students to understand their lessons better.

Uninterrupted Operation for Long Periods: Unlike humans, machines do not need to take frequent breaks and rest. The machines programmed to work for long hours continue to work without getting tired, bored, and distracted. For example, it is possible to reach training robots at any time of the day. In addition, the number of hours an instructor can give is limited. On the other hand, the robot that teaches can provide lessons for unlimited time as long as there is an energy source.

Daily Applications: We use artificial intelligence every day with smartphones. For example;

Applications that correct our mistakes while writing messages and conform to spelling and applications that can identify people's faces in the photos we take and tag them on the social network are among the applications we use daily. In addition, you can easily find the address you need to go to with navigation technology. Today, artificial intelligence is used in almost every field.

Disadvantage of artificial intelligence in the educational sector

The emergence and gradual evolution of artificial intelligence promises to revolutionize every aspect of human endeavor. Its application in the education sector, which hitherto rests totally on human natural intelligence has been without some disadvantages. Some of these challenges were enumerated by Nalbant K. G. (2021) as follows:

Technology Addiction: Students interact with each other on social platforms rather than social
interaction. Since students spend too much time with technology, they cannot allocate enough time to their education and lessons

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and cannot provide motivation. Since a student spends almost 90% of his free time in virtual environments and games, he cannot give the necessary importance to his education. It is one of the issues that parents complain about the most.

Negative Impact on Social Life: Before the development of artificial intelligence, students were doing more social and group work. With the development of technology, work has become more individual. Tablets and computers, which are the closest friends of the individual, have replaced the libraries used to be visited by the class for research and study. Now, the ability of a single individual to access information with a few keys has isolated individuals and given them an asocial personality.

Negative Impact on Health: As the development of artificial intelligence increases competition among students, this situation will stress them. It will put pressure on them. In this case, it can negatively affect the mental health and psychology of students. In addition, technological products cause various health problems due to the radiation they emit. Health problems such as eye disorder, nerve compression, neck, waist, and wrist pain can also be seen in individuals who spend a lot of time with technology.

Probability of Causing Unemployment: The fact that machines replace people by doing the work that people do is an indicator of unemployment. As artificial intelligence develops, people may become dependent on machines and robots. This reduces people's creativity and causes them to be lazy individuals. If we consider unemployment in terms of education, robotic teachers can replace ordinary teachers. Many jobs in the education sector are at risk. Unlike humans, robots are less likely to make mistakes. Because robots do not have situations such as being late for work and not coming to work, they need to get the proper instructions.

Lack of Creativity: Imagination and creativity are features that do not belong to artificial intelligence. Although machines create designs, they cannot rival the invention of the human brain. People's intelligence and feelings are endless. They have emotional intelligence. People can shape their thoughts with their emotions. But machines cannot even imitate these emotions.

Income distribution imbalance: Some individuals can have the most advanced technologies
because their incomes are high, while people with low incomes have less developed technology or no technology at all. This situation leads to tremendous unfair competition between students who can and cannot reach technology due to financial opportunities. Examples of this can be seen today.

High Cost: Developing artificial intelligence is a difficult task because machines are highly complex. Repair and maintenance of these machines can also be quite costly. Because day by day, they need to be more innovative and renew themselves. In addition, to meet the desired demands, their software must be constantly developed and updated. Their system may crash, they may need to be rebooted. Solving such problems can cause significant loss of time and financial loss. This is also true for the education sector.

Ethical concern: Artificial intelligence can make unethical decisions when using their decision-making mechanisms because they do not have feelings and ethical understandings that are unique to humans. Human intelligence cannot be copied. Machines only do what they are programmed to do. In an extreme situation, they may not be able to make the right decision. **Lack of Experience:** People can learn from their experiences and gain experience. However,

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machines do not have such a feature. Even if they have the data, they use it differently. Devices do not have feelings of worry or anxiety. These machines, which lack belonging, unity, and togetherness, cannot act like humans

Teacher-specific challenges to the application of Artificial Intelligence for education

In a study to examine teacher-challenges of artificial intelligence for the teacher Hernando, Diaz and Guerra (2019) identified potential challenges that the student must face in front of a robot teacher or with an artificial intelligence medium that is not a human teacher. From a sample of 140 respondents. The employment of robots or artificial intelligence in the classroom was opposed by 98 academics who pointed to the lack of leadership, the aloofness of students' reactions to their classmates and surroundings, inactivity, and the incapacity to foster critical thinking. They also pointed out that emotions are a significant factor influencing the teaching-learning process and that robots lack the human competencies to deal with emotions effectively.

The study concluded with cautions about the potential dangers of extreme reliance on artificial intelligence and robotics in education. It emphasized that robots lack emotional depth, making them unsuitable role models and incapable of fostering meaningful connections with students. Teachers and students alike expressed concern that robots, devoid of emotions, cannot provide the personalized support and understanding essential for effective learning, nor can they monitor individual progress with the same attention as human educators. Moreover, the indiscriminate application of robotics and AI could lead to depersonalized education and even job displacement for teachers. The study advises caution and asserts the need for human oversight to prevent robots and AI from taking control of educational processes without the essential guiding hand of human educators.

Artificial Intelligence (AI) in education offers numerous opportunities, including personalized learning experiences, adaptive assessments, and improved teaching and learning outcomes (Mohammed Rizvi, 2023; Jason Ryan A. Pujeda, 2023). However, its implementation faces significant challenges, such as ethical concerns, lack of teacher training, and insufficient infrastructure (Jason Ryan A. Pujeda, 2023; Fati Tahiru, 2021). To effectively integrate AI into educational settings, teachers need to develop specific digital competencies (Jason Ryan A. Pujeda, 2023; Petros Lameras & S. Arnab, 2021). Lameras & Arnab (2021) propose a taxonomy of AI applications and a framework for teacher self-reflection on AI-related skills. While AI adoption in education is more advanced in developed countries, its impact on teaching and learning is still being explored (Fati Tahiru, 2021). Successful implementation requires careful consideration of ethical issues and effective integration into existing educational systems (Mohammed Rizvi, 2023; Fati Tahiru, 2021).

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Synopsis of Applications of Artificial Intelligence and Examples of Tools

Type/Application of AI	Function of AI	Example of tool
Personalized learning	Help create personalized learning plans for individual students based on their learning progress, strengths, and weaknesses. AI can identify students' learning needs by analyzing data from multiple sources such as assessments, homework, and quizzes and provide targeted feedback.	Most AI tools
Intelligent tutoring systems (ITS)	These systems can adapt to students' learning styles and provide tailored instruction and support, helping students to improve their learning outcomes. These systems can help students stay motivated and engaged with their learning by providing immediate feedback.	ALEKS, Carnegie Learning, and Knewton
Automated grading	AI can help automate the grading process, saving time for teachers and providing students with immediate feedback on their assignments. AI can provide feedback on grammar, spelling, and syntax by analyzing essays, reports, and other written assignments. By using automated grading systems, teachers can focus more on essential tasks such as lesson planning and supporting students, resulting in significant time savings (Adiguzel et al., 2023)	Turnitin
Predictive analytics	AI can analyze student attendance, engagement, and performance data to predict future outcomes. This information can be used to identify students who may need additional support, enabling teachers to provide targeted interventions.	Grammarly's NLP-powered software
Intelligent content	Can help create and curate learning materials tailored to individual student's needs and learning styles. By analyzing student behavior data, AI can identify students' learning preferences and create customized learning materials that are engaging and relevant.	EdTech startup Smart Sparrow
Virtual assistants	AI-powered virtual assistants can help students with administrative tasks such as scheduling, reminders, and task management.	Brainly
Automated transcription and translation	Can help transcribe and translate lectures and other educational materials, making them accessible to a wider range of students. This can help students who may have difficulty understanding the language used	Otter.ai, Amazon Transcribe, Dragon

	in their coursework or may have hearing impairments.	Naturally Speaking, and Google Voice.
Learning management systems (LMS)	Allow educators to create, deliver, and manage learning materials, assignments, assessments, and evaluations for students. Educators can use LMS platforms to administer online assessments, monitor student progress, and provide feedback on student performance.	Blackboard, Canvas, and Moodle.
Automated essay scoring (AES) software	uses NLP algorithms to evaluate and grade essays and written assignments. Educators can use AES software to provide students with immediate feedback on their writing, save time on grading, and ensure consistent and objective evaluation.	e-rater, Grammarly, and Turnitin.
Learning analytics tools	Use data mining and AI algorithms to analyze student learning data and provide insights into student performance, engagement, and learning outcomes.	Learning Analytics and Knowledge (LAK) and Open Learning Analytics (OLA).
Computer-based testing (CBT) platforms	Allow educators to administer online assessments, including multiple-choice, true/false, and essay questions. Educators can use CBT platforms to assess student knowledge, save time on grading, and provide students with immediate feedback (Bassey et al., 2020).	ExamSoft, JAMB CBT, UNICAL Postgraduate e-exams, ProProfs, and Questionmark.
Gamification tools	Uses gamebased elements to motivate and engage students in learning activities and assessments.	Classcraft, Kahoot!, and Quizlet
Virtual reality (VR) and augmented reality (AR) tools	Use immersive technologies to provide students with interactive, experiential learning experiences. Educators can use VR and AR tools to engage students in handson learning activities, provide real-world experiences, and enhance student learning outcomes.	Google Expeditions, Merge Cube, and Nearpod VR
Formative assessment tools	Formative assessment tools enable educators to monitor students' learning in real-time, provide feedback, and adjust instruction based on their	Mentimeter, Nearpod, and Socrative.

	performance	
Online polling tools	Allow educators to gather student feedback on specific topics or questions.	Google Forms, Kahoot!, and Poll Everywhere.
Interactive whiteboards	Enable educators to present and annotate digital content, engage students in interactive activities, and collaborate with students in real-time.	Google Jamboard, Promethean ActivPanel, and SMART Board.
Digital portfolios	Enable students to collect and showcase their work, reflect on their learning, and receive feedback from educators and peers.	Google Sites, Seesaw, and WordPress.
Data visualization tools	Data visualization tools enable educators to analyze and present data in visual formats, such as graphs and charts, to gain insights into student performance and learning outcomes.	Google Data Studio, Infogram, and Tableau.
Social media platforms	Social media platforms enable educators to connect with students, share learning resources, and promote student engagement in learning activities.	Facebook, Instagram, and Twitter.
. Plagiarism detection	Uses NLP algorithms to analyze student work and detect instances of plagiarism.	Copyscape, Grammarly, and Turnitin.
Classroom response systems	Allow educators to pose questions and receive real-time student feedback using electronic devices.	iClicker, Poll Everywhere, and Top Hat. 24, Edulastic, ExamView, and Google Forms.

Adapted from Owan V. J, K.B. Abang, D. O. Idika, E. O. Etta and B. A. Bassey (2023)

Conclusion

The enormous prospects presented by artificial intelligence make it a potent tool for revolutionising education. While it is obvious, as seen in the many challenges it has as a tool for teaching and learning, artificial intelligence would redefine academics and open up new vistas. The threat of diminishing the human element of education can be overcome by creating a balance between its super-efficiency and the warmth of human emotions required in holistic learning.

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