ACADEMIA International Journal for Social Sciences
Volume 5, Issue 3, 2026 ISSN-L (Online): 3006-6638

The Role of Artificial Intelligence in Enhancing Teaching and Learning Processes

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Received: 03-02-2026 **Revised:** 17-02-2026 **Accepted:** 03-03-2026 **Published:** 19-03-2026

ABSTRACT

The increasing use of artificial intelligence–enabled learning tools has the potential to bring significant changes to teaching and learning processes in the current education sector. This study critically evaluates the implications of artificial intelligence technologies in educational institutions by conducting a qualitative systematic literature review. Peer-reviewed journal articles, as well as proceedings of related conferences within a specific time span, were selected purposively on the basis of specific inclusion and exclusion criteria, noting the studies on the use of artificial intelligence technologies for teaching and learning. The selected studies were processed with a structured content analysis technique, which helped to identify the themes, applications, as well as the outcomes associated with the implementation of artificial intelligence technologies within the education sector. Findings include the use of the following teaching technologies enabled by artificial intelligence: intelligent tutoring systems, adaptive learning systems, automated assessment, feedback, and learning analytics. However, the same research also outlines various challenges faced by education sector faces ethical challenges, data protection, potential biases in algorithms, limitations of infrastructure, and the preparedness of teaching staff. Based on the findings, the study provides recommendations for the effective implementation of AI in educational settings. By making use of the evidence-based application of AI tools in teaching, this research will help fill the gaps in the existing literature on the application of AI in education.

Keywords: *Artificial Intelligence in Education; Teaching–Learning Processes; Personalized Learning; Adaptive Learning Technologies; Learning Analytics*

INTRODUCTION

The current evolution information and communication technologies (ICT) has significantly facilitated the use and creation of artificial intelligence (AI) in different industries including the education industry. AI has turned into a part of the contemporary world, and it is used in government, business, healthcare, engineering, and education (Saleem et al., 2025). These technological advancements have continued to shape the teaching and learning experience through the improvement of the instructional process, the creation of adaptive learning, and the inspiration of organizational efficiency (Kang, 2023). AI has the possible as well as new challenges in the sphere of education. According to researchers, AI-powered

technologies are transforming academic practices, making such technologies helpful in personalized learning, enhancing decision-making through instructional methods, and facilitating automated assessment (Admane et al., 2024). The use of AI has now been applied to teaching and learning, as well as educational administration, allowing it to provide data-driven teaching, adaptive learning to the needs of individual learners, and efficient assessment systems that will give learners real-time feedback (Sahito et al., 2024; Zhao et al., 2025).

Although these technologies can help to considerably enhance learning outcomes and engagement, the implementation and professional development of teachers must be attentively organized to address the issues connected to data privacy, ethical use, and teacher preparedness to the innovative approach. Artificial intelligence facilitates the process of teaching and learning in a variety of ways. Indicatively, AI-based tools used in social and collaborative learning summarize classroom activities, assist students toward course goals, enable a group-based instructional process by learning analytics, and encourage participation in online learning communities.

Higher education is an area where the application is specifically relevant since the needs of learners are diverse and demand many ways in which the instruction can be flexible and responsive. Artificial intelligence can be defined as the capacity of machines, especially computer systems, to emulate human intelligence functions like perception, learning, reasoning and decision-making. It is a collection of computational methods which are based on human mental and neurological processes. Chiu et al. (2023) explained that AI is the ability of digital machines to conduct activities that were previously performed with human intellect. On the same note, de Jong, (2020) defines AI as a scientific research of creating intelligent machines that can act human-like. AI has several areas of technology, including machine learning, big data analytics, computer vision, speech recognition, neural networks, robotics, and natural language processing.

All these areas lead to intelligent systems of education. According to Teachflow.AI, (2025), AI in education has been incorporated into the administrative processes, teaching and learning. Within the framework of the present research, artificial intelligence in education can be described as the application of AI-powered technologies to teaching and learning activities and environments (i. e., intelligent tutoring systems, Chatbots, educational robots and automated assessment tools) to improve and support teaching and learning. The paper is structured in the following way.

Statement of the Problem

Although these AI technologies have immense potential to enhance teaching and learning through personalization, adaptive instruction, and data-driven decision-making, much of their integration into institutions is still limited and poorly understood. Most of the existing literature approaches issues related to AI tools independently and lacks a well-thought-out examination of the pedagogical implications, effectiveness, and challenges associated with such tools. Besides, ethical issues, data privacy, algorithmic bias, infrastructural limitation, and preparation on the part of teachers create difficulties for the efficient integration of AI in teaching-learning. This research gap in comprehensive evidence-based understanding therefore calls for a critical examination of AI applications and their role in promoting teaching and learning processes.

Research Objectives

1. To examine the role of artificial intelligence in enhancing teaching and learning processes.
2. To identify key AI-enabled applications used in education.

3. To analyze the benefits and challenges associated with AI integration in teaching and learning.

RESEARCH METHOD

A qualitative systematic review focused on the role and application of artificial intelligence in improving teaching and learning practices was conducted through this research study. Peer-reviewed journals and conference literature were selected following a careful process of sampling based on well-defined criteria and specifications. The literature reviewed focused on AI applications within the teaching and learning context. A structured approach to content analysis was conducted to understand the various application areas and learning outcomes with respect to AI applications within teaching and learning processes.

Organization of the Paper and Its Contribution.

The presented paper reviews the available empirical and theoretical research on the use of artificial intelligence in education and its impact on the learning and teaching processes. It critically examines the applications of AI in learning and its pedagogical significance, possible advantages, and challenges thereof. The paper synthesizes existing research in order to give a detailed picture of the way AI-driven technologies are transforming the instructional practices and interaction with learners.

The study makes a contribution to the current body of knowledge because it critically assesses the pedagogical impacts of AI applications in the classroom context and discusses the future trends in the integration of AI in education. Through that, it would broaden the body of knowledge in regards to the shifting landscape of the education ecosystem and would essentially offer educators and policymakers and researchers valuable information on effective and proper use of artificial intelligence in improving teacher and learning quality.

Artificial Intelligence in Learning.

The implementation of artificial intelligence can dramatically change the educational environment by automating its administrative procedures, providing learners with prompt and individualized feedback, and adjusting the instructional methods to the needs of different learners. These capabilities help educators to spend more time designing the curriculum, planning instruction, and engaging students in meaningful ways. Reacting to the accelerated technological changes, learning institutions are more and more likely to become innovative in their teaching and learning processes so that they could be relevant and efficient (Aldosari, 2020).

The emergence of new methods of artificial intelligence in the recent past, including machine learning, deep learning, artificial neural networks, natural language processing, and genetic algorithms have enabled the establishment of intelligent learning environments. Such environments are used to detect learner behavior, predictive modelling, adaptive instruction, and recommendations regarding learning resources to a person (Ouyang and Jiao, 2021). The overall goal of artificial intelligence is to give machines the capability to manipulate information and resolve issues in manners that are more similar to the human cognitive mechanisms. Luckin et al., (2016) report that artificial intelligence has a direct impact on education in two major areas. First, AI-based curriculum design enables personalization of the learning experiences to suit the needs of the individual learners. Using the collected information on students, including the learning styles, performance levels, strengths, and weaknesses, AI systems can create the personal learning paths that facilitate student-centered teaching. Second, AI can be used to automate administrative duties, contributing to the workload decrease of educators and providing them with the opportunity to focus on teaching and working with students. AI-driven systems can effectively deal with routine tasks like grading, scheduling, recording attendance and managing records. Also, AIs can be used to remind students about

assignments, course enrollment, fee payments, and other academic necessities through the creation of AI-based communication tools that will send notifications to the students. Plagiarism detection software based on AI has also evolved to be increasingly advanced thereby adding to academic integrity and quality assurance. All these applications evidence that artificial intelligence is already integrated into many of the educational functions and is still gaining relevance in improving the effectiveness of teaching and learning processes Holmes et al., (2021).

Summary

Table 1. Applications of Artificial Intelligence in Teaching and Learning Processes

	Technology	Application Area	Academic Description
1	Intelligent Tutoring Systems	Personalized Instruction	The intelligent tutoring systems (ITS) use artificial intelligence to provide personalized instructions and feedback. The systems examine performance of the learners, gaps in knowledge as well as their learning pace and adjust the instructional content. ITS contributes to the increase of engagement between learners, the acquisition of concepts, and self-paced learning through the delivery of customized learning.
2	Adaptive Courseware	Personalized Learning Pathways	Adaptive courseware is an AI-based and machine learning-based system that dynamically alters students' learning paths in real time in accordance with their progress and performance. The information produced by such systems helps teachers and administrators to determine the individual or group learning needs so as to facilitate specific instructional interventions (Luckin et al.,2016).
3	Student Grading	Automated Assessment and Feedback	AI-based grading systems are rule-based and data-driven algorithms that are used to evaluate assignments, quizzes, projects, and presentations. These systems are consistent in their evaluation, offer quick responses and offer individualized recommending means to improve, which make these systems better in assessment efficiency and learning outcomes.
4	Administrative Tasks	Academic Management	Artificial intelligence-based systems are able to efficiently handle mundane administrative procedures (including: attendance checks, resource allocation, scheduling, and calculating grades). Making these processes automated helps to ease the administrative workload and enables educators to pay more attention to instructional and pedagogical processes.

5	Global Classroom Possibilities	Collaborative and Cross-Border Learning	AI will help to create global classrooms that are not limited by the geographical and institutional boundaries. With the help of AI-enhanced platforms, learners will be able to collaborate internationally, access international resources, and have cross-cultural learning experiences (Aldosari, 2020).
6	Learning and Instruction	Academic Support and Intervention	AI tools help teachers to track the performance of learners and detect poor performers. Because it offers feedback in a timely manner and directs specific academic support, AI helps to enhance the effectiveness of the instruction and the success of students.
7	Administrative Support	Institutional Decision-Making	Higher education institutions use AI technologies to facilitate administrative tasks including budgeting, scheduling, IT services, transportation, maintenance, and student record management. Moreover, the AI-based analytics is to interpret the recruitment, admission, and retention data, thus, providing the possibility to identify students at risk of failure or dropping out early and implement the necessary measures.
8	FAQ Chatbots	Student Support Services	Chatbots can be used to automate responses to most frequently asked questions, which makes students have 24/7 access to academic and administrative support. Chatbots improve the efficiency of communication and enable teachers to concentrate on more critical pedagogical tasks by minimizing the response time and administrative effort.
9	Learning Models	Instructional Design and Analytics	AI-based learning models aim at creating an in-depth profile of learners and simulating the instructional behaviors according to the academic objectives. These models assist in instruction design based on data, predictive analytics, and optimization of instructional methods to enhance learning outcomes.
10	Learning Analytics and Predictive Insights	Data-Driven Teaching and Early Intervention	Artificial intelligence facilitates sophisticated learning analytics by gathering and assessing high amounts of learning data to produce anticipatory insights regarding student performance, student involvement and learning activities. These AI-based analytics can help teachers to recognize at-risk students, predict their performance, and employ interventions in the form of instruction in a timely manner.

Artificial Intelligence Capabilities in Educational Processes

AI-powered products and services have become a part of everyday life for educators, and some of these are AI-powered virtual assistants, grammar and plagiarism checkers, essay evaluation software, intelligent writing assistants, and mobile apps used for organizing educational activities and operations on a daily basis. It can be concluded that educators are becoming increasingly aware of AI-powered technology and its capacity to improve and facilitate teaching and learning activities related to efficiency, personalization, and accessibility, and this awareness has been a result of everyday exposure and encounters with AI-powered technology and its capabilities and applications in education and everyday life, particularly thanks to advanced AI capabilities such as recognition and natural language technology.

The learning processes are undergoing changes beyond the current early stages of the digital paradigm, where the focus was solely on the digitization of the learning workflows and the automation of the mundane tasks. The current integration of technology in learning focuses on executing the learning tasks in a much more effective manner as compared to the past attempts in an efficient manner.

Currently, various techniques from artificial intelligence are being applied within education sectors, such as decision trees, fuzzy logic, genetic algorithms, Bayesian belief networks, artificial neural nets, and hidden Markov models. According to Holmes et al., (2021), various positive advances are anticipated to occur within education due to the use and application of these latest technologies. These include intelligent systems capable of providing students with customized learning content. These advancements are likely to immensely lower educators' workload while increasing learning quality. Furthermore, predictive learning systems based on AI are being proposed to predict students' learning outcomes and learning efficiency rates.

Another significant area where artificial intelligence is contributing is in personalizing and accommodating learning to meet the needs of every individual learning. This is because artificial intelligence helps the teacher gauge the level of comprehension that the student has mastered regarding the content of learning, and as a result, it offers help along the way, depending on the needs of the student. In many learning environments, artificial intelligence acts as an intelligent learning assistant that helps the student master a concept and also increases learning participation.

The flexible and adaptive character of AI-enabled learning environments enables and empowers the learner to personalize their own unique and preferred educational experience based on their own personal preferences and goals. According to Zawacki-Richter et al., (2019), artificial intelligence provides a well-structured and well-organized technological platform which facilitates effective and successful learning through flexibility and control of the learning process and enables greater motivation and immersion in the process of learning.

Of the most influential recent developments in educational AI, perhaps the most influential is a class of algorithms called Generative AI. Generative AI refers to systems capable of generating new and realistic content by learning patterns from existing data, without simply reproducing the data verbatim. Such systems can create text, speech, images, videos, music, and code; this allows AI applications to increase in scope in education. A leading example is ChatGPT, a conversational AI model that can create essays, summarize content, answer questions, provide translations of languages, and converse interactively. The functionalities of generative AI include text generation and enhancement, answering questions, changing tones of content, information summarizing and simplification, code generation, translation, and explaining. This significantly enhances the effective role of educational chatbots and intelligent learning tools, thereby further strengthening the role of artificial intelligence in developing teaching and learning.

Pedagogical Implications of Artificial Intelligence in Education

The modern economy depends more than ever upon education systems being able to foster a new generation of highly educated, yet expertise-possessed individuals equipped with the skills of a labor market constantly faced with new changes. Educational practices will need, thus, to become more adaptable to the requirements of the modern workforce. The enhanced role of 'Artificial Intelligence' means, paradoxically, making some professions redundant while simultaneously inducing a need for new skill-sets, thus inducing a radical change within the pedagogy of educational systems (Ullah & Almani, 2022; Jain & Jain, 2019). Educational theory will thus need a paradigm shift owing to 'Artificial Intelligence', which will affect the role of teachers as well as students.

Pedagogy plays crucial role enabling teachers to adopt effective instructional approaches that cater to the diverse learning needs of students. With the help of the combination of AI technologies, teachers are able to understand the concept of how students acquire knowledge, thereby allowing them to select the approach depending on the capacity of the students. An AI-based future necessitates that the education system adopt AI education within its academic modules both at the student as well as teacher levels. Given the fast pace at which AI technologies are advancing and expanding into society, institutions that provide systematic education in AI literacy could ensure that their graduates are capable of playing a role in technology development while attempting to address the demands of social issues that are being brought about by economic challenges.

From a pedagogical or educational standpoint, the role of artificial intelligence in enhancing the effectiveness of the teaching and learning process cannot be ignored. This technology has the ability to detect students who underperform in their studies early enough for remediable action to take place. In addition to that, it helps in the development of the curriculum by offering the ability to create and optimize the curriculum according to the targeted students as well as the available resources. Organizations that adopt the use of AI in their pedagogical processes improve the effectiveness of the process and help such institutions to become forerunners.

The inclusion of AI in the learning framework presents both opportunities and moral grounds. On the positive side, AI-based learning technologies such as intelligent tutoring systems, virtual learning assistants, and intelligent chatbots provide enhanced learning outcomes. Such technology enables students to develop and polish their skills related to the use of language and problem-solving. Furthermore, AI-based learning platforms break the barriers of time and space, enabling self-learning and studying according to personalized schedules.

AI enhances malleable and immersive learning processes by incorporating Virtual Reality (VR) and Augmented Reality (AR) within learning. An immersive learning process enhances learner motivation and theoretical understanding by applying theoretical concepts to practical situations. By example, incorporating AI with VR learning has improved learning efficiency by immersing learners within culturally rich situations to learn languages within realistic contexts (Redecker et al., 2019). The use of AI and VR learning enhances learner engagement and theoretical understanding by immersing learners within practical situations. The AI-powered VR and AR learning process provides learners with real-life situations to learn and enhance theoretical understanding.

For example, in language learning, AI and VR technologies were applied in improving teaching efficiency by immersing students in a culturally rich environment that allows for a practical application of language, as it was applied by Redecker et al., in 2019. This process of immersion increases the motivation of students and serves to improve conceptual knowledge since it would be able to relate knowledge with its application.

In addition, there are important pedagogical advantages in inclusive education offered by AI. The technologies that utilize AI offer inclusive opportunities for leaning for special needs learners, such as those who have speech or communication disorders. The technologies harness the use of personalization in teaching, depending on learners' needs and preferences, making education more inclusive with the help of AI. According to Alghamdy (2023), AI makes it easy for learners to achieve academic success through automated assessment and feedback, thereby contributing to learner empowerment.

Despite these benefits, the use of AI in pedagogy has critical concerns. The first major issue includes the potential decline in the development of critical and creative thinking skills. A learning platform that relies too much on the use of AI may hinder human-computer interaction and the constructivist learning theory. The majority of the learning platforms involving the use of AI have a basis in learning theories that include behaviorism and objectivism. These two learning theories might not have the ability to fully grasp the nature of learning. The concerns over the potential biases and the possible dehumanization of learning also need critical consideration.

This, however, calls for a strategic balance between technological aspects and human aspects of education with the aim of ensuring that AI impacts this process and raises its education quality rather than lowering it. By this, AI has the potential of offering educators more time away from such mundane tasks as grading and administration, thereby enabling them to provide more sympathetic lecture and interaction with students. Education artificial intelligence potential is still a relatively new area in education and has lots of promising and upcoming changes in education and education learning processes and approaches, as indicated here.

As has been pointed out by Bates et al. (2020), AI applications on the educational scene have to do with operations at a strategic installation and enabling level.

To conclude, whereas AI does possess a tremendous promise with regard to the improvement of learning results and simplifying the process of education as well as furnishing new-generation skills for students, the successful implementation of AI technology will predominantly rely on pedagogical approaches. As the results of a qualitative research undertaken by Williamson & Piattoeva (2022) have disclosed, a certain perception of students with regard to AI technology and education as one which may affect teachings of autonomy and a typical role of the environment of a learning process might be assumed to have significant undertones of adopting AI technology into the approaches of teaching.

Challenges

Although the vast benefits of artificial intelligence (AI) to improve teaching and learning activities are evident, some of the numerous complexities facing the application of AI within teaching and learning backgrounds cannot be overstressed. According to Alghamdy (2023), despite the various benefits offered by AI technology, a systematic approach should be applied when integrating AI into teaching and learning activities within the institution of education.

A key area would be related to the roles and responsibilities of educators and professionals working in the sector. The pace with which AI-related technologies are advancing would require educators to develop skills to handle these technologies. According to Aldosari (2020), many institutions are finding it challenging to plan and execute the development of skills regarding digital understanding to shape technological environments. It would be difficult for professionals to use AI-related technologies effectively without upscaling skills.

The other factor which might be continuously thwarting the effect of emerging technologies on the learning sectors is the generally slow uptake of these emerging technologies. It can be noted that the learning sectors tend to be quite averse to taking risks, are not well-funded, and generally prefer the old ways of learning. This might cause a slow uptake of the use of AI innovations in the learning sectors. As observed by Zawacki-Richter et al., (2019), teachers have to quite often be convinced of the beneficial use of emerging technologies in the learning sectors.

However, the emergence of generative AI tools such as Chat GPT, Bing AI, and Microsoft Copilot has raised concerns academic integrity in educational environment. The use of Artificial Intelligence technologies that aid learning has the potential to hinder active student participation and the development of critical thinking and creativity. Over-reliance on these technologies by learners and instructors also has the potential of reducing academic skills such as analytical and problem-solving abilities. To address this issue, instructors have to be equipped with relevant training and education on how to use Artificial Intelligence technology for academic purposes. There are ethical complexities in the implementation of AI within the education sector. Williamson & Piattoeva (2022) have listed several ethical challenges of the application of AI within the learning context. Some of the ethical challenges include privacy concerns, surveillance, autonomy of the learner, bias in algorithms, as well as discrimination. The listed challenges depend on the levels of students' development. Efficiency in the generation of learning documents through the use of AI does not necessarily mean the documents contain the best teaching. There might also be negligence in the critical review of a document produced through the application of AI.

Data privacy and security is another significant issue. This is because AI needs big data, and this data may include personal information of students and tutors that may be compromised. This data may be subject to cyber-attacks and abuse (Williamson and Piattoeva, 2022). Another significant issue that may hinder the integration of AI in education is the problem of the digital divide. This problem may occur because of different access to technology and internet connectivity, which may deny many students, especially from poor backgrounds, access to educational aid technology provided by AI. According to Zawacki-Richter et al. in 2019 and Luckin et al. in 2016, if the issue of inclusive access is left unaddressed, the problem of inequality in education may be worse in the age of AI. The costs involved in the development of infrastructure for the implementation of AI technology would be another source of burden for the education sector. Those that cannot develop the innovation would be left behind in the race of education competitiveness.

On the research side, the existing literature on AI in education also faces some constraints. According to Chiu et al. (2023), the majority of literature on AI in the field of education regards cognitive learning and adaptive learning. However, socio-emotional learning areas are still unexplored. Although literature on ethics in areas such as engineering, law, and the social sciences has already explored the realms of ethics sufficiently well, it has yet to touch upon the areas in the field of education. This can be primarily due to the fact that the field of AI in education has remained more inclined towards the engineering side.

Therefore, a rising need for multi-disciplinary research methodologies, involving the active participation of teachers, education researchers, technology developers, and policymakers, has emerged. Future research work should mainly center on tk-12he development of novel research methodologies in the assessment of the pedagogically applicable implications and overall educational impacts of AI-related systems. This requires a study of these challenges to ensure the use of artificial intelligence to complement the teaching and learning processes of our children.

The Future with Artificial Intelligence

Though the pace of development in the technology of artificial intelligence has been rapid, the pace of research in AI related to education has been slower. According to Holmes et al. (2021), this incongruence poses a problem in formulating guidelines for the optimal and responsible use of AI in the education environment. Though the pace of development in education technology has been rapid, the use of education and pedagogical perspectives has been limited in research studies related to education and AI. In order to fill this research gap, the need for the use of highly advanced methodologies like learning analytics and data visualization studies has been voiced.

In the fields of education and artificial intelligence, there have been very ambitious claims about the potential transformations that AI may bring about. According to Zawacki-Richter et al., (2019), the optimistic views about AI in the education sector are that it would be able to create an environment where AI-infused technologies significantly improve the effectiveness of learning, such that learners would be able to accomplish more than what would be actually possible within traditionally teacher-guided settings. Even intelligent tutoring systems, which are the most advanced version of current AI-based solutions offered within the education sector, are expected to be at the forefront of the future education ecosystem, as they would be aiding learners to adapt to more adaptive environments. Similarly, Williamson & Piattoeva, (2022) argue that advancements within the AI sector would impact the competitiveness of nations, such that nations would be working on the development of AI to improve their competitiveness within the education sector as well as their overall economies. The expected developments in Natural Language Processing will ensure further globalization of education by making it easy to share adaptive learning content across language and culture borders. Learning materials developed in one education system can be localized and applied with only little adaptation, thus improving the accessibility of high-quality education (Ullah et al., 2024). The incorporation of robotics and AI technology into learning environments could help promote technical skills, problem-solving abilities, as well as ignite interest in science, technology, engineering, and mathematics among students.

Nevertheless, the hastening abilities of AI also give cause for concern about the future of learning and human cognition. This is because, as AI systems continue to imitate or improve certain abilities of the human mind, there is a danger that students may rely too heavily on the directions of AI, and this may lead to a reduction in learning and problem-solving abilities as a motivation to continue learning. Chen et al. (2020) observe that if human cognition relies too heavily on AI, then its ability to think and make decisions would be compromised as a cost of advancements in AI. Education systems may lose important human abilities if they are not designed properly.

The increasing application of AI in education further raises issues related to governance, privacy, and security of information. Large volumes of quality data are needed for AI to work properly, thus making educational information more valuable and private. According to Zhang and Aslan (2021), appropriate and effective global governance frameworks are needed to ensure responsible use, shared advantages, and safety of AI technology, particularly with increasing applications and experiments with AI by institutions of learning on local, virtual, and mobile platforms.

Further, the growing development of AI and robotic technology has fueled concerns for educators with respect to cybersecurity threats, budget considerations, and inequitable access to high-quality educational technology tools. The role of AI-enabled power centralized within education systems may widen pre-existing gaps between disadvantaged and more privileged individuals and institutions as they position themselves to take advantage of these benefits and leave the rest behind. The strength of AI technology to improve the quality of teaching and the effectiveness of institutions also cannot be ruled out. In the future, the potential trend of artificial intelligence development in the education sector remains to be seen. Zhao

et al. discusses that the future trend of AI in the education sector remains uncertain. Many institutions of higher learning have so far exhibited poor involvement with the development of AI. However, the effect that early movers have had on the development of AI in the sector has slowly started to reverse the old practices. Identifying the future debate and decision-making around AI development in the education sector for Selwyn in the year 2022 includes the following areas: hyperbole and claims, the limitations of technology used in AI development, potential negative effects on society, assumptions used to inform the development of AI in the sector, and environmental sustainability.

In conclusion, the future role of AI technology within the enhancement of teaching and learning will largely depend on how well the education system strikes a balance between innovation and education, technology and values, and progress and equality. It will also require research and collaboration to ensure that AI technology acts as a transformational yet responsible tool within the field of education.

CONCLUSION

This paper investigated the contributions of artificial intelligence in improving teaching and learning activities by conducting a critical review of the applications of AI, its implications in teaching, and related issues in the assimilation of AI in teaching and learning activities. This research utilized a qualitative content analysis of journal articles and proceedings of conferences. The results led to the latest ideas of scholars concerning the implications of AI technology in a teaching activity. The findings have data that the applications of AI technology are immense in improving a teaching activity.

AI applications such as intelligent tutoring systems, adaptive learning systems, assessment systems, and generative AI tools have tremendous potential to provide every individual with personalized learning experiences. If these applications are appropriately utilized by teachers and educators to teach and deliver learning to students, then these applications could assist students to develop basic skills to be efficient learners in the twenty-first century. Moreover, AI holds tremendous potential to learn and experience more than what is learned in the class.

With the aforementioned advantages, the application of artificial intelligence in the education sector faces various challenges. These include the problem that comes with the ethics of artificial intelligence in the education sector, issues related to academic honesty, as well as issues raised by inequalities within the usage of technology. Mismanaging the oversight role will be one factor that sees greater inequalities within the education sector, thus reducing the humanistic approach to education. Accordingly, the effective integration of artificial intelligence in the teaching and learning process necessitates an integrated approach that harmonizes technological innovation with the principles of good teaching practices, ethics, and education policies. A collaborative effort by the education sector, policymakers, and researchers is needed to ensure that artificial intelligence remains an adjunct that supports, but does not supplant, human interaction and judgment. Future studies on artificial intelligence, applicable from the interdisciplinary or learner-focused paradigm, are needed to assess the long-term effects on the various aspects that define the impact on the quality of education offered by artificial intelligence as a responsible agent of transformation.

RECOMMENDATIONS

On the basis of the findings, it is recommended that the educational institutions should employ a careful and informed strategy while embracing AI applications within the context of teaching and learning processes. Teacher training schemes should also be implemented to prepare teachers to become more receptive and skilled to apply AI-based technologies and tools. Policymakers and administrators should also formulate ethical norms and safeguards related to concerns pertaining to AI applications, such as

privacy, bias, and appropriate usage of AI applications. It is also important to invest adequately in proper technological support and infrastructure to ensure smooth implementation of AI applications.

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