



From Theory To Practice: Harnessing Ai For Enhanced Teaching-Learning Dynamics

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ABSTRACT

Background: This article explores the impact of artificial intelligence (AI) on virtual teaching and learning within various educational contexts. It scrutinizes the features and complexities of AI tools currently employed in education, highlighting their integration with established technologies like virtual learning management systems.

Methods: The methodology involves a comprehensive analysis of primary and secondary sources concerning the advancement of AI and its potential applications in education. Ethical considerations surrounding the adoption of AI in educational settings are also examined.

Results: The study identifies key AI instruments utilized in teaching-learning processes while addressing the ethical debates surrounding their implementation. The outcomes aim to inform and enhance the effective utilization of AI in education while acknowledging its potential benefits and the challenges associated with its integration and growth in educational settings.

Conclusion: The article underscores the transformative potential of AI in education while emphasizing the importance of navigating ethical considerations and challenges inherent in its adoption. By leveraging AI tools effectively, educational stakeholders can optimize teaching and learning processes, fostering innovative and inclusive educational environments.

KEYWORDS: Innovation, Artificial Intelligence, E-learning, Teaching, Learning.

INTRODUCTION: NEW INFORMATION, PEDAGOGICAL AND EMERGING SCENARIOS:

New technology advancements create a previously unheard-of educational environment. The many digital tools always developing and evolving have accelerated the teaching-learning process. The COVID-19 pandemic "imposed" a techno-educational communication model in which universities worldwide engaged in remote teaching and learning via the Internet. The potential of the many technologies used in this process, including Artificial Intelligence (AI), is constantly expanding (Abulibdeh, Zaidan, & Abulibdeh, 2024; Jackson, 2024).

The rapidly developing field of artificial Intelligence has the power to transform our social connections completely. In the last two years, virtual platforms (E-learning) have been the source of new solutions and responses for teaching and learning in education. Artificial intelligence systems aim to enhance the academic community's practical application of them in online learning environments. However, certain international reference centers propose new techniques, educational ideas, and ethical concerns that require analyzing and studying different AI technology instruments (Alier, García-Peñalvo, & Camba, 2024; Nawaz).

A few of these technologies make mention of TensorFlow from Google, Azure from Microsoft, Watson from IBM, and even Amazon's Web Services. According to specialists in artificial Intelligence, as it relates to educational institutions (Selwyn), AI primarily makes use of Learning Management System (LMS) platforms, which promote teacher and student participation and collaboration by facilitating the rapid and easy sharing of experiences, theories, resources, and documentation (Encarnaçao, Manuel, Palheira, Neves-Amado, & Alves, 2024; Novawan, Walker, & Ikeda, 2024).

As a result, research like this one expands on how much AI affects the education sector, enabling well-informed and sensible policy responses. To accomplish the Global Growth Goal of UNESCO's Sustainable 4, which aims to achieve equality, excellence, and education for all, various strategies are being carried out in different nations worldwide. These include the implementation of artificial Intelligence (AI), new educational obstacles based on innovation, and the growth and establishment of computational thinking (Sappaile, Vandika, Deiniatur, Nuridayanti, & Arifudin, 2024; L. Tang & Su, 2024).

The benefits of using artificial Intelligence (AI) in the online instructional model include helping teachers to 1) acquire greater propagation of your instructional material utilized in the educational setting, 2) generate and distribute current knowledge on the students' study subjects, and 3) access and exchange data between teachers and students on subjects of interest (Dai, 2024).

AI must be directed towards enhancing the educational experience of everyone in the class, training teachers, and strengthening educational management systems. Numerous studies, including one by Google for Education, highlight several new developments already happening in elementary and secondary education and, more prominently, the expanding application of Artificial Intelligence in higher education (Haider, 2024).

COMPUTATIONAL THINKING AND DEVELOPMENT OF SKILLS AND COMPETENCIES: THE DEVELOPMENT OF COMPUTATIONAL THINKING AND SKILL SETS:

Parents and educators want kids to learn to use technology and solve problems to be better prepared for future employment opportunities. 92% of jobs worldwide will need digital skills in the future, and 45% of those jobs will need people who are comfortable setting up and using digital tools and systems. The OECD also said in 2018 that kids who start school the following year will face problems in the years to come that we can't even imagine now (Sögüt, 2024; Walter, 2024).

History greatly affects how people feel about schooling, as well as the combination of STEM (Science, Technology, Engineering, and Math), or STEM, is becoming more and more important in educational settings to prepare learners to face contemporary technological difficulties and to encourage action-based entrepreneurship that is in high demand in business. This idea has been growing among academics over the last few decades as an important part of innovation (du Plessis, 2024; Storozhyk, 2024).

Digital skills and knowledge growth are no longer seen as an extra in school; they are seen as something all students should be able to do. Changing their lessons to represent this change is becoming a process, that more and more countries are participating in. This process is called techno-educational or techno-educommunicative. For instance, 42% of Australians think that present-day education is not good enough, and 30% are not sure if kids are ready to earn the employment opportunities of the future (Salsabila & Rohiem, 2024; K. H. D. Tang, 2024).

For their students' best start possible, schools try to help them learn a wide range of technological abilities, such as solving problems, coding, and understanding STEM topics. The goal is for these tools to prepare them for the new technologies and problems that will come up. To support this program, the Australian Administration has given more than \$64 million to early learning and STEM programs in schools (Yu, 2024). This is part of the STEM measure and the Encouraging All Australians in Developing Digital Literacy (digital) project. At the same time, Australia's technological advances in Focus program has been collaborating with 160 poor schools to teach teachers and school leaders about the latest technological advances. The program aims to encourage schools to work together (Akhtar).

TOWARDS AN INNOVATIVE PEDAGOGICAL MODEL: WAYS TOWARD A NEW PEDAGOGICAL MODEL:

The Google for Education study found that driven teachers have more engaged students and want to spend more time teaching than doing paperwork. Teachers put much effort and dedication into administrative jobs like making materials and taking notes. Taking notes and planning lessons are just a few things teachers do every day, and they take approximately three hours. They teach their groups for five hours a day instead. 34% of teachers worldwide say they enjoy a good mix between work and life (Sarwar, Saima, & Gul, 2024).

In the US, 61% of instructors say they are frequently or very often stressed, while in the UK, 67% say they are stressed because of their job. Tech can be used to help teachers get more time, which might greatly affect how

engaged and motivated they are. 84% of teachers in the UK say that technology saves them time, whether by making administrative jobs easier or by helping them grade (Yeslyamov, 2024).

A shocking 88% of teachers in the UK say that using technology in the classroom helps them develop new ways to teach and improves the standard of education.

As teachers are seen as more and more "agents of change," educational institutions are searching for strategies to keep them motivated so they can work on their professional growth instead of doing paperwork. Technology makes the day brighter so that instructors can concentrate on their lessons and how they teach (Singha, Singha, & Jasmine, 2024).

Technology can also help teachers save money on supplies because it makes time by encouraging groups to work together. 83% of instructors in Mexico told Gudiño that one of the best things about technological advances is that it makes it easier for them to search, edit, and create material. On the contrary hand, 60% of instructors in this country believe that technology makes it easier for teachers to work together (Jiménez-García, Orenes-Martínez, & López-Fraile, 2024).

EMERGENCE OF EMERGING TECHNOLOGIES IN THE EDUCATIONAL SCENARIO: A LOOK AT THE RISE OF NEW TECHNOLOGIES IN THE CLASSROOM:

Indeed, individuals' everyday activities are increasingly impacted by cutting-edge and innovative technologies like artificial Intelligence, simulated reality, and augmented reality, sometimes mixed and hybrid reality. While 70% of children in the UK between the ages of 8 and 17 use voice assistants, 91% of kids in the US within the age group of 4 to 11 have access to one. There will likely be over two billion dollars in mobile augmented reality users worldwide in the next years due to the inevitable growth of this technology (A. Ahmad, 2024; N. Ahmad).

This indicates that more and more people are realising the exciting and engaging opportunities that arise when integrating technology into the classroom. For instance, studies on the use of virtual reality in educational settings attest to the fact that this technology enhances student performance and increases motivation to learn. These are useful tools for educators; according to 82% of US teachers, applying technology in schools helps students get ready for their future careers, and 33% of Australian parents think that new developments in instructional technology will open up new avenues for getting their kids interested in learning (Matthew et al., 2024; Tamer, NAYIR, & Bozkurt, 2024).

Schools are always searching for more effective methods to integrate modern technologies into the teaching and learning process. Ashu Kumar, a computer sciences and technology instructor at Penn State University, suggested an operated-by-voice AI assistant for the learning environment that might record student participation and maintain a role, corresponding to the Google for Education study. Simultaneously, the Japanese Ministry of Education has implemented 500 AI gadgets that speak English in Japanese classrooms to enhance students' writing and speaking abilities (Groenewald, Kumar, Avinash, & Yerasuri, 2024).

The German government has set aside three billion euros for artificial intelligence research and development through 2025. This strategy places an extreme value on digital competency from an early age. According to this idea, up to 58% of teachers under 30 in Germany and 48% of instructors in Germany said they would be open to experimenting with augmented reality in the classroom. As with any novel technology, adoption is still early as educators assess the advantages and disadvantages of influencing the public's views and regulatory frameworks (Grájeda, Burgos, Córdova, & Sanjinés, 2024).

ACCESSIBLE AND AFFORDABLE ARTIFICIAL INTELLIGENCE: MICROSOFT AND GOOGLE TOOLS:

EASY TO ACCESS AND CHEAP ARTIFICIAL INTELLIGENCE: MICROSOFT AND GOOGLE TOOLS:

Experts and computer technologists are no longer the only ones with access to artificial intelligence development. One illustration of this is the recently released Virtual Agents for Power (from Microsoft), which enables organizations to quickly develop and manage intelligent chatbots without writing code. This involves engaging in dialogue with instructors and students. Professor David Kellermann, for instance, of the College of New South Wales in Sydney, Australia, has developed an Intelligent Question Bot that can answer questions for students on its own and learns from experience (Ivanashko, Kozak, Knysh, & Honchar, 2024).

This allows for greater student autonomy and supports individualized learning. Additionally, as this example shows, all of these tools may be integrated into a single Microsoft Teams (MS) environment, allowing users to access all of the information in one location and fostering an interactive and diverse learning atmosphere in the classroom. With Google Tools, the same thing takes place. In addition to making the products mentioned above easier to use and more interactive, the synchronization that takes place between Meet, Calendar, Gmail, and Classroom expands the area in which students and teachers can communicate (Zohuri & Mossavar-Rahmani, 2024).

Consequently, the development of worldwide and interactive learning environments is made possible by applying AI-based technologies in real-world and virtual settings. Artificial Intelligence provides students with hearing or vision impairments with additional learning opportunities in this area, even for pupils who use multiple languages for self-expression. To enhance students' academic achievement, AI forces teachers to consider various learning styles and customize the teaching-learning process (Yang, 2024).

Entrepreneurial endeavors arise in tandem with these changes and evolutions, offering the required instruments so that the professional or educational, in this instance, does not have to squander time and resources creating their own. The notion of "AIaaS," or "AI as a Service," which seeks to make artificial intelligence resources and components licensure for education and learning professionals, serves as the foundation for these projects (Abdullah & Basheer, 2024).

These tools can add common AI activities (logic, reasoning) to your toolkit, for example, but might not be appropriate for all e-learning ecosystems. Some of the AIaaS platforms and tools that the big tech companies offer are listed in Table 1 below; the majority of these are cloud-based (cloud computing) (Elimadi, Chafiq, & Ghazouani, 2024).



ROLE	DESCRIPTION
Watson from IBM	AI applications in the cloud that you may incorporate into your apps to hold and handle your data.
Amazon web services	The Amazon cloud provides a large selection of goods and services. DataRobot, Petuum, and H2O are a few more AIaaS systems that show how the area is growing.
Tensor Flow from Google	Open-source, full-featured artificial intelligence framework.
PowerPoint Presentation Translator	Create subtitles in real-time mode.
Microsoft Azure	Services for artificial Intelligence hosted in the cloud can be utilized to develop and manage bot-based or image-recognition apps.

Table 1. Artificial intelligence tools for education

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN E-LEARNING DEVELOPMENT:

Personalized online courses can be generated for users by AI applications on e-learning platforms, taking into account their individual learning preferences. Adaptive learning is using algorithms for machine learning to change course content in real time according to student responses. The number of students opting to enroll in courses and programs online has led to a significant growth in e-learning commerce within recent years. The use of AI possesses the ability to completely transform online education by giving students individualized, effective learning experiences (Lim, 2024).

Students can receive individualized education that fits their requirements and interests by employing artificial Intelligence to personalize the virtual learning environment. This makes for a more effective and efficient learning process. However, integrating artificial Intelligence into e-learning also presents several difficulties and factors that must be considered carefully. Here are a few instances of real-time, deemed successful applications of artificial Intelligence inside the context of online education (online learning) (Table 1.2) (Darda, Gupta, & Yadav, 2024).

APPLICATION	DESCRIPTION
Massive Open Online Courses 	Massive open online courses (MOOCs) can be accessed via the Internet. Class Central reported that one hundred one million learners were enrolled in MOOCs in 2018. Of those, 37 million were on Coursera, 18 million on EdX, 14 million on Xuetang X, 10 million on Udacity, and 8.7 million on Future Learn. The MOOC from EdX tracks how frequently a user views videos and assigns assignments. When the majority of learners respond to an inquiry incorrectly, Coursera tells the teachers.
Carnegie Learning 	The 'Best Use of Artificial Intelligence in Education' award went to Carnegie Learning's MATHia at the 2019 EdTech Innovation Awards. For students in grades 6 through 12, there is an educational engine called MATHia. The system adapts to the student's abilities; for example, it offers pupils who struggle with a different learning environment and more difficult assignments to those who are capable.


<p>Duolingo</p> 	<p>One of the most well-known apps for language learning is Duolingo, which has over 300 million registered users. The app's personalized approach, game-like learning, an abundance of original tasks, and AI-powered chatbots that let users practice real-world conversations make it so popular.</p>
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Table 2: Artificial Intelligence Examples for Online Learning

POTENTIAL OF AI-DRIVEN ONLINE LEARNING: AI-DRIVEN ONLINE LEARNING'S POTENTIAL:

While artificial Intelligence (AI) has been shown to create and absorb new forms, styles, and roles in the teaching of students, it also has the potential to be used in conjunction with E-learning via Learning Management Systems (LMS) platforms, also referred to as learning platforms or managers. However, what potential benefits may artificial intelligence-based LMSs offer? Several analysts contend that artificial Intelligence has significant promise for the LMS industry in keeping up with current e-learning developments (Hess, Cupido, Ross, & Kvern, 2024).

Online learning demands a lot of effort and a well-designed infrastructure to offer students the training and education they truly need. As a result, an LMS that incorporates artificial Intelligence will make work easier for students and improve their understanding of the courses or subjects. Several benefits of the Learning Management System (LMS), including artificial intelligence advancements, address scenarios like Highly personalized content thanks to adaptable education algorithms that adjust to each student's unique learning style and pace.

As a virtual tutor, engage people by imitating human encounters through speech, holograms, or avatars (Porayska-Pomsta, 2024).

Obtain information about the understanding and growth of your students. Construct a system that can recognize and adjust itself in response to student input. Develop chatbots that serve as teaching assistants to respond to student inquiries, offer further assistance, or customize content according to their achievements. Determine which students are struggling with certain courses, subjects, or tests. Offer adaptive learning to ensure that students comprehend each lesson. Create gamification tools to add appeal and relevance to the training. Personalized learning resources and curricula derived from student data. Customized guidance and assistance depending on students' development and performance. Individualized suggestions for extra reading materials and resources (Aguilera, Castro, Aguilera, & Raducanu, 2024; Ali).

Thus, all of these developments in artificial Intelligence impact the educational environment. From the preschool years to the graduate or high school years. This boils down to: "even if the complexities and constant evolution of contemporary settings force us to reconsider schooling by the concept of perpetual learning." However, this reconsideration of teaching through digital automation "does not just comprise the technological aspect of developing, coding, and creating systems that have higher effectiveness." Adopting an online and virtual learning strategy is necessary for all of this (Stanojević & Čomić).

In particular, they apply artificial Intelligence to learning platforms (such as learning management systems or LMS). Global Market Elearning claims that because cloud-based LMS technology offers students flexible and easy training options, it is becoming more and more popular in higher education. Students may access material anywhere, at any time, thanks to the incorporation of cloud technology and artificial Intelligence in learning management systems (LMS). Therefore, institutions can build an online setting that benefits learners and educators with the help of LMS technology that utilizes cloud computing (Kucukkaragoz & Meylani; Williams, 2024).

With its fast deployment capabilities, automated upgrades and updates, and enhanced encryption for online transactions, the technology also provides universities with increased data protection. As per the Global Market Elearning research cited earlier, the online learning market had a valuation of over \$250 billion in 2020 and is projected to grow over 21% between 2021 and 2027. The market will expand due to the introduction of several new technologies, including cloud-based learning management systems (LMS) and virtual reality (VR), in addition to artificial Intelligence (AI) (Bengsch, 2024).

The creation of intelligent content, digital study guides, and real-time questions will be aided by introducing an AI-powered online learning platform. Due to the availability of highly advanced Internet infrastructures and the existence of the greatest universities in the world, the North American e-learning industry represented a turnover share of over 35% in 2020. Major colleges are seeing a spike in international students enrolling online, including Harvard, Columbia, Yale, The New School, and Montana State University (Mao, Chen, & Liu, 2024).

For instance, Harvard-MIT Health Sciences and Technology's (HST) online course enrollment is second only to that of Indian students. This has prompted academic institutions across numerous nations to provide students with online courses across various subject areas. A few of the most popular AI-powered LMS-based solutions are included in Table 2.1 below: (Jameel; Lewis, Popov, & Fatima, 2024).

LMS	FUNCTIONALITY
Moodle	Moodle is the most reliable open-source learning platform in the world. It has incorporated the collection of Moodle add-ons for teachers that expand the system's functionality to teach and learn languages online. Moodle for Moodle includes tools to evaluate speech and listening. For students, it includes audio/video recording or vocabulary learning. It can also provide automated qualifications, which takes time for the teacher and gives students more frequent learning opportunities.
Edge Canvas	The Edge Canvas LMS helps you manage and grow your organization (institute, university, company) by effectively eliminating all problems and paper in classroom administration. Edgcanvas is the definitive training application for students, teachers, and managers. By using the LMS, you avoid having to deal with multiple routine activities in addition to teaching, such as taking exams, creating and checking tasks, administering assistance and fees, maintaining notified to students, etc.
Classroom	Google Classroom is a free educational web service powered by Google. Facilitates communication between students and teachers, both within and outside educational centers. The classroom takes up a lot of time and paper and allows you to create classes, distribute tasks, communicate, and keep everything organized.
Docebo	Docebo is an e-learning platform that allows for multifunctional online training. It is easy to use for members of an organization, employees (Word documents, PDFs, videos, etc.), and members of an organization (employees from a company, students, professors from an institute, etc.).
KEA	KEA is a learning experience platform based on artificial Intelligence that can be used in all industries to personalize learning in the workplace and provide training programs for employees. Driven by AI, which gives life to business teaching on the ground, the entire process is interactive, attractive, and flexible. This way, each individual can learn at his own pace and find the help he needs when he needs it. Y, the AI component continues to improve the process, adapting to students' needs and preferences.

Table 3. LMS platforms that combine artificial Intelligence in their development

RESULTS AND CONCLUSION:

We may conclude from the analysis that modern educational systems give pupils the groundwork for the knowledge and abilities they will need for every aspect of their lives. Future students will work and live with all of these technologies as a part of their everyday lives due to the advancement and application of AI in the workplace. Given this, it's plausible that we are witnessing the end of paper manuals and blackboards in favor of a creative, cutting-edge, technology-based educational paradigm.

As artificial intelligence (AI) develops, regular activity automation will become more centralized inside the digital transformation process. Additionally, the education industry is not immune to this. As a result, it might be necessary to make the process of reevaluating and redesigning educational initiatives a regular and ongoing endeavor in response to the effects of artificial Intelligence. To all of this is the deluge of data that has come with the arrival of the digital age, which has prompted nations to begin mining vast amounts of data for knowledge to offer more individualized learning opportunities.

We should concentrate on their ethical ramifications since these tendencies will only get bigger. To control and increase understanding of the moral utilization of AI in education, we must address this issue and create consensus policy frameworks. The reason for the first consensus is that each nation's educational system must specify whether to use the statistical information of the participants, students, and teachers. Education changes to serve students' needs better, interest them in classes, and prepare them for the future.

To do this, one must develop critical and computational thinking skills. Similarly, creating novel teaching approaches is a part of an ever-evolving educational ecology. In this case, pedagogy and technology can collaborate to support transformation by giving instructors the resources they need to enhance their classrooms, fostering more flexible learning environments, or repurposing classrooms as creative learning environments for the future.

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