

## Chapter 9 - Artificial Intelligence (AI) in Teaching and Learning: A Comprehensive Review

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### Chapter Highlights

- Artificial intelligence has entered the field of teaching and education and has improved education by providing teachers with practical teaching tools. AI applications such as virtual reality, simulations, and providing students with practical skills are noteworthy.
- AI guides teachers by providing students with pedagogical tools such as customized teaching and language learning tools. It also improves the work of teachers and trainers, increasing efficiency, effectiveness, and quality.
- AI can increase the speed at which students learn and help instructors by identifying gaps. With the ability to deliver customized content to students, it provides teaching that suits students' needs, abilities, and skills.
- AI is used in administrative tasks, especially grading, plagiarism checking, and commenting on student work. In this way, it helps teachers spend more time speeding up their administrative work.
- AI applications in education are an important tool to make the educational process more efficient and effective. Future studies should delve even deeper into the role of AI in education and conduct more research to understand the potential of this technology better.

## Abstract

The study aims to determine how AI may affect education. The research only examines how AI affects administration, education, and learning. A preliminary inquiry that established a narrative and framework for AI research determined this. The data show that educational institutions have widely adopted and used artificial intelligence (AI). Computing and associated technologies created artificial intelligence (AI). It now includes web-based and online intelligent education solutions. AI has also been used with embedded computer systems, humanoid robots, and web-based chatbots to conduct teacher jobs alone or with human instructors. Teachers have efficiently assessed and evaluated students' work and improved their instruction using these platforms. Due to machine learning and flexibility, educational systems may modify curriculum and materials to meet student needs; this improves learning outcomes by increasing adoption and retention.

## Introduction

As a result of technological developments, many sectors are evolving to serve a wide range of fields, including civil and military uses (Rodriguez-Andina et al., 2010). Cell phones and the internet are interconnected technologies that significantly affect our daily lives (Huba & Kozák, 2016). There is a contentious debate about how much screen time children should have among psychologists, educators, and parents. Another rapidly expanding innovation can transform the educational system fundamentally.

Artificial Intelligence (AI) is a familiar technology or topic. Several novelists in the past, as well as science fiction movies, predicted its rise to fame. While things have yet to go as planned, technology is here to stay and is causing changes across the board. It is uncommon for technology to be created that has a broad impact across many industries, including education (Nguyen et al., 2020; Minh T. Nguyen et al., 2021).

According to current estimates, experts believe that between 2017 and 2021, the United States will see a 47.5 percent growth in the use of artificial intelligence in education (Lobera et al., 2020). According to a survey on the artificial intelligence market in the US education sector, this is true. Although many education experts believe technology will not replace teachers' necessities, they acknowledge that it will impact how they carry out their duties and the recommended instructional practices.

It's not just about altering the way instructors carry out their duties. Additionally, it is changing how students learn. This growth is occurring in more than just the US. The use of AI in education is anticipated to grow globally at a rate of 45% annually, reaching \$5.80 billion by 2025, according to the market research engine (Berendt et al., 2020).

The study explored how AI has changed education's administrative, instructional, and learning components. AI in education started with computers and computer systems and evolved into online learning platforms. Embedded technologies allow cobots and humanoid robots to function as teacher colleagues, autonomous educators, and chatbots. Robots on various platforms and technologies have enhanced instructors' efficacy and efficiency,

improving educational quality. AI has enhanced students' learning experiences by customizing and personalizing learning materials based on their needs and skills. AI has greatly influenced education, notably in administration, instruction, and learning in the educational system or individual educational institutions.

The paper's organization continues: Section 2 covers recent AI education applications. Section 3 discusses AI background and technical features in education to demonstrate technological applications. In parts 4, 5, and 6, AI techniques in teaching, learning, and educational management are discussed, along with their effects. Section 7 concludes and plans future work.

## 2. Recent Applications of AI in Education

The educational system is very dependent on outdated practices. Although there are knowledge gaps in the current grading systems, a dose of AI tools and technology can usher in a new era of automation. According to estimates, the market for AI in education will grow to \$3.68 billion by 2023, according to [marketsandmarkets.com](https://www.marketsandmarkets.com), with a CAGR of 47 percent from 2018 to 2023 (Subrahmanyam & Swathi, 2018). Educators should consider designing a digital transformation inside their area to include the relevant AI technologies that generate the intended outcomes. Let's look at some of the most important AI uses in education (Vincent-Lancrin & van der Vlies, 2020).

### 2.1. Universal Access to Education

Providing high-quality education to all students, regardless of region or race, is difficult. However, AI can dramatically improve student-teacher and peer-educator interactions. AI technologies provide intelligent data collection, tailored timetables, unique occupations, and 24/7 education. They can also build language translations, subtitles, and regional plug-and-play applications to promote universal learning and eliminate outmoded or inefficient instructional methods (Guilherme, 2019). AI-powered systems can analyze enormous volumes of data in real-time and integrate the cloud, allowing businesses with global branches to do short administrative, testing, and instructional duties identically.

### 2.2. Admin Tasks

In schools, colleges, and institutions, automate scheduling, rescheduling, attendance, grading, financing, bookkeeping, and record-keeping (Sharma et al., 2021). This simplifies the routine, removing boring tasks the employee no longer does. AI can aid in many jobs, including:

- Eliminating truancy warnings
- Automatically send report cards and other correspondence to parents.
- Schedule and plan meetings.
- Send normal student forms, enrollments, and other documentation to the appropriate department via automation.

- Reduce the amount of time spent on progress reports.
- Make any other record-keeping chores more efficient.

It may allow professors and teachers to concentrate on increasing educational quality rather than laborious paperwork and lowering work strain.

### 2.3. Assessment Programs

After collecting measurements for scoring assignments from teachers or professors, AI-powered grading software employs machine learning to develop calculating methods (Alam, 2021). The tools mimic how teachers grade pupils. Teachers' input and AI can swiftly evaluate essays, papers, and tests in several languages. They may swiftly incorporate them into a virtual environment or cloud platform. It helps instructors focus on other activities when there are numerous papers to grade.

### 2.4. Voice-activated Tools

Voice assistants are a fun and practical method to help users and bring learning into the home. The following are some of the advantages of voice assistants in education:

- Efficient time saving for students and teachers
- Community learning opportunities
- Personalized instruction in seconds

Even if they don't have smart speakers, these AI-powered voice assistants can be used in smartphone apps.

### 2.5. Personalized Education

AI technologies help students learn by creating tailored study programs and tailoring lessons. They discover knowledge gaps and provide instructional resources, evaluation tools, and feedback for preschool through college students. AI-powered software, games, and applications may help students learn at their own pace, time, and repetition needs. This machine-assisted classroom helps teachers tailor lessons to students. It may greatly improve flexible learning and give all learners a firm foundation (Rad et al., 2018).

### 2.6. Smart Content

Smart content can range from digital textbooks, manuals, instructional snippets, and videos to AI systems that create individualized educational environments depending on tactics and goals. Find ways to use AI to personalize education, a worldwide trend. Using web-based curricula, schools can create AR and VR learning environments

(Elkoubaiti & Mrabet, 2018). AI monitoring and assessment systems can simplify content for different learning types and varying learning speeds. AI and machine learning algorithms may discover curricular gaps and help teachers address them when many pupils give erroneous answers.

### 2.7. Intelligent Tutoring

Intelligent tutoring systems (ITS) can provide personalized feedback and teaching (Mousavinasab et al., 2021). They cannot replace instructors since they are not mature enough to learn. They can help when human instructors cannot teach and assess small online classes. E-learning platforms may teach languages, geography, circuits, medical diagnostics, computer programming, mathematics, physics, genetics, chemistry, and other disciplines. Engagement, grading, and comprehension guide their design.

### 2.8. Virtual Learning Environment

VR technology lets students engage with information on their mobile devices or laptops. Virtual learning environments can promote immersion, group learning, and student counseling. Virtual reality headsets can help ADD/ADHD kids focus by blocking distractions (Huda et al., 2018). Interactive virtual simulations offer students soft skill coaching, life skills, and self-development.

## 3. AI Background and Technical Aspects in Education

### 3.1. The Background of AI and Approaches in Education

Artificial intelligence (AI) is often used to describe computers. Computers may have been the foundation of artificial intelligence, but a review of various articles shows a shift away from computers, hardware, and software. Thanks to embedded computers, sensors, and other technologies, AI can now be integrated into robots, buildings, and other devices (Do et al., 2021). In reality, the research defines and accounts for AI twice. They call AI a theory and a field. AI is an area of computer science that addresses several cognitive tasks related to human intelligence, including learning, comprehending problems, identifying patterns, and adapting (Hwang et al., 2020). The paper defined AI as a theoretical framework for designing and applying computer systems with intelligence and the ability to perform human-like tasks like speech recognition, visual perception, language translation, and decision-making.

Many academic definitions and studies of AI highlight similar elements or qualities. Sharma et al. call AI "devices that can approximate human reasoning" (Verma et al., 2021). Like this, AI requires decades of study and development. System designers, data scientists, product designers, statisticians, linguists, cognitive scientists, psychologists, education experts, and others collaborated to create intelligent education systems that could support teachers and students (Nagao, 2019). AI is founded on enhanced software and program skills, such as algorithmic machine learning, which allows computers to do activities that require human intelligence and environmental adaptability (Nguyen et al., 2021). Artificial intelligence—a machine's or computer's ability to replicate human intelligence and behavior—was also seen (Cabezas-González & Casillas-Martín, 2021).

Artificial intelligence is the development of computers with some intelligence and the capacity to do human-like tasks, including cognition, learning, decision-making, and environmental adaptation. Therefore, some qualities and concepts are essential for AI. This definition and discussion of AI conclude that intelligence, a machine's ability to do activities that require human-like abilities, is a significant component.

New applications, including face unlocking, speech recognition, natural language translation, virtual reality, AI, and machine learning, have gained interest in mobile device usage to improve computing quality. Machine learning demands a lot of computational power for complicated training and learning. Computationally efficient systems have solved this challenge. Qualcomm launched the Snapdragon Neural Processing Engine in 2016 to accelerate GPU neural network operations. HiSilicon offered HiAI for neural network operations. The Android Neural Networks API was designed to run machine learning models quickly on mobile devices (Hojjatnia et al., 2020). This API benefits mobile users by reducing network latency and complexity. SqueezeNet, MobileNet, and Shufflenet are well-developed mobile phone AI learning networks (Zhou et al., 2021). AI on mobile devices makes learning faster, more engaging, and more personalized, elevating mobile education. Because AI can connect students to virtual classrooms, virtual reality helps build a worldwide classroom. AI-powered chatbots customize online learning and transform instructor interactions into chats. Students' understanding may be assessed using this technique.

### 3.2. Technical Aspects in Education

As shown in Table 1, AI approaches can benefit the educational sector in various circumstances. Examples of AI-assisted education include innovative virtual learning, intelligent teaching, and data analysis and prediction. Table 1 lists the main applications of AI in education along with the key technologies that underpin them. It's important to note that as learning requirements rise, AI-enabled education is becoming increasingly important (Pokrivčáková, 2019). Intelligent education systems provide timely, personalized training and feedback to both teachers and students. They mostly use machine learning-related technologies (Perrotta & Selwyn, 2020), which are strongly related to statistics models and cognitive learning theory, to increase the value and effectiveness of learning.

Table 1. AI techniques with scenarios in teaching and learning.

No	AI education scenarios	AI possible techniques
1	Intelligent schools	Virtual labs; A/R; V/R; hearing and sensing technologies;
2	Online and mobility of remote education	Virtual personalized assistants; Edge computing; Real-time analysis;
3	Personalized intelligent teaching	Intelligent teaching systems; Data mining or Bayesian knowledge interference; Learning analytics;
4	Grading and evaluation	Computer vision; Image recognition; Prediction systems;

5	Students and Schools' assessment	Academic analytics; Adaptive learning methods; Personalized learning approaches;
6	Building curriculums	Big data data analysis; Clustering algorithms; Machine Learning or Deep Learning technology;

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AI systems use machine learning, data mining, and knowledge model methodologies for learning analysis, recommendation, comprehension, and acquisition (Chen et al., 2022). Teaching materials, data, and intelligent algorithms comprise an AI education system with two parts: the system model (which contains the learner, teaching, and knowledge models) and the intelligent technology (Kim et al., 2020). Figure 1 shows that a model's contribution to a data map, which builds structures and association rules for education data (Romero & Ventura, 2020), is crucial to learning. The model is an artificial intelligence system's brain.

The learner model improves AI learning systems' autonomy. Information from students' behavior while learning determines it. Students' ideas and talents are examined to determine their learning capacity. The learners' knowledge mastery is assessed by mapping the knowledge analysis's findings—learner modeling links learning objectives, resources, tools, and instructional techniques (Chassignol et al., 2018). The knowledge model produces a knowledge structure map with learning components, sometimes adding specialized information and instructions to avoid typical mistakes and misconceptions (Yang & Zhang, 2019). The teaching model established the knowledge field's norms, which combined the learner and knowledge field models, allowing instructors to personalize instruction.

Students are more inclined to conduct themselves well, act well, or ask for help as they learn. AI systems can always use the tutoring model's teaching theories. The user interface displays learners' performance through speech, typing, and clicking and outputs words, figures, cartoons, and agencies. The sophisticated HMI performs AI functions, including speech recognition, emotion detection, and natural language interaction.

#### *a- Machine Learning*

The core of machine learning is the process of parsing, which produces meaningful patterns and organized information based on a sampling data set known as "training data. For instance, machine learning can help students choose classes and even universities by providing recommendations. It "matches" students with institutions where they can grow the most by using data on student success, aspirations, and preferences. Additionally, this technology can help teachers better understand how students absorb each concept (Goksel & Bozkurt, 2019). To help students grasp the course material better, instructors can modify their teaching strategies in response to cumulative student performance data. For instance, photo recognition and machine learning predictions can be used to assess tests and homework for students, yielding results more quickly and reliably than humans. Deep learning, a branch of machine learning, has received much media attention lately. The most commonly used methods are decision tree learning, inductive logic programming, clustering, reinforcement learning, and Bayesian networks. From a technical perspective, deep learning emphasizes the learning of successive layers that produce increasingly meaningful representations. These layer features, arranged in literal layers stacked on top of one

another, are extracted using neural networks.

### *b- Learning Analytics*

Learning analytics uses student characteristics and knowledge objects from learner and knowledge field models. Learning analytics applies machine learning to education. Intervening with at-risk pupils or offering feedback and instructional content is one way to tailor education to specific students (Balica, 2018). Machine learning, data visualization, learning sciences, and semantics are used. AI-based competency learning may uncover student insights and predict their fundamental abilities, allowing institutions to respond proactively. AI's broad learning capabilities and competency-based learning power learning analytics. AI can identify prospective dropouts based on multiple characteristics, providing schools with early warning systems and actionable data. Learning analytics should expand to encompass interpersonal skills, the arts, and literature, which complicate evaluating competencies and learning outcomes. Learning analytics must be specialized enough for individual learning environments and wide enough for numerous institutions and courses. Innovative learning analytics will help students, instructors, administrators, and institutions learn.

### *c- Data Mining*

Educational data mining provides automatic, methodical answers. AI-based educational data mining creates intrinsic association rules and customizes information for students. A few writing exercises can assess student demographics and grade information (Chien & Chen, 2008). This is done via machine learning regression, which may also predict student achievement. Data mining improves knowledge acquisition and learning by understanding learning situations and students.

Data mining extracts hidden information through pattern recognition and predictive modeling, allowing educators to alter curriculum development. Data mining-based AI can help students study at their own speed and choose their learning technique from knowledge field data, which is one of its most important uses. In customized learning, students choose topics that interest them, and teachers modify their teaching methods (Walkington & Bernacki, 2020). Data mining helps AI develop more accurate and reliable intelligence (e.g., via machine learning).

Figure 1 shows how AI education's technological framework develops a data map with structures and association rules for educational data.



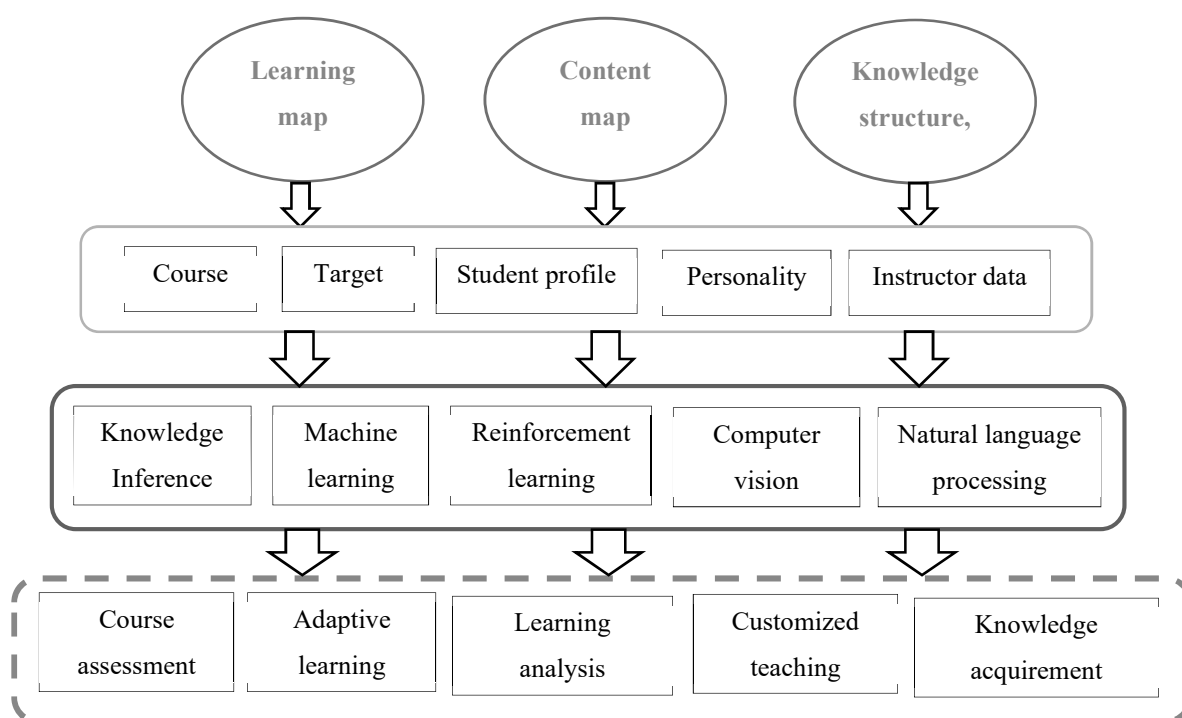


Figure 1. An illustration of the AI education technological structure

#### 4. AI in Teaching

The papers discovered and analyzed show that AI systems have invaded teaching and education. AI helped create and execute effective instructional tools. These tools have improved education, as seen in Figure 2. The graphic displays AI applications for instructors. AI platforms and instructional aids are highlighted in several publications. In (Felix, 2020), virtual reality is used to teach pupils or demonstrate knowledge. Pedagogical tools and platforms include AI applications like simulation-based education. Other projects have considered using virtual reality as an AI component in education. Virtual reality, 3-D technologies, and highly interactive simulations have been shown to assist pupils in learning concepts (Ahmad, 2018). Through virtual reality and simulation, AI guides medical students through practical topics like procedures and human anatomy.

Other research has focused on integrating AI into machines or robots, developing strong instructional tools, and improving pedagogical approaches. According to some research, integrating AI principles into robots and developing and using cobots as teacher assistants and colleagues can help students learn to read and pronounce words (Eguchi, 2021). The study found that using AI in education, especially as instructional tools and with other technologies, has spurred the development of better teaching tools (Desyandri et al., 2019). Pokrivcakova, on the other hand, promotes chatbots and AI integration in computer applications. Chatbots can answer student questions and offer instructional information (Kristanto & Mariono, 2017). AI lets humanoids and robots think, decide, communicate, and converse, making them useful educational aids.

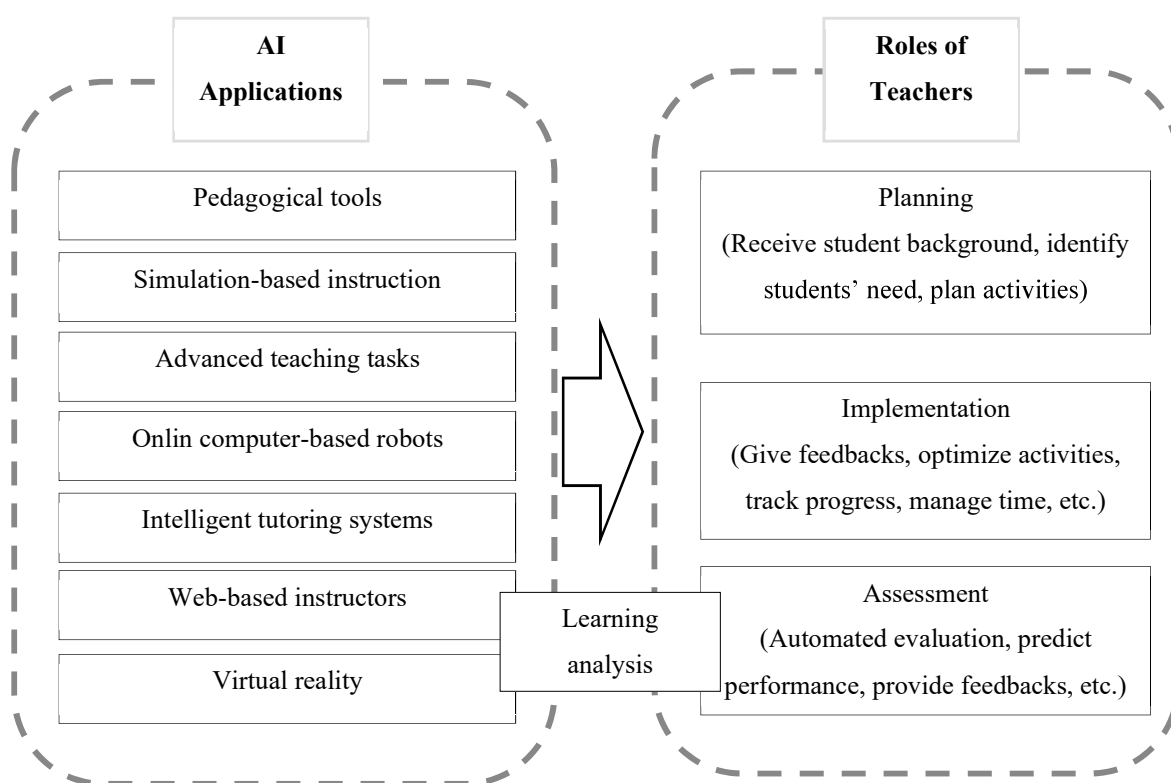


Figure 2. Contents of AI technologies to support teaching roles in educational areas

Due to the article's analysis, several AI education applications were found. Studies examine intelligent tutoring systems in various ways. Rus et al. state that animated conversational agents like chatbots or robots and intelligent tutoring systems (ITS) that communicate and hold dialogues have improved teaching (Chen et al., 2016; Nino, 2020). Pokrivcakova's AI education apps, like CALL, which gives pupils personalized teaching and language learning writing and translation tools (Nino, 2020), focus on the same themes. AI is also used in education to give teachers or instructors directions. AI in web-based education, notably AIWBES, has made teaching and adding teacher-like capabilities important tools for instructors. The use of AIWBES in teaching and the incorporation of teacher-like functionalities make the platform a strong tool for instructors (Koh, 2019).

IWBE, or intelligent and adaptive web-based systems, in which teachers are studied and presented as social agents, are more likely to be discussed to ensure that web-based education is an effective and organized way to enhance the learner experience. The technology then understands and supports teachers in instructing pupils (Pardo, 2018). It supports instructors' instruction as a standalone educational tool. Several technologies and methods use AI.

### Discussion of the impacts

Figure 2 shows how teachers used AI in instruction in this research. Numerous studies show that educators readily adapt and use AI as a teaching aid or educational tool. AI in instruction and pedagogy has greatly affected this part of education. Numerous studies have shown that it improves instructors' productivity, efficiency, and quality. Delivering relevant material according to the curriculum and the learner's needs and skills determines effectiveness. Assimilation and retention of knowledge by students or learners assess efficiency and quality. Given

these operational definitions and descriptions of efficiency, quality, and effectiveness, the study's findings suggest that AI has helped education achieve quality, effectiveness, and efficiency.

AI boosts instructional efficiency. Rus and his colleagues (Chen et al., 2016) claim that employing evidence-based or empirically supported strategies, such as widespread usage of cognition and learning models (Huang & Rust, 2018), has helped pupils learn and remember the most. As Rus et al. noted, learner-centered systems like DeepTutor and AutoTutor enable customization and tailored information based on the learner's skills and needs, improving the learner's experience and encouraging learning objectives. AI has increased instructional quality and efficacy since current technology-based adaptive systems tailor materials and information to learners' requirements, delivering an ideal learning experience (Alammary et al., 2014). AI improves course content distribution, especially on online and web-based learning platforms, from curriculum development through delivery.

AI, especially its incorporation into online and web-based learning platforms, has improved education since it allows these platforms to generate and utilize outstanding teaching materials (Kahraman et al., 2010). The same learning benefits were seen in other investigations. Estevez et al. (2019), emphasize the importance of adaptable IWEBS and instructions based on observed and learned learner behavior. These characteristics improve learning and instructional efficacy by allowing platforms to personalize pedagogical strategies. CAL and CBT use a "put it all on the web" approach and may not meet students' learning needs, while ITS customizes, individualizes, and personalizes learning (Lambropoulos et al., 2015). AI has improved education, notably in terms of efficacy and efficiency. AI tutoring systems were created to overcome the problems of one-on-one teacher-student tutoring, improving instructors' jobs (Darling-Hammond, 2017).

The investigation revealed several major themes or ways AI has affected instructors' jobs. Technology, particularly artificial intelligence (AI), can promote academic integrity through plagiarism checks, proctoring, and online student monitoring on Grammarly, Turnitin, and White Smoke (Alam, 2021; Fazlollahi et al., 2022; Maxim et al., 2016). In other research (Hite et al., 2019; Schelly et al., 2015), gamification, which leverages AI for education, improved instruction. Virtual reality and 3-D technology are also part of gamification. These studies also discussed the benefits of VR and 3-D simulation, team-viewer tools, and gamification to improve education. Another study found that expressive humanoid robots with dialogue and conversational skills can improve educational quality by encouraging student involvement (Kaendler et al., 2015; Masika & Jones, 2016; Scull et al., 2020; Strauß & Rummel, 2020) due to their expanded capabilities and human-like looks.

## 5. AI in Learning

Learning, a crucial part of education, is also studied. With good learning resources and instruction, artificial intelligence may help students learn faster. AI can also help students catch up faster by alerting professors to concerns the human eye misses. Figure 3 shows how AI has been embraced, employed, or abused to help students' learning in the study's many papers. Software that uses AI to enhance student learning has also been found. AI has greatly improved student learning by tailoring curriculum and content to students' needs, talents, and abilities

(Xie et al., 2021). Adaptive learning software uses AI or machine learning to "adapt" a student's learning route in real-time. Teaching pupils to acquire and retain information can be done in numerous ways (Chee et al., 2015; Holmes et al., 2021). AI in education has erased national and international barriers, enabling global online and web-based learning (Kumar & Sharma, 2016; Tekin et al., 2015).

Publications identified platforms and applications. Some systems allow content customization and personalization, which improves learning and retention. Knewton uses machine learning algorithms to make real-time recommendations to students based on their learning preferences. It then tailors course content to their needs (Williamson, 2016). Other systems with comparable characteristics, such as Cerego, Immersive Reader, and CALL, can improve students' educational experiences from pre-kindergarten through university bachelor and graduate programs (Schonert-Reichl, 2017; Williamson, 2016). The authors also showed that AI and chatbots improve students' learning experiences by employing machine learning algorithms to personalize information to their needs and competencies (Benešová & Tupa, 2017). The author also discusses how machine translation, adaptive educational systems, and intelligent tutoring systems use AI to help students. AI customizes and personalizes content to meet learners' skills and needs.

However, past research has demonstrated that AI applications dramatically impact learners' experiences. Intelligent tutoring systems (ITS) and simulation-based learning enhance deep learning, which improves student learning (Hwang et al., 2016). Mikropoulos argues that simulation and virtual reality improve student learning (Ahmadi & Reza, 2018). Simulation, virtual reality, and other AI-based learning technologies assist students in becoming future-ready and able to keep up with AI in industry (Galloway & Swiatek, 2018). Another example of AI helping kids study is AIWBES. AIWBES generates learned material more adaptively. Kahraman et al. says AIWBES' interactive problem-solving will help students complete these tasks by providing qualified assistance at each level (Cantabella et al., 2019). The same AI capabilities are mentioned in online learning. IWBE, or intelligent and adaptive web-based systems, especially multi-agent systems (MAS), treat learners as social agents, analyze their behavior, and adjust by providing relevant information (Ikedinachi et al., 2019; Sharma et al., 2019). AI's integration, acceptance, and use in education have focused on enhancing students' experiences despite its significant influence on other parts of education.

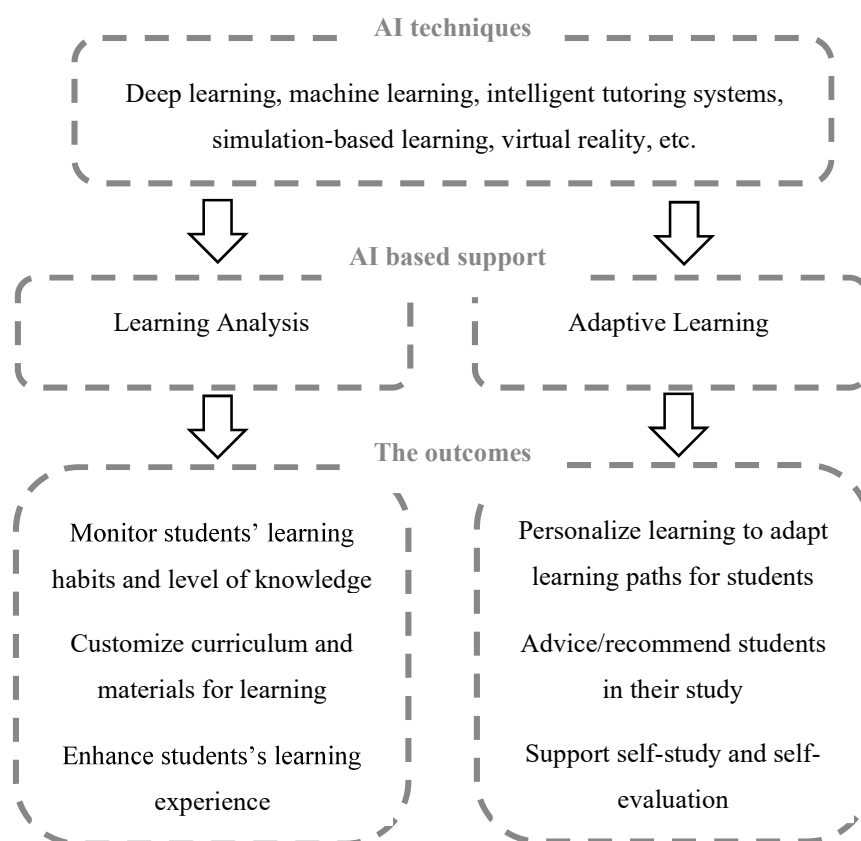


Figure 3. Contents of AI techniques to support learners

### Discussion of the impacts

This research also investigates how AI has affected student learning. AI's conversational agents question and prod pupils until they can explain themselves and their logic, boosting information intake and retention, according to Rus et al. (Salem, 2019).

Some research suggests AI can help students learn. AI may assess learning progress, including knowledge and understanding, and utilize the results to improve the system's capacity to personalize content to students' needs and abilities, encouraging them and exploiting their unique skills to promote retention (Pinchbeck & Heaney, 2022; Salimon et al., 2021). AI allows Pokrivcakova to build and employ intelligent learning systems and adaptive material customized to each student's learning requirements and skills, such as intelligent virtual reality and simulation teaching and learning, which increases learning (Villegas-Ch et al., 2020). Simulation and other similar technologies aid education. Simulation and other technology increase learning by giving students hands-on experience. The researchers reviewed studies showing VR and 3-D technologies boost learning usability, enjoyment, excitement, motivation, and engagement (Raja & Priya, 2021).

Later research on web-based systems demonstrated significant AI and learning quality gains. According to Kahraman, adaptive hypermedia, information filtering, class monitoring, and collaborative learning improve student engagement, interactions, and learning (Kabudi et al., 2021). Peredo et al. connected AIWBE to better

learning and noted that web-based systems tailor instructions and materials to discover and evaluate learner activities. StudentTracker middleware tailors AIWBE pedagogy using online learner data, including completed tasks, learning tracking, time, and others (Davies et al., 2021). Web-based platforms encourage learning through cost and global availability (Coma-Tatay et al., 2019). Platforms boosted learning overall.

More research showed AI's learning benefits and influence. TurnItIn and Pearson's Write-to-Learn have increased learning using AI for writing and editing (Crossman, 2019; Haldorai et al., 2021; Mehtab & Mahmud, 2022). However, several studies have shown AI may harm learning. Pangrazio et al. (2022), say AI may make paper mills and paper-churning platforms easier for students to use, encouraging dishonesty and undermining academic integrity. According to research, AI for learning offers more benefits than drawbacks (Kassymova et al., 2020; Sadeghi, 2019).

### 6. AI in Educational Management

This chapter discusses AI research in education, focusing on administrative duties. AI is expected to impact administrative jobs, including grading, reviewing, and giving comments on students' work. Sharma et al. assert that AI has boosted institutional and administrative productivity, particularly for distance and online learning (Gandedkar et al., 2021). Some systems, like Knewton, help professors provide students with feedback based on how they utilize them. Other research on administrative support systems takes similar views.

For example, intelligent tutoring systems (ITSs) may grade and comment on student work (Al-Hanjori et al., 2017). Instructors who use ITS are more efficient at administrative activities in addition to their main duty of guiding students to success. Mikropoulos and Natsis' study validates these conclusions: AI has made administrative chores like grading student work more efficient (Hanewicz et al., 2017). In today's online learning environment, tools like Turnitin and Ecree give suggested grading, check for plagiarism, and let teachers perform various administrative tasks. AI speeds up administrative tasks that would take a long time without it.

#### *Discussion of the impacts*

AI has greatly influenced education administration and management in many forms and for varied purposes. It has helped professors grade and provide students with feedback. Instructors may easily grade and comment on students' work with AIWBE systems (Reis et al., 2019). Websites like Knewton help teachers grade student work and provide comments on learning progress (Alnahdi, 2019). AI has simplified administrative tasks and enhanced teachers' instruction. With intelligent tutoring systems' various features, teachers may grade and give comments (Goralski & Tan, 2020).

Other AI-powered apps help professors identify plagiarism, grade, and offer students feedback on their work. Grammarly, Ecree, PaperRater, and TurnItIn are examples. AI has greatly reduced instructors' paperwork and administrative tasks, allowing them to focus on teaching and disseminating information according to the institution's or nation's curriculum (Chamunyonga et al., 2020; Paek & Kim, 2021). Even though many of the

articles evaluated focused on other areas of education, there was an improvement in the quality of administrative tasks and processes and the efficiency and productivity of instructors or educators in completing them.

## 7. Conclusions and Future Work

This research sought to determine how AI will impact schooling. A qualitative literature review was the research strategy and approach. The study analyzed professional journal articles, publications, and conference reports to reach its purpose. Computers and computer technology have enabled the development and usage of artificial intelligence (AI) in numerous sectors. AI, which has a major influence on its industries, was made feasible by introducing personal computers and subsequent processing and computing advances. The educational institutions studied in this research have widely embraced and deployed AI.

AI has various educational and technological uses. Some professions use AI to examine comprehension issues, instructor backgrounds, and school infrastructures to build curriculums. AI helps instructors, students, and administrators arrange for study or instruction. Opening concerns and adding challenges might cause field researchers considerable problems.

## Acknowledgements:

The author would like to thank the support of the Thai Nguyen University of Technology (TNUT), Viet Nam.

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### Citation

Nguyen, T., TK., Thuan, H. T., & Nguyen, M., T. (2023). Artificial Intelligence (AI) in teaching and learning: A comprehensive review. In A. Kaban, & A. Stachowicz-Stanusch (Eds.), *Empowering Education: Exploring the Potential of Artificial Intelligence* (pp. 140-161). ISTES Organization.