Original Article

Artificial Intelligence in Education: Examining the Impact of AI on the Teaching-Learning Process

Mohsen Ghafarzadeh*[1], Mohamadjavad irandoost[2]

1. B.Sc., Elementary Education, Shahid Bahonar Campus, Farhangian University, Isfahan, Iran.
2. B.Sc., Elementary Education, Shahid Bahonar Campus, Farhangian University, Isfahan, Iran

Abstract
Artificial Intelligence (AI), particularly with machine learning and deep learning techniques, is revolutionizing human cognitive processes. From increasing accuracy and speed in performing repetitive and complex tasks to improving decision-making processes, AI has made significant strides in various fields including healthcare, business, and law. In healthcare, AI is accelerating medical diagnoses, and in business, it serves as a powerful analytical tool, increasing efficiency. In the legal field, it has optimized justice processes by providing public legal education services. The application of AI in teaching and learning processes is also significant; this technology has the potential to personalize the learning experience, provide 24/7 access to knowledge, and assist students in completing assignments with higher quality. Moreover, by providing new opportunities for teachers to optimize teaching content and assessment tools, it enhances their performance. However, there is a need for human oversight and guidance in the application of AI to maintain professional ethics and protect privacy. Ultimately, AI has the potential to have a lasting impact on the future of education by enabling personalized and targeted learning.

Introduction

Following Artificial Intelligence, or AI for short, is the simulation of human intelligence processes by machines, especially computer systems. In other words, it involves using large amounts of data to program intelligent machines. (Figure 1)
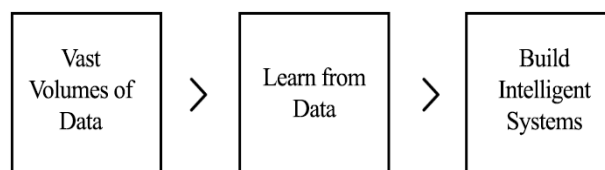

Figure 1. A conceptual view of artificial intelligence

These systems, by incorporating prior knowledge and experiences, are capable of imitating human behavior.

The use of these systems will increase efficiency, speed, and accuracy for humans. The foundation of artificial intelligence is machine learning and deep learning techniques.

Why is artificial intelligence important? Because AI has a great potential for performing tasks that require repetition, high accuracy, speed, and long-term calculations, and involve many details. Additionally, AI can improve many company processes and provide insights

*Corresponding Author: m.ghafarzadeh@cfu.ac.ir

and conditions that were previously unavailable in the absence of AI. This is why many large companies in the world, such as Google and Uber, have started to incorporate AI into their systems to improve efficiency and effectiveness and gain a competitive advantage.

AI tools often align with three fundamental principles:
- Learning: Acquiring and processing new experiences
- Creating self-correcting behavioral models: Improving algorithms to ensure the most accurate results
- Reasoning: Selecting specific algorithms to solve a particular task

In this section, we will discuss the application of artificial intelligence in various fields and branches.

Artificial Intelligence in Healthcare: AI can significantly contribute to accelerating and improving human diagnoses in patients. These technologies have the potential to transform many aspects of patient care as well as administrative processes in provider, payer, and pharmaceutical organizations.

There are currently a number of research studies that show AI can perform as well or better than humans in key healthcare tasks such as disease diagnosis. Today, algorithms outperform radiologists in detecting malignant tumors and guide researchers in how to create groups for expensive clinical trials. However, for various reasons, it will take years for AI to replace humans in the broader medical process.

IBM Watson is recognized as a leading AI-powered healthcare technology that can assess the resources available to clinicians in a particular hospital and tailor its recommendations based on their equipment and location, while cancer specialists can conversely analyze Watson's suggestions to determine from which specific medical texts it has drawn its inferences.

The application of AI in business: AI can act as a precise coach and supervisor in parts of a company. Experts in this field have stated: This technology has the ability to monitor and analyze actions in near real-time and provides feedback, thus guiding or coaching employees through the process. This can reduce errors caused by employee ignorance and increase the overall efficiency of a company and business.

Application of Artificial Intelligence in Law: One of the applications of this system in legal matters includes: Public legal education: Cambridge University has worked on LawBot, aimed at helping ordinary people understand complex legal issues related to 26 major crimes under English and Welsh law, and also helping them decide which legal actions to pursue using the services of an experienced lawyer. With the help of artificial intelligence, many tedious paper-based processes can be made easier and automated for both ordinary people and lawyers and judges.

Based on the information provided and the services that artificial intelligence can provide as an assistant and even a colleague in various fields, we can state the advantages of artificial intelligence as follows:

1.High accuracy and speed in working with large data sets that require calculations with minimal error, which can lead to discovering patterns in very large data sets that are hidden from the human eye.

2.Automation and optimization of other tools by making them smarter.

3.Ability to draw conclusions from previous work and activities and to improve and evolve continuously.

4.Unlimited 24-hour use, unlike humans who need rest.

5.Providing unique reports for each individual, specifically tailored to that individual and based on their performance (using this data for future improvement and effective results).

The use of Artificial Intelligence for learning and teaching
Given the rapid growth and advancement of artificial intelligence and its related technologies, and the widespread and increasing use of AI in various fields, and due to the significant impact it can have on the future of everything, including the realm of education and learning, it is necessary for educational planners, teachers, students, and anyone who can play a role in the teaching and learning process in any way to become familiar with this tool and how to use it in their work.

The use of AI in teaching and learning for students
Artificial Intelligence can bring the following benefits to students:
1. 24/7 access to learning: They can use this educational resource whenever they want and dedicate learning time to when they have the highest mental and intellectual returns. Also, due to the lack of spatial limitations, they do not need to be present at a specific time in a specific place to learn.
2. Better interaction and engagement: When content is created individually and uniquely for each person and student, and customized tasks and dedicated consultations are also assigned to the student, their interest in studying and learning increases.
3. Less pressure: When lessons are presented specifically, it prevents students from being compared to each other, because in the traditional method, when asking a question in class, they had to ask it in front of everyone, but in this method, they are only one keyboard away from their answer.

Additionally, it can include the following:
1. Due to the personalized and individualized nature of education, students' confusion and ambiguities are reduced because they can ask questions and receive answers at the same time with the most information and accuracy, and factors such as embarrassment about asking questions and thinking that the question may be considered foolish do not exist (since in some current educational systems, asking questions is postponed until the end of the class and the end of the teacher's speech).
2. Students no longer need to take private tutoring to resolve their doubts because they have a vast source of information with high analytical power at their disposal.
3. Increased speed and quality of learning due to the reduction in class size in terms of population and the increase in learning efficiency and the elimination of concerns about the end of class and the end of time for questions. (Because sometimes these questions are even forgotten or lead to wrong answers and the wrong path.)
4. It can help those who cannot afford private tutoring to resolve their academic difficulties, as it can be accessed even with a mobile phone connected to the internet.
5. Based on the information it has about the individual in terms of academic and personality, and considering the exam schedule of the courses, it can create a dedicated study plan for the student, tailored to their learning speed and style, to maximize learning in the individual.

The use of AI in teaching and learning for teachers
1. Since AI has the ability to assess each student individually, it can provide a final report on the overall and average performance of the class to the teacher so that they can identify their teaching strengths and weaknesses and make changes to their content and delivery to improve. (In general, it will improve the teacher's deficiencies in various areas, deficiencies in subject matter and how to improve it, identifying more minor deficiencies that are normally hidden or unrecognized.)
2. Simplifying non-educational text writing for purposes such as inviting parents to school...

3. Creating and producing better, faster, more accurate, and more engaging educational content such as lesson planning, educational PowerPoint presentations, summarizing educational resources, exam questions, in-class and out-of-class activities, only by providing keywords for the topic in question.
4. Based on learning theories, Edward Thorndike believes that in exams, wrong and correct answers should be corrected quickly and feedback should be given to prevent the repetition of wrong answers and to reinforce the student or learner for correct answers, so they understand what they have learned well and what they have not learned or learned poorly. Therefore, he concludes that exams should be corrected quickly and the results announced promptly. AI, with its capabilities, can help the teacher achieve this goal and by quickly correcting grades, it can help the learning process, which in turn allows each person to know their grade and their progress status and be able to plan for further progress, not as a fruitless quantitative or qualitative result that does not help the student.

In general, the role and assistance of AI in the educational sector can be divided into three main categories:
1. Adaptive learning
2. Grade assistance
3. Personalized learning

Adaptive Learning

Adaptive learning is a technology-driven approach to education that tailors learning content and activities to the individual needs, abilities, and progress of a specific learner. Using algorithms and artificial intelligence, this method continuously assesses and optimizes students' learning paths to personalize their learning experience. Some individuals learn best by reading, some by watching videos, and others by listening to recorded audio files. AI-based analysis enables the adjustment of the course's complexity level and content personalization for learners. Learners' motivation and engagement increase significantly when their education is tailored to their preferences, improving learning outcomes.

Benefits of Using Adaptive Learning:
-Students can choose their own learning speed.
-Students can clearly see their progress charts, which is a motivation to complete the course.
-Students can benefit from teacher support and explanations at any time.
-Students have reported learning more when content is learned using adaptive learning.
-Many have reported that they not only want to take another course that follows the adaptive model but also recommend it to others.

These systems typically include the following features:

Continuous assessment: Students are continuously assessed to measure their level of understanding.

Flexible learning paths: Learning programs are adjusted based on the learner's profile and progress.

Immediate feedback: Students receive immediate feedback that helps them understand what they need to improve.

Real-time adaptability: Adaptive learning systems can automatically change the learning content based on learners' responses and interactions.

Grade Assistance

Traditional exam grading has always been a time-consuming and arduous process, accompanied by several challenges:

1.Human grading in traditional methods can introduce biases and prejudices towards the examinee, affected by factors such as the grader's mood, personal grudges, and biases.

2. Traditional grading methods can be extremely time-consuming, taking away valuable time from more productive teaching activities such as personalized tutoring.
3. The traditional method limits teacher feedback, as students receive only a numerical or qualitative grade, without additional insights such as progress charts or specific areas for improvement.

Artificial intelligence can assist teachers in the process of evaluating student performance and grading exams. These AI tools can include features such as automatic grading, student progress analysis, and providing feedback tailored to the individual needs of each student. Such systems can enable teachers to spend more time teaching and assisting students rather than spending a lot of time grading papers or analyzing results.

The use of AI in grading can completely change the exam grading system and significantly contribute to the advancement of education and learning. These contributions may include:

1. Impartial Evaluation and Grading: The use of these systems promises that personal biases, prejudices, negative and positive mindsets, fatigue, and personal grudges no longer interfere with grading, and the results are purely the product of the student's own efforts or shortcomings.
2. Scalability: These systems can provide the power to analyze and grade numerous papers without the decrease in performance or human error associated with traditional methods.
3. Personalized Feedback: Personalized feedback refers to feedback that is provided based on the individual performance, characteristics, or needs of each student or user. This report is generated through a detailed analysis of the answers and can be a guide for the student to know which weaknesses to address or which strengths to focus on to achieve better results.

Personalized Learning

Personalized learning refers to AI systems designed to tailor educational experiences and learning to the individual needs, skills, interests, and abilities of each learner. Because each student has a unique learning history and set of cognitive skills, these systems use data on the learner's past performance, learning speed, preferences, and sometimes even emotions to adapt the learning content.

Here's how personalized AI learning works:

Data Collection: Gathering detailed data about the learner, which can include interaction patterns, test scores, time spent on different topics, and even facial expressions or biometric data, if available.

Analysis: Using machine learning algorithms to analyze collected data and identify patterns, strengths, weaknesses, and learning styles of the student.

Adaptation: Automatically adjusting the curriculum, difficulty level of tasks, type of content delivery (such as visual, auditory, or kinesthetic), and learning paths to match the learner's data profile obtained from analysis and data collection.

Feedback: Providing continuous and immediate feedback to both learners and instructors. This can include areas that need more attention or suggestions for resources that may be helpful.

Engagement: Maintaining student engagement by providing game-like elements or challenges tailored to their level.

Predictive Insights: Imagine a student having trouble understanding a specific concept in mathematics. Using data such as previous exercise scores, response time to questions, and other learning-related factors, AI can identify patterns indicating the student's difficulty in a particular area of the subject. Then, using predictive algorithms, the system can detect that this student may have difficulty in the next exam and provide the necessary intervention and

guidance before it happens, so that the student does not have to resort to trial and error and can benefit from continuous and uninterrupted progress.

Continuous Improvement: With each interaction, AI can gain more information about the student and thus continuously improve personalization over time.

Due to its multifaceted learning capabilities and simultaneous presentation of text, images, sound, and other interactive elements, AI can significantly advance the learning process. Personalized AI learning has the potential to transform education in a student-centered, efficient, and effective manner, addressing issues such as student disengagement and one-size-fits-all approaches to learning. However, this technology requires serious attention to issues such as privacy, ethical use of data, and the need for human oversight in education.

Introducing Efficient AI Tools for Teachers in Education

In this section, we will introduce several AI-based websites that can be useful in various parts of the teaching and learning process, emphasizing the importance of using AI in education.

Canva Magic Write Canva offers a clear user interface that allows teachers to easily create custom designs. This tool provides a wide range of templates, graphics, and design tools, enabling teachers to create engaging and visually stunning presentations. Canva's AI technology generates high-quality content for presentations, cover letters, greeting cards, blogs, or anything else based on a few keywords, making it easier for teachers to create professional-looking presentations or handouts without spending a lot of time. This simplification can save teachers time for more valuable tasks in teaching. Canva's adaptability and ease of use make it the best AI presentation tool for teachers.

Sendsteps.ai Sendsteps.ai is a great AI tool for teachers as it allows them to easily and effectively engage their students during class or presentations. With Sendsteps.ai, teachers can create interactive presentations based on a document or other information. The steps for creating a PowerPoint presentation on the website are as follows:

1. Select the presentation or PowerPoint option.
2. Choose the topic by writing it.
3. Select the presentation language, which includes various languages such as Persian; however, a site subscription is required to select this language.
4. Determine the tone of writing.
5. Choose the suggested titles based on the selected topic. After completing these steps, the PowerPoint will be written and prepared using images and information collected by the site, although the presentation content can also be uploaded if desired.

Lesson Planning and Question Creation

Eduaide.ai: This is an AI-powered lesson development tool that provides educators with over 100 types of resources to create high-quality educational materials. Educators can create a curriculum, generate discussion prompts, use the "teaching assistant" to help create individualized learning plans, write emails, and take advantage of this comprehensive teaching assistant.

A Sample Lesson Plan and Questions Created by the Website

Here is a sample lesson plan and questions written by this website on the topic of the Achaemenid Empire:

Objectives, Realistic:

-Students will analyze the key features of the Achaemenid Empire during the specified period.

-Students will examine important historical events and figures of the Achaemenid Empire.

-Students will evaluate the impact of the Achaemenid Empire on the region and its legacy.

Prior Knowledge:

-Students should have prior knowledge of basic concepts and historical events.

-Students should have a basic understanding of ancient civilizations and empires.

Clue Set 1: (The term clue is used to refer to a series of questions, signs, pictures, or any other type of pointer that helps students understand the lesson topic).

-Show a map of the Achaemenid Empire during the specified period.

-Display images of major architectural structures from the Achaemenid Empire.

-Discuss the significance of the Achaemenid Empire in world history.

Clue Set 2:

-Present a short documentary on the rise and expansion of the Achaemenid Empire.

-Provide a timeline of key events during the Achaemenid Empire.

-Engage students in a discussion about the social structure and government of the empire.

Clue Set 3:

-Distribute primary source documents from the Achaemenid Empire period for students to analyze.

-Divide students into groups and assign each group a specific aspect of the empire to research and present to the class.

-Hold a class debate on the achievements and shortcomings of the Achaemenid Empire.

Practice Assignments:

-Assign a study of a history textbook or online resource about the Achaemenid Empire.

-Ask students to create a timeline of important events and figures during the Achaemenid Empire.

-Ask students to write a short essay on the significance of the empire's architectural achievements.

Team Activities:

-Divide students into teams and ask them to create a visual display, such as a poster or infographic, that highlights the main contributions of the Achaemenid Empire.

-Conduct a simulated archaeological excavation where students search for artifacts related to the Achaemenid Empire and discuss their historical significance.

-Assign each team a different region influenced by the Achaemenid Empire and have them create a presentation on how the empire impacted that region.

Formative Assessment:

-Ask students to participate in class discussions and share their understanding of the key features and important events of the Achaemenid Empire.

-Give a short quiz or exit ticket where students answer questions related to the Achaemenid Empire.

-Review and provide feedback on students' completed practice assignments and team activities.

Questions:

-How did the Achaemenid Empire shape the political and cultural landscape of the ancient world?

-What factors contributed to the rise and fall of the Achaemenid Empire?

-In what ways did the Achaemenid Empire leave a lasting legacy on subsequent empires and civilizations in the region?

Question 1: Which civilization is associated with the Achaemenids? a) Greek b) Roman c) Persian d) Egyptian Answer: c) Persian

Question 2: Who was the founder of the Achaemenid Empire? a) Cyrus the Great b) Alexander the Great c) Darius the Great d) Xerxes the Great Answer: a) Cyrus the Great

Question 3: The Achaemenids ruled during which historical period? a) Bronze Age b) Iron Age c) Classical Period d) Middle Ages Answer: b) Iron Age

Question 4: The defeat of the Achaemenid Empire by the Greeks was in which famous battle? a) Battle of Thermopylae b) Battle of Marathon c) Battle of Issus d) Battle of Gaugamela Answer: d) Battle of Gaugamela

Question 5: Which Achaemenid king is famous for building Persepolis? a) Cyrus the Great b) Darius the Great c) Xerxes d) Artaxerxes I Answer: b) Darius the Great

OpenAI Website: One of the best websites and providers of different versions of ChatGPT, which can be used as a vast source of information, can be very helpful to teachers in the field of education due to its extensive information in all fields.

The following lesson plan and questions about the Achaemenid Empire were written in Persian by ChatGPT4:

Lesson Plan: The Achaemenid Empire

Overall Goal:

To familiarize students with the history, culture, politics, and geography of the Achaemenid Empire and understand their impact on world civilization.

Specific Objectives:

By the end of this lesson, students will be able to:

-Describe the formation and expansion of the Achaemenid Empire.

-Examine the principles of Achaemenid government and administration.

-Understand the importance of the Silk Road during this period.

-Recognize historical monuments such as Persepolis.

-Analyze the religious and cultural policies of the Achaemenids as the founders of human rights.

-Discuss the impact of the Achaemenids on subsequent civilizations.

Prerequisites: Students should be familiar with basic concepts of history, civilization, and map reading.

Duration: Implementation of the plan in 4 sessions of 45 minutes each

Teaching Method: A combined method including lectures, group discussions, interactive activities, and the use of teaching aids such as maps, images, and clips

Tools and Teaching Aids:

-Images and maps of the Achaemenid Empire

-Models of Achaemenid monuments such as Persepolis

-Historical documents

-High school history book

-Reliable internet pages for student research

Session 1: Introduction and Formation of the Empire

-A general review of the history of Iran before the Achaemenids

-Introduction of Cyrus the Great and the formation of the empire

-Introduction of the territories under rule and political geography

-Group activity: Creating a mind map of the Achaemenid Empire

-Homework: Researching Cyrus' lineage and how he came to power

Session 2: Governance and Administration of the Empire

-Examining the governing principles of Cyrus and Darius

-Administrative structure and provincial division

-Introducing satraps and their role in government

-Group discussion: Comparing the administrative system of the Achaemenids with other civilizations

-Homework: Preparing a presentation on the duties and roles of satraps

Session 3: Culture, Religion, and the Silk Road

-Introducing Zoroaster and the religions of the Achaemenids

-Examining the religious and cultural policies of the Achaemenids

-The importance of the Silk Road and its impact on the economy
-Group work: Creating a poster of the Silk Road and its major cities
-Homework: Writing a short essay on the impact of the Silk Road on trade
Session 4: The Legacy of the Achaemenids and Their Impact on the World
-Introducing historical monuments such as Persepolis and Naqsh-e Rostam
-Examining the importance of inscriptions and ancient writings
-The impact of the Achaemenids on subsequent civilizations and human rights
-Class discussion: The impact of the Achaemenids on art, architecture, and world culture
-Final assignment: A presentation on various topics related to the Achaemenids on a designated day
Evaluation: Students will be evaluated based on class participation, homework, presentations, and a final exam on the entire lesson content.
Based on the above lesson plan, you can design the following questions:
-How did the Achaemenid Empire form and what factors led to its expansion?
-What was the structure of the Achaemenid government and administration and how did it differ from other governments of that time?
-What role did the Silk Road play in the economy of the Achaemenid Empire and why was this road so important?
-What place did Persepolis hold in the history and culture of the Achaemenids and what information can be extracted from its inscriptions?
-How can it be said that the Achaemenids played a role in strengthening and promoting human rights? Give examples of these impacts.
These questions should be designed to encourage students to think critically and allow them to demonstrate their knowledge through analysis and reflection.
There are many similar AI-based tools that can facilitate the teaching and training tasks of teachers, and only a few of them have been introduced with examples above to show the power of AI and the impact it will have on education in the future.
Considerations of Using AI in the Teaching and Learning Process
So far, AI has not been able to instill in learners the feeling that the world is a good place to live due to its lack of emotional intelligence and understanding of human relationships; therefore, it always requires human supervision.
If the teaching and learning process is directed by AI in a way that minimizes the social interactions of children and the resulting pleasure that comes from school, it must be controlled.
Since students' access to information is not limited or monitored by AI, and it can answer almost anything that is asked, it must be controlled by a human supervisor or personalized and limited to the same goals by an educational institution or organization before students can access it.
There may be a mindset that with the expansion of AI, there is no need for teachers; however, even in the age of AI, teachers must be present as supervisors of students, managing students' information and guiding them in the right direction through AI and ensuring the compatibility and proper functioning of AI in the educational process.
Additionally, the following limitations can also be considered:
1.Unequal access to this technology in disadvantaged areas can create a digital divide.
2.Over-standardization of the content provided may significantly reduce critical thinking and creativity, leading to a uniformity of the curriculum.
3.Excessive use by students may reduce their ability to solve problems and other cognitive skills, as they rely too much on AI responses.

The Future of AI in Education
Over the past 4 years, the use of this technology in the education industry and development has increased by 47.5%, and investment in AI is expected to reach $190.61 billion by 2025, and AI may take over many of the functions that humans perform.

Of course, this shouldn't be a cause for alarm, as more optimized and correct training will allow humans to choose more challenging jobs in the future, and the widespread use of AI in education will provide more opportunities for educators to think about higher horizons.

On the other hand, there will always be roles that require creative, cognitive, and emotional intelligence skills. The best results are achieved by combining AI and human abilities. For example, AI-based learning systems can be a great tool for teaching subjects such as foreign languages and mathematics. However, a teacher is still needed to guide students on aspects they don't know, such as the subtle differences and exceptions to the rules. Even if AI offers exciting advancements to improve the field of e-learning, it is still in the early stages of use. It requires more testing and research to be successfully implemented.

One of the main challenges in the future of AI is increasing the awareness of the general public and non-experts about the applications and benefits of AI in various fields, especially education, as people deal with education, school, and learning more than anything else from the beginning of their lives.

AI has a positive impact on children, adults, teachers, and schools in the field of e-learning and makes high-quality education accessible to everyone. However, many are worried that AI technologies will replace humans, but it can be predicted that AI will act as a great support system for human experts, especially in the field of education, as a result, AI will pave the way for a new path for the e-learning industry in the coming decades.

Conclusion and Recommendations
Given the depth and breadth of AI applications in various fields, including healthcare, business, law, and specifically in the field of education, it can be concluded that AI is no longer just a theoretical concept but has become a key factor in transforming and revolutionizing our future prospects. The numerous opportunities created by AI can be very effective in shaping new learning paths, including providing adaptive learning opportunities, accurate assessment of student performance, and supporting personalized learning. However, more than anything, AI requires careful and rational monitoring and use to ensure that its applications lead to progress not only in the efficiency and effectiveness of professional processes, but also in the enrichment and development of human skills and abilities.

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