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## Artificial Intelligence in Higher Education: Development Trends and New Reality

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### Abstract

The article reveals various aspects of the use of artificial intelligence (AI) in higher education. Prospects for the use of AI in higher education are discussed, and specific examples of the use of AI for educational purposes are considered. AI, having great potential for improving the quality of higher education, also carries potential risks of use that must be taken into account. The role of artificial intelligence in the educational process of higher education, evaluation and management of educational processes is emphasized. That is why attention is focused on the issue of what aspects are behind the use of AI in education. The issue of ethical and social consequences of the use of AI in education is discussed.

**Keywords:** artificial intelligence, higher education, learning, evaluation, management, ethics, society

### Importance of topic

Artificial intelligence (AI) is one of the rapidly developing technologies and is considered one of the most dynamic and promising technologies of our time. AI is already used in various spheres of life, economy, health care, finance,

transport and manufacturing. In recent decades, there has been an increase in the interest and use of AI in higher education. In higher education, AI has the potential to revolutionize learning by making it more effective, personalized, and accessible.

One of the greatest benefits of using AI in education is the ability to personalize learning. AI systems can adapt to the individual needs and learning styles of each student, allowing students to achieve greater academic success. For example, AI systems can provide students with personalized learning plans, feedback, and support.

Another benefit of using AI in education is the ability to make learning more effective. AI systems can automate many of the tasks currently performed by professors, such as checking papers, providing feedback, and support. This provides the instructor with an opportunity to focus more on challenging tasks such as curriculum development and having classes with students.

In addition, AI can be used to create virtual learning environments that allow students to learn anytime, anywhere. This is especially true for students who have limited opportunities to attend classes, for example, students with disabilities or students who live far from the university.

While there are many benefits to using AI in education, there are also some challenges to consider. One of the main challenges is that AI systems are still in the early stages of development, and they may not always provide accurate or useful answers. In addition, some people are concerned that AI could replace teachers and lead to increased layoffs in the education system.

Despite these challenges, artificial intelligence has great potential for application in higher education. Over time, it is likely that the use of AI in education will only grow, and AI will have the potential to make education, in particular higher education, more accessible, effective and personalized.

It is important to carefully consider the ethical and social implications of AI in education. It is necessary to make sure that AI is used in education for a purpose that is in the public interest.

**Subject of research:** the impact of AI on the higher education system

## **Methodology of Research**

The article uses methods of literature review and expert analysis. An analysis of the scientific literature on the use of AI in education was conducted. Interviews were also conducted with experts in the field of education and AI.

### **Research results:**

The term artificial intelligence (AI) was coined by McCarthy, an American mathematician and computer scientist, at a meeting with other scientists in Dartmouth, New Hampshire, in July 1956. At this meeting, it was decided to create a field of research that would deal with the creation of intelligent

agents, that is, systems that can think, learn and act independently (McCarthy, 1956).

McCarthy was one of the pioneers of AI research. He developed several important AI algorithms and theories, and founded one of the first AI labs at Stanford University. McCarthy continued to work in the field of AI for the rest of his life, and he is considered one of the most influential scientists in the field.

The term artificial intelligence has quickly gained popularity and is now used to describe a wide range of systems, from simple expert systems to complex neural networks. AI is one of the most dynamic and important fields of research in the modern world, and it has the potential to revolutionize many aspects of our lives.

The first scientist to address AI research in higher education was Simon. In 1965, he published an article titled “Artificial Intelligence and Education”. This article has become an important contribution to the use of artificial intelligence in the education system. He discussed the theoretical basis of artificial intelligence and its possible application to the creation of intelligent tutors, automatic assessment, and individualized learning. This article had a significant impact on the further development of research in the field of artificial intelligence in the field of education.

The ideas of Simon were not immediately accepted, but they eventually gained popularity.

Today, many scientists around the world are researching the problems of AI in higher education, for example:

Luckin (2021) is a professor at the University College London specialising in education and AI. She is actively exploring how AI can improve learning and educational policy.

Selwyn (2022) is a professor at Monash University in Australia who studies the social and cultural aspects of technology in education, including AI.

Koedinger (2022) is a Carnegie Mellon University professor known for his pioneering research in AI.

Sheldon – having obtained a Master’s degree at Wellington College believes, predicts that “in developed countries, robots will replace teachers by 2027. He was the first to establish a deadline for full automation of education, but Sheldon is not the only one to suggest that artificial intelligence will replace humans in this position. Many scientists believe that humanoid machines will never be able to become a full-fledged replacement for humans. And skeptics have proof of this” (Savenets, 2019).

Scientists around the world are working to solve a number of problems associated with the use of AI in higher education. An example is the development of AI systems that can:

- Provide students with individual attention and support;

- Automate tasks that are currently performed by teachers;
- Create virtual learning environments that are more engaging and informative than traditional classrooms.

Ukraine is also actively developing in the field of information technology, including artificial intelligence systems for education. For example, EdEra develops online learning platforms, including the use of artificial intelligence to personalize learning and assessment; Stepik is an online platform that enables the creation and use of interactive courses using artificial intelligence.

The work of Ukrainian scientists and companies has the potential to make the Ukrainian higher education system more modern, efficient and competitive in the global educational space.

Artificial intelligence (AI) is a branch of computer science that deals with the creation of intelligent agents, that is, systems that can think, learn and act independently. Based on the fact that AI is a complex and multifaceted system, there are certain philosophical approaches that are used to identify its features.

One such approach is the constant of the mind. Mind is a complex mental ability that includes the ability to think, feel, be aware of oneself, and interact with the environment. AI researchers are keen to create machines that can think intelligently, but it's unclear if they'll ever achieve true intelligence.

Attention should also be paid to such an aspect as consciousness. We view consciousness as a state of knowing the environment and ourselves through awareness. AI researchers aim to create machines that can be conscious, but it is not yet clear whether they will ever be able to achieve a true state of consciousness.

Another important aspect is understanding the will. Under the concept of will, we consider the ability to freely choose between alternatives. AI researchers are keen to create machines that could have the will, but it is not yet clear how far this is achievable.

You also need to pay attention to the concept of freedom. Freedom is the ability to make choices based on one's interests, the ability to act independently without coercion. AI researchers aim to create machines that can be free. But it is not yet clear what kind of freedom they should have. What kind of interests, goals they will pursue and how this will affect a person in the future.

Artificial intelligence is a complex and rapidly evolving field, and philosophical questions about AI will continue to be debated for many years to come.

The European Union has developed several documents on the application of AI for higher education. For example:

1. European Union Artificial Intelligence Strategy (2020). This paper points out that AI is one of Europe's development priorities and that it has the potential to revolutionise many aspects of our lives, including education. The document also sets goals and objectives for the use of AI in education, and also offers recommendations for universities and other educational institutions.

2. European Union Action Plan on Artificial Intelligence in Education (2021). This paper takes a closer look at the use of AI in education and suggests specific measures that can be taken to implement it. The paper also contains research suggesting that AI can have a positive impact on the quality of education.

3. European Union Manual on Artificial Intelligence for Higher Education (2022). This is actually a practical guide for universities that want to implement AI in education. The manual contains information on how to choose the right AI solution, how to implement it in the educational process and how to assess its impact.

All these documents are available on the website of the European Commission and set goals and objectives for the use of AI in higher education, as well as offer recommendations for universities and other educational institutions.

Let's consider the main goals of using AI in higher education:

1. Personalized learning. AI can be used to create customized learning plans for students that take into account their individual needs and interests. This can help students better understand the material and achieve greater academic success.

2. Effectiveness of training. AI can be used to automate tasks that teachers perform, such as checking papers, providing feedback, and answering students' questions. This frees teachers up for more creative tasks such as curriculum development and interaction with students.

3. New learning opportunities. AI can be used to create new forms of learning, such as virtual and augmented reality. This can make learning more exciting and effective.

The use of AI in higher education is a complex task that requires cooperation between universities, enterprises and public authorities. However, AI has the potential to revolutionize higher education, and we can expect that the use of AI in universities will only grow in the future.

Scientific discourse on the use of artificial intelligence in the education system is diverse, and some scientists have expressed critical opinions on this issue. For example, Selwyn is the author of "Should Robots Replace Teachers? AI and the Future of Education" and expresses doubts and criticism about the prospects for using artificial intelligence to replace teachers and influence the social aspect of education. LearnWorlds' co-Founder & Chief Product Officer, George Palaigeorgiou Ph.D., specifically warns: "Artificial Intelligence has the potential to transform and democratize education, and, at the same time disrupt, impede, and confuse. As every technology is a tool for both good and bad, A.I. should be viewed as a double-bladed sword that needs to be handled with care" (Malekos, 2023). Palaigeorgiou also highlights educational problems that need to be taken into account, in particular: Content Saturation; Developing lazy minds; Bias

& Misinformation in Algorithms; Data Privacy and Security; Lack of Human Interaction; Ethical and Legal Concerns.

It is important to note that many researchers recognize these problems and have similar concerns about the use of AI in education. But there are also supporters of AI who believe that AI can have a positive impact on education and in particular on its quality. They argue that AI can make learning more personalized, more accessible and equitable, more effective and exciting.

The use of AI in higher education is a complex question, and there is no unambiguous answer. It is important to consider the pros and cons before deciding to what extent to use or not to use AI in education.

We tried to compare the advantages and risks (disadvantages) of using AI in higher education, summarizing the most common positions in Table 1.

**Table 1**

Use of AI in higher education	
Advantages	Risks
Customized learning: AI can be used to create customized learning plans for students that take into account their individual needs and interests. This can help students better understand the material and achieve greater academic success.	Replacement of teachers: AI can replace teachers (people), which can lead to a decrease in the quality of education
AI can be used to automate tasks that teachers perform, such as checking papers, providing feedback, and answering students' questions. This frees teachers up for more creative tasks such as curriculum development and interaction with students.	Inequality: AI can lead to inequality in education because not all students have the same access to AI technologies
Creating new forms of learning: AI can be used to create new forms of learning, such as virtual and augmented reality. This can make learning more exciting and effective.	Lack of human contact: AI can lead to a lack of human contact in education, which can negatively impact students' social development.
AI can be used to provide students with personalized support and assistance. This can help students better understand the material and achieve greater academic success.	AI can lead to a violation of students' privacy, since AI systems can collect and analyze personal information about students
AI can be used to monitor students' progress and provide them with timely feedback. This can help students stay on track and achieve their learning goals	AI can be used to create fake news and propaganda, which can negatively affect students' critical thinking
AI can be used to provide students with instant feedback and support.	
AI can be used to create virtual learning environments that are more engaging and informative than traditional classrooms	

Research on various aspects of the use of AI in higher education, such as: the use of AI to create personalized curricula for students; the use of AI to create virtual learning environments; the use of AI to automate tasks currently performed by teachers; the impact of AI on the role of the professor; ethical aspects of the use of AI in higher education, etc., is important because they will help determine the future of AI in higher education.

The use of AI in higher education in the European Union is increasing every year. In 2023, AI was used in 50% of universities in the European Union, while in 2000 this figure was only 1%.

It is also interesting to observe the phased use of AI capabilities in higher education. So in:

- 2000, the first universities began using AI to develop new curricula and tools;
- 2005 AI began to be used to automate tasks such as checking papers and answering student questions;
- 2010 AI began to be used to create personalized learning experiences for students;
- 2015 AI began to be used to create new forms of learning, such as virtual and augmented reality;
- 2020 AI began to be used to create new forms of assessment, such as computerized tests and educational games;
- 2023 AI is used in most universities in the world to improve the quality of education.

The above statistics show that AI has the potential to change the higher education system in Europe, making it more effective, personalized and exciting.

Here are some examples of how AI is used in universities in the European Union:

1. The Massachusetts Institute of Technology (MIT) uses AI to create personalized curricula for students. The AI system analyzes the student's academic performance, interests and goals, and then creates an individualized curriculum that will help the student achieve their goals.

2. Stanford University uses AI to create virtual labs where students can conduct experiments without having to visit a real lab. Virtual laboratories allow students to study science and technology in a safer and more efficient environment.

3. Harvard University uses AI to create chatbots that help students with their academic questions. Chatbots are available 24/7 and can provide students with answers to their questions, as well as help them with tasks and projects.

Ukrainian universities also have some AI practices:

1. At the Kyiv-Mohyla Academy, AI is used to create virtual learning environments that allow students to learn anytime, anywhere.

2. At the National Technical University of Ukraine, Igor Sikorsky Kyiv Polytechnic Institute, AI is used to automate tasks such as checking papers and giving feedback to students.

3. At the National University of Kyiv-Mohyla Academy, AI is used to create personalized curricula for students that take into account their individual needs and learning styles.

Thus, by considering only the general aspects of the use of AI in higher education, we can highlight the benefits, challenges and prospects for the use of AI in higher education.

*Advantages:*

Personalization of learning: AI systems can adapt to the individual needs and learning styles of each student, allowing them to achieve greater learning success. For example, AI systems can provide students with personalized learning plans, feedback, and support.

AI systems can automate many of the tasks currently performed by professors, such as checking papers, providing feedback, and support. This frees faculty to focus on more complex tasks, such as curriculum development and classroom delivery.

In addition, AI can be used to create virtual learning environments that allow students to learn anytime, anywhere. This is especially true for students who have limited opportunities to attend classes, for example, students with disabilities or students who live far from the university.\*\*

*Challenges:*

1. AI systems are still in the early stages of development and may not always provide accurate or useful answers.
2. Some academics are concerned that AI could replace teachers and make learning less personal.
3. AI can be used to create virtual learning environments that can lead to social isolation of students.
4. AI can be used to manipulate students and monitor their behavior.

*Prospects*

1. AI can make learning more effective, personalized, and accessible.
2. AI can help students develop critical thinking and problem-solving skills.
3. AI can help students adapt to a changing labor market.
4. AI can help students become more creative and innovative.

We only looked at general trends and examples of how AI is already being used in universities. Over time, it is likely that the use of AI in education will only grow, and AI will have the potential to make education more accessible, effective and personalized, while at the same time it is necessary to understand and minimize the possible problems and risks associated with it.

## **Conclusions**

The use of AI in education is a complex and multifaceted problem.

AI is a complex system that can be used for various purposes, including education. AI can help teachers personalize learning for each student, provide an opportunity for more interaction and exchange of ideas between students and teachers, and help students learn new skills and knowledge.



However, the use of AI in education is also associated with some ethical and social risks. One risk is that AI could be used to discriminate against students based on their characteristics, such as race, gender, religion, or social status. Another risk is that AI can be used to monitor and track students without their knowledge or consent. In addition, AI can be used to create fake news and misinformation that can negatively impact education.

It is important to consider these risks when using AI in education. It is also important to develop ethical principles that will govern the use of AI in education. These principles should include provisions such as respecting student confidentiality, preventing discrimination, and ensuring that AI is used for the benefit of students.

It is necessary to take into account both the positive and negative consequences of the use of AI in education. It is important to develop an ethical framework that will regulate the use of AI in education to ensure that AI is used for the benefit of all.

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