Vol. 5 No. 1, 2024
Three Seas Economic Journal
DOI: https://doi.org/10.30525/2661-5150/2024-5-3

APPLICATION OF ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION INSTITUTIONS: FOREIGN EXPERIENCE

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Abstract. The *purpose* of this article is to study the application of artificial intelligence in higher education institutions in foreign countries. The article provides an overview of various tools for using artificial intelligence in the educational environment, reveals examples of successful implementation of digital technologies in higher education institutions, and outlines the shortcomings that should be taken into account when introducing artificial intelligence into educational practice. *Methodology*. The study used a set of complementary methods based on the principles of general scientific methodology: theoretical methods of analysis, synthesis and generalisation of works corresponding to the stated topic. Theoretical analysis allowed the identification of theoretical concepts, models and technologies used to support the educational process. The method of synthesis enabled the information obtained to be put into a systematic and comprehensible form. By synthesising different sources and data, a general idea of how artificial intelligence can be used in modern education was formed. The method of synthesis helped to build a system of existing knowledge and experience in this area and identify new areas of research. *Results*. The creation of individualised experiences using artificial intelligence and machine learning has been shown to tailor learning to the individual characteristics of the student, increasing the effectiveness of training. Personalised learning technologies are used to improve the learning process through data mining and the provision of personalised information. Personalised learning can also use methods such as games and virtual activities to make the learning process more interesting and engaging. Disadvantages include insufficient technological development, lack of personal contact, limited AI in the curriculum, limited creativity and flexibility of systems, algorithmic discrimination and loss of skills. Despite these shortcomings, it is noted that the use of intelligent learning systems and adaptive technologies allows for the personalisation of learning based on the individual characteristics of each student, which contributes to more effective training. It is important to find an optimal balance between the traditional approach to learning and the use of the latest learning technologies that will contribute to successful and productive learning. *Practical implications* include the importance of personalising learning with the help of intelligent systems, the need to find a balance between traditional and modern methods, taking into account the shortcomings of technology implementation, continuing research and developing partnerships for the successful implementation of artificial intelligence in educational practice. *Value/Originality*. The paper proposes specific methods and examples of artificial intelligence application in education, analyses the shortcomings of this process and provides practical recommendations for its further improvement.

Keywords: artificial intelligence, higher education institutions, digital technologies, education management systems.

JEL Classification: J21, J23, P36

1. Introduction

In the modern world, artificial intelligence (AI) is one of the most discussed and promising technologies worldwide. It is present not only in everyday life but also in education and science. AI has the potential to transform the way people live, especially in the context of educational technologies. It is becoming an important tool in the advancement of education, providing new opportunities and realising ideas that previously seemed difficult to realise. In turn, innovative changes in higher education, manifested in the transformation of its target, semantic and value components, can be observed today all over the world. Modern education is becoming increasingly

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active, practical, informal and remote. The main purpose of higher education is to prepare students for independent and effective action in a dynamically changing environment, with high levels of uncertainty and the need for constant adaptation. Therefore, it is becoming increasingly important to study and develop new educational methods and technologies that would transform higher education and increase its efficiency and flexibility.

The purpose of this article is to study the use of artificial intelligence in higher education institutions of foreign countries. In accordance with the goal, the following tasks are set:
– To select and systematise sources that reveal the practice of using modern teaching methods and technologies in higher education;
– to describe the main modern technologies used in the practice of higher education in foreign countries;
– to formulate conclusions about the possibilities and prospects of using the described methods and technologies in domestic education.

The study used a set of complementary methods based on the principles of general scientific methodology: theoretical methods of analysis, synthesis and generalisation of works that correspond to the stated topic. The theoretical analysis allowed to identify theoretical concepts, models and technologies used to support the educational process. The synthesis method made it possible to combine the information received in a systematic and understandable way. By synthesising various sources and data, a general idea of how artificial intelligence can be used in modern education was formed. The method of generalisation helped to build a system of existing knowledge and experience in this field and identify new areas of research.

Collectively, these methods formed the methodological basis for studying the use of artificial intelligence in education, which allowed to gain a comprehensive and in-depth understanding of this topic.

2. Application of Innovative Technologies in the Educational Environment

Digital technologies are permeating all spheres of life, transforming traditional areas of business, education, medicine and culture (Bobro, 2023). AI and digital technologies are helping to blur boundaries and expand educational opportunities for students worldwide. Intelligent search and recommendation systems are already helping to provide students with the information and resources they need to continue learning.

In general, artificial intelligence refers to the field of science that explores the possibilities of machine learning and programming computer systems to perform various functions related to data analysis and processing, such as image analysis, speech, text, media processing, etc. Modern AI uses neural networks, machine learning and deep learning to analyse and process large amounts of real-time data. In education, this enables the creation of innovative solutions such as intelligent learning platforms tailored to the needs of each student.

Educational management information systems are an integrated set of information and documentation services for collecting, storing, processing, analysing and disseminating data for planning and managing the educational process. Artificial intelligence and machine learning algorithms help to make management decisions based on the data obtained in order to improve the educational services provided.

Artificial intelligence systems can also help educators perform their tasks: assessing assignments, providing individual answers to students, assessing knowledge, etc. (Zawacki-Richter, Marín, Bond et al., 2019). AI systems can also use materials from the traditional curriculum to create individual textbooks for specific disciplines. These systems are digitising educational materials and creating new interfaces to support students across all academic courses. By developing customisable learning support applications, AI can adapt educational standards to the needs of students based on their knowledge, interests and abilities.

Creating an individualised learning experience through artificial intelligence and machine learning allows education to be tailored to the unique characteristics of each student, thereby increasing the effectiveness of workforce preparation. Personalised learning technologies are used to improve the educational process through intelligent data analysis and the provision of personalised information. Personalised learning can also use methods such as games and virtual activities to make the learning process more engaging and appealing.

In the educational environment of developed countries, considerable attention is paid to the use of innovative teaching methods and technologies. The issue of using new, more effective methods and technologies has become particularly relevant in the context of such global trends as globalisation and digitalisation of education.

The analysis of foreign sources on the educational environment of developed countries allows to state that there are three main trends in the use of teaching methods and technologies in higher education, which complement each other and shape the future image of higher education.

Wider use of active learning methods, which allow to diversify the learning process and promote the involvement of students in various types of learning activities:

– The creation of special environments in educational organisations that allow for the implementation of non-linear learning scenarios and individual educational trajectories;
– digitalisation of education, which is expressed in the increasing use of artificial intelligence and various devices in the educational process.

Modern active learning methods include the following:
– Hybrid learning;
– flipped classroom;
– event-based learning;
– methods of developing critical thinking;
– scenario-based learning, and so on (Waisberg, Hudek, 2021).

The second trend in higher education related to the transformation of educational technologies and methods is the creation of special environments in educational organisations that support innovative educational practices. Such specially organised environments have different names – an educational institution ecosystem, an intelligent learning environment, etc. The creation of special environments in higher education makes it possible to create and maintain conditions in which the emergence, testing and dissemination of new teaching methods and technologies is possible (Feuerriegel, Shrestha, Krogh, Zhang, 2022).

The third trend shaping the development of educational technologies in higher education is the digitalisation of education. Although information and communication technologies have been used for educational purposes for the past three decades, digitisation as a trend has not yet exhausted its potential, and information technologies are penetrating deeper into educational activities.

Foreign researchers point to the use of artificial intelligence, including the spread of chatbots, the use of various devices and gadgets in the educational process of higher education, among the current areas of information technology development.

Thus, the analysis of innovative teaching methods and technologies in the educational environment shows that current trends indicate the continuous development and transformation of educational practices in higher education institutions, aimed at improving the quality of education and preparing students for the modern labour market.

3. The Practice of Applying Artificial Intelligence in the Educational Environment

As already mentioned, artificial intelligence is a technological innovation that is changing almost all areas of people's daily lives, including education. In higher education institutions in developed countries, artificial intelligence is becoming an increasingly common tool that helps solve a variety of problems, from optimising university management to improving the learning and research processes. For example, the innovative American company Ozobot introduced the Ozobot Classroom learning management system. The technology includes a control panel for educators, integrated with the ability to track data on students' learning process. This additional tool allows educators to offer individual assistance tailored to the curriculum of a particular student (Ozobot, 2024).

AI can also be used to analyse and predict student behaviour. For example, it can be used to predict how students will react to different materials, such as lectures, case studies, and interactive exercises. This will allow educators to understand which teaching methods will be most effective for a particular group of students.

Intelligent educational systems in education are intelligent tools used in the learning process that allow students to acquire subjective personalised education. They provide an interactive learning environment and support individual student needs, offering adaptive and personalised learning programmes that can be tailored to each student. An example of such a technology application is the Indian company Interview Bit, which uses AI capabilities to create personalised learning paths for students.

In the introductory text of Scaler Academy, the entire test duration is tracked and recorded, and after completing the tasks, the tests go through tools that check them for plagiarism and also track the semantic flow of decisions. These systems also provide comprehensive knowledge diagnostics, tracking of learning progress and success, immediate feedback, recommendations and effective strategies for achieving the best results.

For example, a specialised education platform at the University of New South Wales is used to support students throughout their studies (New South Wales, 2024). It is essentially a hybrid of a group chat and a chatbot, where students can find materials and receive advice. This addresses the issue of 24/7 information and increases students' motivation to learn.

The challenges faced by modern education systems, including distance or hybrid learning, require additional methods and tools to monitor educational activities. Indian companies Mercer Mettl (Mercer Mettl, 2024) and Littlemore Innovation (Littlemore Innovation, 2024) offer solutions for digital examinations using AI and machine learning. Thanks to this technology, more than 80,000 students have successfully passed entrance exams in an online format.

AI is not only being used to assess and monitor, but also to predict defaults on education loans: the

Shaping Edu project at Arizona State University is helping banks and the government to predict education loan debt (Arizona State University, 2024). The AI model can find appropriate solutions to avoid loan defaults for the payer.

Like any technology, AI has its drawbacks, which need to be taken into account when using it in an educational environment:

1. Insufficient development of the technology. Despite the active development of artificial intelligence, its use in higher education remains a relatively new area, which creates risks of failures and errors.

2. Lack of personal contact. One of the main disadvantages of using AI in the educational environment is the indirect contact with other participants in educational activities. Education involves not only the transfer of information, but also the development of interpersonal skills, creative thinking, and emotional intelligence, which requires interaction with educators and other students.

3. Limitations of artificial intelligence in the curriculum. AI can cope with standard tasks, but when dealing with more complex information, for example, in the field of artistic creativity or ethics, it may not be able to solve the tasks in a comprehensive manner.

4. Limitations on the creativity and flexibility of systems. Artificial intelligence operates on the basis of algorithms and predefined rules, which can limit its ability to adapt to unforeseen situations or offer new approaches to solving problems.

5. Algorithmic discrimination. Another disadvantage of using AI systems in education is the potential for algorithmic discrimination. AI systems can be designed to use biased data or algorithms, which can lead to discrimination against students.

6. Loss of competences. In addition, the use of AI in education may lead to the loss of certain competencies, such as social and emotional skills, if AI systems are used for autonomous decision-making.

Thus, the use of artificial intelligence in education has its advantages and disadvantages. However, it cannot be denied that the use of AI in education is a real breakthrough and can significantly improve the learning process and the quality of education, making it more accessible to all through the intelligent application of its systems. The use of AI in education should be for the benefit of students, educators, and society as a whole.

4. Conclusions

Thus, the introduction of digital technologies and artificial intelligence in the education sector opens up broad prospects for improving the learning process and education management. The use of intelligent learning systems and adaptive technologies allows for personalised learning, taking into account the individual characteristics of each student, which contributes to more effective training of the workforce. It is also important to note that digital tools help solve modern challenges, such as distance learning and digital exams, providing reliable and innovative solutions for the education sector. Therefore, the transition to digital education defines a new stage in the development of educational practices, but it is necessary to take into account the disadvantages that arise in the process of using AI. Finding the optimal balance between traditional approaches to learning and the use of the latest technologies for learning will contribute to successful and productive education.

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Received on: 19th of February, 2024
Accepted on: 02th of April, 2024
Published on: 30th of April, 2024