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ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN EDUCATION: BENEFITS AND CHALLENGES

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Abstract: The article analyzes the impact of artificial intelligence on education. The article reveals the history of artificial intelligence development, provides a wide range of AI solutions aimed at improving the quality of education and optimizing educational processes, as well as the advantages and disadvantages associated with the introduction of AI in higher education. In addition, the article focuses on the future of AI use, changes in the role of the teacher, and the ethical aspects of AI use.

Key words: Artificial intelligence, integration into education, advantages of AI, ethical issues, social inequality, structure of educational programs, critical thinking, creativity.

Artificial intelligence (AI) is one of the most significant technological evolutions of our time, and its impact on higher education opens up new horizons for students, teachers, and administrative staff of educational institutions. In recent years, there has been an active desire to integrate AI into educational processes, which is due not only to advances in technology, but also to the need to adapt to the rapidly changing requirements of modern society and the labor market. The use of AI in higher education is manifested in various forms: from intelligent tutoring systems to automated knowledge assessment tools. This impact is becoming especially important in the era of digitalization, when traditional teaching methods are faced with new challenges and opportunities. Artificial intelligence can not only improve the quality of education through an individual approach to each student, but also increase the efficiency of educational processes by automating routine tasks. However, the introduction of AI also raises a number of complex issues - from ethical aspects to data privacy issues. Given all the challenges and opportunities, analyzing the impact of artificial intelligence on education becomes necessary to understand the future of the educational environment and prepare for it [1].

The history of the development of artificial intelligence in education begins in the 1960s, when the first experiments in the use of computer technology in educational institutions began to gain popularity. At that time, software products such as PLATO and LOGO began to appear, which provided interactive learning and allowed students to complete tasks in a computer environment. Since the mid-1980s, research in the field of AI began to reach a new level with the development of machine learning technologies and expert systems. One of the first such systems was the use of AI in the context of automation of learning, where the software could adapt to the user's knowledge levels. At the turn of the millennium, efforts to integrate AI into the educational process became more widespread, which is explained by the growth of computing power and the availability of the Internet.

In higher education, modern AI technologies include a wide range of solutions aimed at improving the quality of education and optimizing educational processes. One of the most notable areas is the use of intelligent learning systems that can analyze students' progress and adapt to their individual needs. These systems use machine learning algorithms to identify

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students' strengths and weaknesses, offering individual tasks and materials. An important aspect is the introduction of adaptive learning, which allows creating unique learning paths for each student, taking into account their previous achievements and preferences. This approach not only increases student motivation, but also promotes deeper learning. Thus, students can work at their own pace, which is especially important in the context of heterogeneity of groups in higher education institutions. Also, automation of student assessment using AI technologies reduces the time spent on checking work and provides a more objective and impartial approach to assessment. AI-based tools are capable of not only checking tests and assignments, but also analyzing essays, determining the quality of argumentation and text structure. This allows teachers to focus on a more important part of their work - interaction with students and organization of the educational process. Also, the process of obtaining information and helping students in their educational activities is improved by the use of technologies for creating chatbots and virtual assistants, which allows them to receive prompt answers to questions that arise. All these technologies together represent a powerful tool for modernizing educational processes in higher education institutions, creating opportunities for more actively involved and focused learning [2].

The use of artificial intelligence in education opens up many advantages that not only improve the quality of the educational process, but also make it more accessible and individualized. Firstly, AI provides unique opportunities for individualization of learning, adapting educational materials to the needs of each student. This is achieved by analyzing data on how students interact with content, allowing you to automatically select tasks and recommendations based on their strengths and weaknesses. Artificial intelligence can adapt the pace of study depending on the assimilation of the material, which is especially useful for students with different levels of preparation. Secondly, access to educational resources is significantly expanded thanks to AI technologies. Students can use online platforms where AI helps find and analyze the necessary sources, and also searches the global knowledge base, which makes it possible to study anytime and anywhere. Thirdly, quality learning can be improved by automating assessment and feedback. AI systems are capable of assessing students' work in real time, providing clear and reasoned results, which increases student motivation and allows teachers to focus on more important aspects of the learning process, such as interaction with students and the development of critical thinking. Thus, the use of AI in education not only contributes to more effective learning, but also reduces the workload of teachers, which ultimately leads to the creation of a more comfortable educational environment for all participants [3].

However, it is important to consider the drawbacks and challenges associated with the implementation of artificial intelligence in higher education. Firstly, ethical issues occupy a prominent place in the discussion about the use of AI in education. A system based on algorithms may be biased due to data shortcomings, which may lead to unfair assessments and lack of opportunities for certain groups of students. This raises questions about how to ensure equal access to all educational resources and how to regulate the use of AI within the framework of legal norms and ethical standards. Secondly, data privacy is another pressing issue. The use of AI requires the collection and processing of vast amounts of student data, which creates the risk of leaks of personal information and potential violations of students' rights. As data protection technologies are implemented, the importance of complying with laws in this area becomes increasingly important, as any violation may lead to legal consequences and loss of trust from students and teachers. Thirdly, inequality in access to

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technology also poses a serious challenge. In the context of globalization and the transition to distance learning, differences in technology availability between different regions and social groups may deepen existing educational imbalances. Students from less affluent families may face difficulties in accessing the necessary resources, which raises questions about fair and equal education. Thus, the successful implementation of AI in education requires not only technological solutions, but also a comprehensive approach to social and ethical aspects, including comprehensive cooperation between various parties: technology developers, educational institutions and government agencies [4].

Another major challenge is the lack of qualified teachers who can effectively apply AI technologies in the educational process. There are cases where even when educational institutions have access to high-tech equipment, the lack of trained specialists results in only partial and inefficient use of available resources. In addition, differences in educational standards and course programs between different educational institutions also affect the level of technology integration, creating barriers to equal access to quality education. As a result, students with access to technology and qualified teachers have advantages in educational and career prospects, while their less advantaged peers face significant limitations, which highlights the need for targeted efforts to eliminate inequalities in digital education [5].

The future of artificial intelligence in education promises significant changes that will be determined by both technological trends and social needs. One of the key trends will be the further development of adaptive learning systems capable of self-learning based on the analysis of big data about students. This will allow not only to more accurately adjust educational materials to the individual needs of each student, but also to accurately predict when a student is experiencing difficulties, offering him additional help. In addition, the use of AI in the automation of assessment and evaluation of the quality of the educational process will contribute to improved feedback and increased transparency of learning results [6].

In addition, the impact of AI on the structure of educational programs will be manifested through the integration of interdisciplinary approaches and new learning formats. Courses focusing on critical thinking, creativity, and solving complex problems will become important in light of labor market needs. There will also be an increasing focus on skills in working with new technologies, such as interacting with AI and developing one's own software solutions. As for initiatives for students and teachers, the use of AI in learning management systems will open up new horizons for collaboration, providing not only access to modern educational resources, but also the opportunity for specialists in their field, including teachers, to create courses and modules that meet current trends and societal requirements.

The interaction of artificial intelligence and higher education is a complex but extremely inspiring process, involving many aspects and factors. Modern AI technologies are transforming approaches to learning, automating assessment processes and offering individualized educational paths, which in turn opens up new horizons for students and teachers. The role of teachers is also undergoing significant changes: they need to adapt to new technologies and rethink their tasks in the educational process. Examples of successful use of AI both in our country and abroad serve as documented evidence of the positive impact of AI on the educational process. However, the future of using AI in education requires caution and deep reflection in order to balance innovation with ethical aspects and social equality, making education accessible and high-quality for every student. Ultimately, the integration of artificial intelligence should be conscious and responsible, with an emphasis on creating a safe and

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inclusive educational environment that promotes the development of critical thinking and creativity in students.

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