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THE CONCEPT OF DIGITAL TRANSFORMATION OF EDUCATION AND ITS PEDAGOGICAL ESSENCE

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Abstract:

Annotatsiya:

Mazkur maqolada sun’iy intellektning rivojlanish bosqichlari va uning ta’lim tizimidagi o‘rni tahlil qilingan. Tadqiqotda sun’iy intellektning tarixiy rivojlanishi, zamonaviy texnologiyalari hamda ta’lim jarayoniga ta’siri o‘rganilgan. Shuningdek, ta’limni individuallashtirish, adaptiv o‘qitish va samaradorlikni oshirishdagi roli yoritilgan.

Kalit so‘zlar: sun’iy intellekt, raqamli transformatsiyasi, ta’lim tizimi, adaptiv o‘qitish, mashinaviy o‘rganish, neyron tarmoqlar, innovatsiya, raqamli ta’lim**.**

Аннотация:

В данной статье рассматриваются этапы развития искусственного интеллекта и его роль в системе образования. Исследуются исторические аспекты развития ИИ, современные технологии и их влияние на образовательный процесс. Особое внимание уделяется индивидуализации обучения и адаптивным образовательным системам.

Ключевые слова:искусственный интеллект, система образования, адаптивное обучение, машинное обучение, нейронные сети, инновации, цифровое образование.

Abstract:

This article analyzes the stages of artificial intelligence development and its role in the education system. The study examines the historical evolution of AI, modern techn ologies, and their impact on the learning process. Special attention is given to personalized learning and adaptive educational systems.

Keywords: artificial intelligence, education system, adaptive learning, machine learning, neural networks, innovation, digital education

The digital transformation of education is an important process that encompasses the current challenges and opportunities in the field of education . Through the integration of the education system with digital technologies, the effectiveness of the educational process is increased, and pedagogical approaches adapted to individual capabilities and needs are expanded. This process is primarily associated with the development and widespread use of information technologies, and to understand it, it is important to determine its main essence and pedagogical principles.

Introduction. Digital transformation requires innovative approaches from educators that allow them to create a more personalized, interesting and effective learning environment for students through textual, visual and interactive tools. This process, therefore, creates broad opportunities for developing independent thinking of learners, introducing new approaches to organizational and pedagogical exercises. The Resolution of the President of the Republic of Uzbekistan, No. PQ-4996 dated 17.02.2021, On measures to create conditions for the accelerated introduction of artificial intelligence technologies [1], in accordance with the Digital Uzbekistan - 2030 Strategy and the creation of favorable conditions for the accelerated introduction of artificial intelligence technologies and their widespread use in our country, ensuring the availability and high quality of digital information, and training qualified personnel in this field [2]. In the digital transformation

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of education, artificial intelligence not only means the introduction of technologies, but also requires a fundamental change in pedagogical culture and communication methods. In this important environment, innovative experiences based on advanced pedagogical schools and franchises are gaining importance, creating new opportunities for improving the quality of education. Also, through the digitalization of education, existing problems and alternative solutions are being identified, and a person- centered learning environment is being developed.

This process, using proven methodologies and technological tools, is aimed at improving the quality of education and the personal and comprehensive components of the learning process. Thus, the development of artificial intelligence in education not only represents technological changes, but also encompasses pedagogical and psychological aspects, serving to update and develop them. When considering a brief overview of the stages of development of artificial intelligence and its role in the education system, its historical stages and the level of practical implementation provide important additions. The concept of artificial intelligence and its formation are associated with the Dartmouth Conference, which is considered the starting point for the development of AI [3]. The development of artificial intelligence began with the modeling of human thought processes and focused on the creation of the first rule-based systems and algorithms [4].

Later, statistical and machine learning technologies appeared, these inventions and approaches played an important role in identifying and improving human thinking. Machine learning technologies have made it possible to analyze large amounts of data based on statistical approaches [5]. At the next stage, the capabilities of artificial intelligence have expanded with the help of deep learning and neural networks, enabling it to perform complex tasks [6].

As a result of these developments, the role of artificial intelligence in education has also yielded the expected results, creating opportunities for individualizing learning processes and introducing adaptive learning systems. With the introduction of artificial intelligence technologies in educational institutions, educational programs tailored to the needs of students have been developed, and methods of monitoring and assessing the teaching process have been improved. Based on these developments, an increase in the quality of education, ensuring the priority of students' knowledge and skills, as well as an increase in the professional qualifications of teachers have been observed. A deep understanding of the stages of development of artificial intelligence and its place in the education system is important for the formation of a competitive and flexible educational environment in our time, and also ensures the active introduction of technological innovations in our country. Today, the relevance of artificial intelligence is especially evident in the field of education. It serves to individualize the educational process, introduce adaptive learning systems, and increase the efficiency of education [7]. Currently, the relevance of artificial intelligence is increasing in all respects. Its impact on the field of education is considered, first of all, in connection with ensuring an individual approach, increasing the efficiency of the educational process, and adapting to the needs of students. Educational needs, especially in connection with the adoption and effective use of new technologies, play an important role in ensuring a high level of adaptability. With the help of innovations, the possibility of personalizing the educational process, creating programs adapted to the capabilities of the student, as well as fast and accurate analysis of data is expanding. This, in turn, together with improving the quality of education, serves the innovative development of the education system.

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Later, with the development of computer technologies, machine learning approaches appeared and the possibility of analyzing large volumes of data was created [8].

The development of artificial intelligence is ushering in a new era in pedagogy and educational technologies, which has become the main tool for ensuring the flexibility and efficiency of the education system. **Methodology.** Research approaches to studying the stages of development require the integration of various methods. In this process, historical, statistical and exploratory methods are widely used, which are of great importance in analyzing the stages of development of artificial intelligence. Approaches developed through the historical method are used to study technological revolutions and innovations characteristic of certain periods. Statistical and quantitative methods allow us to determine the dynamics of development, identify the relationships between stages. Exploratory methods allow us to analyze existing data, identify new trends and understand the interaction of development stages. In the educational context, methods based on mechanistic, educational technologies and pedagogical approaches are used. It is important to develop adaptive learning systems through experience, integrate the data factor into the educational process and test methods adapted to individual requirements. Also, the effectiveness of stages in the educational process is assessed using computer science, statistical analysis and informatics methods. All methods are aimed at achieving a certain synthesis in order to improve the development stages and improve the quality of education, and include a wide range of interdisciplinary approaches. In the educational context, experiments based on adaptive learning systems and pedagogical technologies have gained significant importance. These systems allow for teaching adapted to the individual needs of students [6].

Results. According to the results of the study , the stages of development of artificial intelligence have had a significant positive impact on the education system. At the initial stage, systems based on simple algorithms were introduced, while at the next stage, adaptive educational technologies were developed: the learning process was individualized; increased student interest; The knowledge assessment system has been improved [7]. It has also been found that systems created on the basis of artificial intelligence are an effective tool for increasing the level of knowledge of students.

Regarding the changes in stages, significant positive results are observed in the field of education in the process of development of artificial intelligence. For example, Uzbek scientists Odinakhon Olimova analyzed the historical evolution and stages of AI in the article “History of Artificial Intelligence, Stages of Development”, while Makhmud Lutfillayev and Feruza Egamberdiyeva covered modern technologies (Deep Learning, chatbots) in the stages of development of AI. Among international scientists, Alan Turing, one of the founders of artificial intelligence, wrote the beginning of the theory of AI (1930s), Stuart Russell and Peter Norvig wrote the famous book, Artificial Intelligence: A Modern Approach, Joshua Bengio, Geoffrey Hinton and Yann LeCun, the founders of deep learning (Deep Learning), conducted research. The above results have ensured an increase in the quality of education, increasing the individual abilities and learning speed of students. This approach, along with increasing the effectiveness of education, has increased the interest and participation of students and pupils. As a result, the educational process has become personal and interactive, based on an individual approach, which has created new opportunities for students and pupils to achieve their goals. In general, there have been wide opportunities for developing their abilities, increasing their academic success, and finding solutions to problems in the educational process. These changes have significantly improved the quality of education

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and made it possible to acquire more skills and knowledge.

Discussion. The changes introduced into the educational process at different stages of development of artificial intelligence technologies, their impact on the learning process of students, and their ability to increase their adaptability to modern requirements have been carefully studied.

Artificial intelligence is an important factor in the modernization of the education system. However, there are also some problems associated with its introduction:

- data security;
- ethical issues;
- reduction of the human factor [9].

Therefore, the following recommendations have been developed:

- improving legislation on AI in education;
- teachers' digital competencies;
- ensuring technological safety [10].

It has become an impetus for improving the quality of education, as well as for the development of a teaching system adapted to individual requirements and needs. However, the widespread introduction of artificial intelligence in the education system also poses problems, such as data security, insufficient development of animation, and a decrease in the importance of the human factor. In **conclusion**, the following recommendations are offered for political and practical projects: first, strengthening the legislative framework supporting the development of artificial intelligence in the education sector, second, developing special programs for improving the skills of teachers and their widespread implementation, and third, ensuring data security and taking technological security measures are important. Also, in order to properly use the potential of technology, it is necessary to develop effective cooperation between the government and educational institutions, introduce innovative approaches, and constantly monitor development trends. Such strategies can ensure that the education system fully utilizes the potential of artificial intelligence and minimizes its negative consequences.

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