# Artificial Intelligence in Education: Theoretical Review

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*Abstract-* **The article discusses the use of artificial intelligence in education, as well as solving the problems of personalization of education and career guidance. Identified and analyzed the need for the introduction of artificial intelligence in the learning process, as well as technologies that are already in use. The possibilities of using artificial intelligence in the personalization of learning are presented. After analyzing the possibilities of using artificial intelligence, we came to the conclusion that it is necessary to use and improve the technologies of neural networks and artificial intelligence in education.**

*Keywords*: Innovations in education, artificial intelligence, training, end-to-end technologies, vocational education.

## 1. INTRODUCTION

Today, digital technologies are deeply integrated into the education process, fundamentally transforming teaching methods. The development of artificial intelligence and neural networks is enhancing the efficiency of the education system, introducing personalized approaches, and expanding opportunities for adapting to the individual needs of students. These technologies not only optimize the learning process but also help students independently assess their knowledge level and foster a deeper understanding through more targeted learning models.

AI-powered systems facilitate the development of distance learning, analyze knowledge, and assess students' interests and abilities to recommend suitable educational programs. Moreover, these technologies alleviate the burden on educators by automating repetitive and complex tasks, such as analyzing test results, checking assignments, and personalizing the learning experience.

## 2. ANALYSIS AND RESULTS

This article explores the integration of artificial intelligence into the education system, its effectiveness, and its impact on students. It also examines approaches and prospects for optimizing the learning process in a digital environment, highlighting the relevance and future potential of AI in education.

Neural networks, including artificial intelligence, are increasingly being integrated into various fields, including education. In this study, we will try to understand what artificial intelligence represents and how it affects the development of society and education.

In general terms, neural networks are a mathematical model, a massive computational code capable of making predictions by solving an intellectual task based on the assessment of criteria for a given question, analyzing vast amounts of information and databases. Artificial intelligence generates the most realistic and accurate answer.[1] The advantage of neural networks lies in their ability to learn independently, without direct involvement from an IT specialist, which is known as machine learning. [2]

Currently, artificial intelligence and machine learning are actively applied in education, from conducting and grading exams to automatically selecting learning materials for students who experience difficulties in certain subjects. AI helps students engage more deeply with topics, improve their knowledge and skills, analyze their academic performance, and adjust their learning plans under continuous and objective monitoring by an "emotionless" machine.[4]

Artificial intelligence is actively being integrated into the learning process, and it is evident that the scale of its application in education will only continue to grow. Let's examine the main areas of AI application in education today:[5]

*Automation of routine tasks*

Teachers have always borne a significant responsibility and workload in working with students—monitoring academic performance, grading assignments, and assessing students' knowledge and preparation for lessons. These routine tasks consume a substantial amount of time that could be better spent on the valuable teaching process. To

enhance the efficiency and quality of education, artificial intelligence now offers the possibility of delegating such routine tasks. It is undeniable that a human can never process the same amount of text and other information as AI. Additionally, AI eliminates human errors, ensuring higher accuracy in assessments.[6]

*Personalized learning*

There is much discussion about personalized learning today. By integrating AI technologies into the educational environment, it is possible to develop personalized learning plans for each discipline, tailor instruction to students' needs, and monitor their progress. This is achieved through methodologies developed by educators and psychologists to assess students' abilities, motivation, will-power, and other characteristics, forming the foundation for individualized learning programs.

*Development of educational applications and specialized content*

The creation of educational applications and specialized content also contributes to personalized learning. This functionality is widely used by students and teachers alike. [7] For example, in language learning, AI-powered applications allow students to practice foreign languages in different formats within a single platform. AI can recognize students' speech, analyze sentence structure, vocabulary, and grammar, and provide additional exercises of similar content to reinforce learning. These applications are highly popular because they integrate seamlessly into users' daily digital routines. Beyond language learning, AI applications are expanding into other subjects and are gaining recognition among both students and educators.

This table summarizes the main directions of artificial intelligence integration into the educational process. It highlights key areas of AI application in education, including automation, personalized learning, educational applications, and career guidance. The table provides insights into how artificial intelligence contributes to improving the quality and efficiency of education and indicates its future development directions. (Fig 1.)
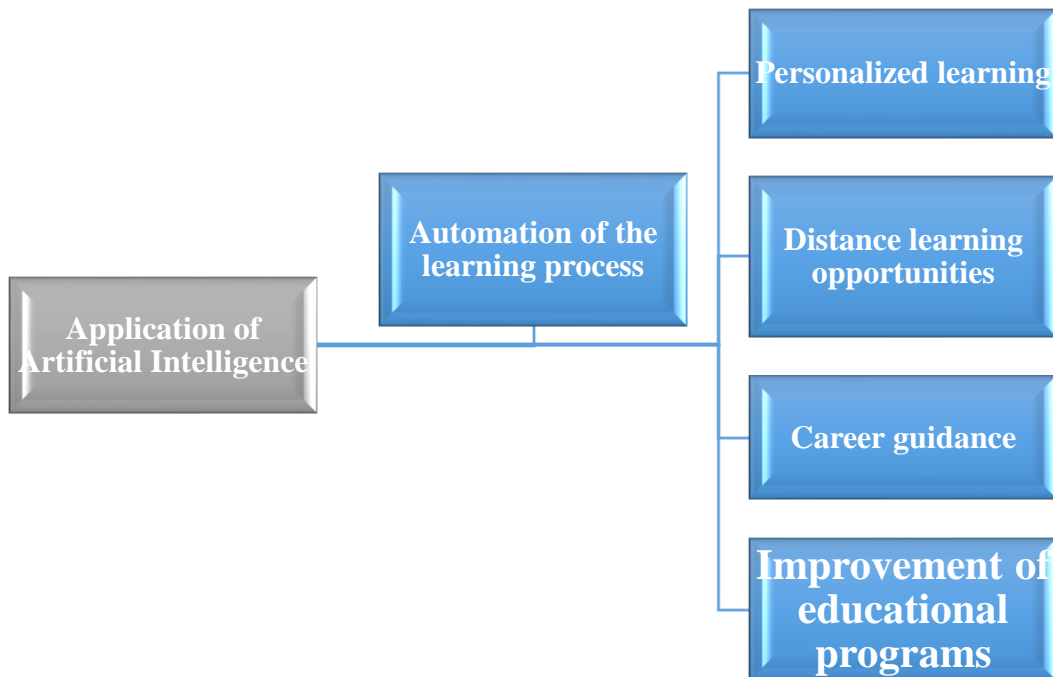


Figure 1. Artificial Intelligence Applications in Education

In the digital age, in addition to mastering professional competencies (hard skills), it is essential to develop soft skills. The ever-growing volumes of information and knowledge have a significant impact on the human brain. While it is impossible to absorb all the information, artificial intelligence can assist in performing various tasks, allowing students to develop critical thinking and creativity. Today, advanced technologies can serve as excellent tools for gathering and filtering information, helping students learn more effectively and enabling educators to improve the quality of knowledge acquisition.

Neural networks are rapidly gaining interest among educational institutions and platforms. By analyzing students' activities, artificial intelligence can mechanically identify their weak points in various subjects. This, in turn, signals

to educators the need for additional intervention and support to improve students' performance. The concept of integrating artificial intelligence into the educational process aims at personalizing the system, adapting it to students' abilities, and monitoring social aspects while ensuring convenience and practicality in its use.[8]

The digital world is an enormous flow of information that a person cannot fully process and analyze—so why not let technology handle it? Neural networks can help manage teachers' routine tasks, such as grading tests, coursework, and extensive homework assignments. Their ability to detect various types of errors in written texts, solve test problems, and even tackle complex mathematical equations is a groundbreaking advancement in education and a highly useful tool for educators.

Another challenge in modern education that neural networks can help address is career guidance. This is not just about preparing students to choose a profession but also assisting them in self-determination and subsequent employment. By analyzing responses to diverse questions through a logically structured sequence, AI generates a detailed picture of an individual's abilities and interests.

Here's how it works: A system of tests developed by a leading group of Russian educators in various fields serves as the input data for the neural network. These tests are offered to students, and the questions are carefully selected and formulated based on clear criteria that reflect professional expertise and awareness in different areas of education. Once the data is entered, the AI model, trained through machine learning, generates a numerical output indicating the specific fields where the test-taker should consider further development.

## 3. CONCLUSION

To sum up, artificial intelligence and neural networks have the potential to greatly enhance the learning experience, making education more efficient, personalized, and aligned with the digital age. By integrating these technologies, students can develop stronger digital literacy skills while educators gain tools to track progress and tailor lessons to individual needs.

One of the biggest advantages of AI in education is its ability to help students make informed career choices. Instead of being influenced by societal expectations, family, or peers, students receive recommendations based on their own skills, interests, and learning patterns. This personalized approach ensures that education becomes more meaningful and relevant to each individual.

However, AI is just one piece of the puzzle. It works best when combined with other breakthrough technologies like big data, robotics, the Internet of Things, cloud computing, virtual and augmented reality, and quantum computing. Together, these innovations create a dynamic learning environment that prepares students for the rapidly evolving professional world. By embracing these technologies, we can ensure a future where education is not only smarter but also more inclusive and adaptable to the needs of every learner.

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