OPPORTUNITIES FOR USING ARTIFICIAL INTELLIGENCE TOOLS IN PRIMARY EDUCATION

Ganiyeva Aziza Nizam qizi
Termez University of Economics and Service
Student of the direction "Primary Education"
Phone : +998957872620 e-mail: azizaganiyeva56@gmail.com

Abstract: This article analyzes the pedagogical possibilities, theoretical foundations and methodological approaches of using artificial intelligence tools in primary schools. The role of the introduction of artificial intelligence technologies into the educational process in improving the content of primary education, improving the quality of education and developing students' digital competencies is highlighted. The article presents methodological recommendations for the effective use of artificial intelligence tools by primary school teachers , individualization of the educational process, rapid assessment of students' knowledge and the advantages of AI technologies in creating educational resources.

Keywords: artificial intelligence, primary education, digital technologies, ChatGPT, adaptive education, digital competence, educational quality, interactive education, person-centered education, innovative pedagogy.

Introduction. The rapid development of information and communication technologies is bringing about fundamental changes in the education system, creating new opportunities for improving the content, methods and means of teaching. In particular, the widespread introduction of artificial intelligence technologies into the educational process is recognized as one of the important factors in supporting students' learning activities, effectively organizing teachers' professional activities, and improving the quality of education. Today, artificial intelligence is becoming one of the main directions of innovative development not only in the fields of production, medicine or economics, but also in the education system.

Primary education plays a crucial role in the intellectual, social, and communicative development of learners. At this stage, students develop fundamental skills in reading, writing, numeracy, communication, and independent thinking. Therefore, the pedagogical technologies applied in primary school should be aligned with learners' age-related and psychological characteristics, foster their interest in learning, and support the development of their creativity. In this regard, artificial intelligence (AI) tools can serve as effective instructional resources for achieving these educational objectives.

In recent years, the Republic of Uzbekistan has also implemented comprehensive reforms aimed at the digital transformation of education, the integration of modern information technologies into the teaching and learning process, and the enhancement of teachers' digital competencies. These reforms have created favorable conditions for the effective application of innovative digital technologies, including artificial intelligence, in primary education.

The purpose of this article is to analyze the theoretical foundations and pedagogical possibilities of using artificial intelligence tools in primary grades, to highlight methodological approaches to effectively integrating them into the educational process, and to develop practical recommendations for teachers.

Analysis of relevant literature. The introduction of artificial intelligence technologies into the education system has become one of the most relevant scientific directions in the field of pedagogy and

educational technologies in recent years. International scientific literature has widely covered the possibilities of artificial intelligence in improving the quality of education, identifying individual educational needs of students, and organizing the teaching process based on a person-centered approach.

Theoretical foundations of artificial intelligence in education Wayne Holmes , Maya Bialik and Charles Fadel . According to their scientific views , artificial intelligence is not intended to replace the teacher in the educational process, but is an innovative tool that supports his pedagogical activities, determines the level of individual mastery of students, and effectively organizes the educational process [1]. Scientists emphasize the priority of the pedagogical goal in the use of AI technologies and the need to ensure effective cooperation between humans and technology.

Rose Luckin, in her research, describes artificial intelligence as an "intelligent pedagogical assistant" and argues that it can be used to monitor student learning, provide individual recommendations, and organize personalized learning. According to the scientist, the rational use of AI technologies can help develop students' independent learning skills and increase educational effectiveness [3].

Zawacki-Richter , Marín , Bond and Gouverneur 's research analyzes the application of artificial intelligence in higher and general education systems. The authors note that AI tools are highly effective in organizing adaptive learning, automated assessment, analyzing the learning process, and providing individual feedback to students. At the same time, they emphasize the need for strict adherence to ethical standards, data security , and transparency when using artificial intelligence [5].

The “Guidance for Generative AI in Education and Research” and "Recommendation on the Ethics of Artificial Intelligence" documents published by UNESCO set out the main principles for the use of artificial intelligence in education. These documents note the importance of protecting human rights, creating equal educational opportunities, ensuring the security of personal data, maintaining academic integrity, and not losing pedagogical control when using AI technologies [7].

Uzbek scholars have also conducted numerous studies on the digitalization of education, the integration of information and communication technologies (ICT) into the teaching and learning process, and the development of modern pedagogical approaches. In particular, R. H. Jo'rayev emphasizes that the effective implementation of digital technologies in the modernization of the education system is one of the key factors in enhancing students' learning engagement and improving the quality of education. According to the scholar, an innovative educational environment requires teachers to effectively utilize modern digital tools for pedagogical purposes [4].

B.X. Khodjaev notes that digital educational tools in the educational process organized on the basis of a competency-based approach serve to develop students' competencies in independent thinking, information search and analysis, and practical problem-solving [2]. His scientific views are of great importance in illuminating the methodological foundations of integrating artificial intelligence tools into the primary education process.

Sh. Sharipov in his scientific work substantiates that the use of innovative pedagogical technologies serves to develop students' creative and critical thinking, activate the educational process, and increase the effectiveness of teaching. The scientist emphasizes that the use of modern educational tools is also an important factor in the development of teachers' professional competencies [6].

Methodology. In this article, a comprehensive analysis of scientific literature in the field of pedagogy, educational technologies and artificial intelligence was carried out in order to scientifically and theoretically illuminate the possibilities of using artificial intelligence tools in primary grades and identify methodological foundations for their effective integration into the educational process . The research methodology was based on modern pedagogical approaches, principles of competency-based education and concepts of digital education.

Based on the comparative analysis method, the compatibility of artificial intelligence tools with traditional teaching methods, their impact on the educational process, and their suitability for the age and psychological characteristics of primary school students were assessed. The capabilities of various AI tools in preparing educational materials, creating exercises, developing individual tasks , and assessing student knowledge were also compared.

Using the method of scientific generalization, the pedagogical principles of using artificial intelligence tools were systematized. The principles of student-centered education, individualization, adaptive learning, interactivity, continuous feedback , and the development of digital competencies were taken as the basis. These principles serve to form a methodological model of using artificial intelligence tools in the process of primary education.

Using the descriptive analysis method, the functional capabilities of ChatGPT, Gemini, Microsoft Copilot and other generative artificial intelligence tools and their application in teaching primary education subjects were described. Also, the need to adhere to the principles of pedagogical expediency, information security, personal data protection and academic integrity when using these tools was scientifically substantiated.

Results and analysis. The use of artificial intelligence tools in primary education creates broad opportunities for improving the quality of teaching, individualizing the educational process, and enhancing students' cognitive activity. It is advisable to organize the methodology for using artificial intelligence tools in primary education based on several sequential stages.

The first stage is lesson planning and preparation of teaching materials. At this stage, the teacher can use artificial intelligence tools to develop lesson plans, presentations, didactic materials, test tasks , and creative exercises. For example, using ChatGPT or other generative artificial intelligence tools, texts, mathematical problems, questions and answers, and role-playing scenarios appropriate to the age characteristics of students can be prepared in a short time. This saves the teacher's time and improves the quality of the lesson.

The second stage is individualization of learning activities. Artificial intelligence tools allow creating individual tasks, taking into account the level of knowledge, interests and pace of mastery of students. For strong students, more complex tasks that require additional analysis can be recommended, and for students with poor mastery , simplified and step-by-step tasks can be recommended. This approach supports the individual development of each student.

The third stage is the organization of interactive education. With the help of artificial intelligence tools, it is possible to organize dialogue-based exercises, problem situations, virtual conversations and creative tasks. By communicating with artificial intelligence, students develop the skills of clearly expressing their thoughts, asking questions, analyzing answers and comparing different points of view. This serves to form their critical thinking and communicative competencies.

The fourth stage is to assess knowledge and provide feedback. Artificial intelligence tools can be used as an auxiliary tool in analyzing students' written work, test results, and practical assignments. AI-based platforms help the teacher identify students' mistakes, provide them with recommendations, and plan further learning activities. However, the responsibility for final assessment and pedagogical decisions should remain with the teacher.

The fifth stage is to develop creativity and critical thinking. It is important to use artificial intelligence not as a tool for obtaining ready-made answers, but as an assistant that stimulates thinking. Giving students tasks aimed at analyzing the answers given by AI, comparing them, identifying errors, expressing their opinions and suggesting alternative solutions develops their independent and critical thinking.

The pedagogical skills of the teacher are crucial when using artificial intelligence tools in primary schools. The teacher must critically evaluate the materials provided by AI, check their

reliability and adapt them to the age characteristics of the students. Artificial intelligence cannot replace the teacher, but serves as a modern pedagogical tool that supports his professional activities.

Conclusions and recommendations. The widespread introduction of artificial intelligence technologies into the education system creates new opportunities for improving the content of primary education, increasing the effectiveness of teaching, and forming 21st century competencies in students. The scientific sources and methodological approaches analyzed in this article show that the rational and pedagogically targeted use of artificial intelligence tools in primary grades serves to increase students' cognitive activity, develop independent learning skills, support critical and creative thinking, and individualize the educational process.

For the effective use of artificial intelligence tools in primary grades, it is advisable to implement the following recommendations:

- systematic development of professional competencies of primary school teachers in artificial intelligence and digital pedagogy;
- development of methodological guides and practical recommendations on the use of artificial intelligence tools;
- gradual integration of AI tools into the teaching process, taking into account the age and psychological characteristics of students;
- expanding the possibilities of organizing individual and differentiated education using artificial intelligence;
- to develop students' skills in the responsible use of artificial intelligence, academic integrity, information security, and digital literacy;
- Improving regulatory and methodological documents and recommendations on the use of artificial intelligence tools in schools .

Overall, the integration of artificial intelligence tools into primary education serves as a key driver of educational innovation by improving the quality of instruction, facilitating the implementation of learner-centered teaching approaches, and creating extensive opportunities for developing students' digital literacy, communication skills, and critical thinking competencies.

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