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USING ARTIFICIAL INTELLIGENCE IN TEACHING NATURAL SCIENCES

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Abstract: This article explores the pedagogical potential of Artificial Intelligence in teaching natural sciences at the primary education level. It examines how AI-driven technologies contribute to enhancing the quality of education, fostering students' cognitive engagement, and supporting the implementation of innovative teaching strategies. Particular attention is paid to the role of AI in enabling personalized learning, interactive instructional methods, and adaptive assessment. The study highlights both the advantages and challenges associated with integrating AI into early science education and concludes that AI technologies significantly improve the effectiveness and efficiency of the teaching and learning process in primary schools.

Keywords: Artificial Intelligence, primary education, natural sciences, educational technologies, digital learning, interactive methods, interactive innovative pedagogy.

INTRODUCTION

Currently, the education system is developing rapidly and is being enriched with modern technologies. In particular, the introduction of digital technologies and artificial intelligence (AI) into the field of education is taking the teaching process to a new level. This process is also gaining importance in the primary education system and requires new approaches to student learning. Teaching natural sciences in primary grades serves to form students' interest in the environment, explain natural phenomena, and develop scientific thinking. Therefore, it is necessary to use modern, interactive, and effective methods in teaching these subjects. Along with traditional teaching methods, the use of artificial intelligence technologies allows further improvement of the learning process.

Based on these instructions, the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 425 dated July 10, 2025 "On measures for the implementation of priority projects in the field of artificial intelligence technologies in 2025–2026" (https://api-portal.gov.uz/uploads/17/2025/07/11/ba6d88dc-2142-a21d-5f54-45d76e31ffad_media_.pdf) was adopted.

By this resolution, in order to ensure the implementation of the Resolution of the President of the Republic of Uzbekistan No. PQ-358 dated October 14, 2024 "On Approval of the Strategy for the Development of Artificial Intelligence Technologies until 2030", the state institution "Center for the Development of Artificial Intelligence and Digital Economy" was established and priority projects to be implemented in 2025-2026 were identified.

Artificial intelligence allows organizing education taking into account the individual characteristics of students, conveying complex topics in a simple and understandable form, as well as quickly assessing students' knowledge. This serves to improve the quality of education, develop independent thinking of students, and form them as individuals with



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modern knowledge. The relevance of this topic is that today, while information technologies are developing rapidly, the education system must also adapt to these changes. Through the effective use of artificial intelligence, it is possible to increase interest in natural sciences among elementary school students, improve their level of knowledge, and organize the educational process on an innovative basis.

The purpose of this work is to study the possibilities of using artificial intelligence in teaching natural sciences in primary grades and to substantiate its effectiveness. Also, within the framework of this topic, the advantages of artificial intelligence, methods of application and its role in the educational process are analyzed.

Main part. Teaching natural sciences in primary grades is of great importance in forming a scientific worldview in students, understanding natural phenomena and developing a conscious attitude towards the environment. The introduction of artificial intelligence technologies in the modern education system is taking this process to a new level. The Decree of the President of the Republic of Uzbekistan No. PF-132 dated April 12, 2023 "On measures to develop the field of artificial intelligence", Resolution No. PQ-4868 "On measures to radically improve the system of personnel training in accordance with the requirements of improving the quality of education and developing the digital economy" and other regulatory and legal documents establish the introduction of AI technologies in education as one of the priority areas of state policy. The educational process organized with the help of artificial intelligence is organized more effectively, taking into account the age characteristics, interests and level of knowledge of students. Interesting, interactive and demonstrative teaching methods are especially important for primary school students, and AI expands these opportunities.

First, adaptive learning systems based on artificial intelligence ensure the individual development of students. For example, the Khan Academy platform determines the student's level of knowledge and provides appropriate tasks. This allows each student to learn at their own pace, and in cases of difficulty, they receive additional explanations. As a result, the level of students' mastery of knowledge increases and they strengthen their self-confidence.

Secondly, experience and observation play an important role in the study of natural sciences. However, it is not always possible to conduct all experiments in real conditions. Therefore, virtual laboratories and simulations based on artificial intelligence are of great importance. With their help, students can observe various natural processes in a safe environment. For example, by studying the water cycle, plant growth, or simple physical phenomena virtually, students strengthen their theoretical knowledge and acquire practical skills.

Third, intelligent assistants based on artificial intelligence increase the efficiency of the educational process. In particular, systems such as ChatGPT provide quick and understandable answers to students' questions. This develops students' independent learning skills. The student can ask again about a topic that is not clear to him and understand it through various examples.



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Elementary school students absorb more visual information more quickly. Therefore, animations, videos, and interactive models created using artificial intelligence are very effective in teaching natural sciences. For example, when information about the solar system, weather phenomena, or the animal world is presented in a visual format, students easily understand it and remember it for a long time. Artificial intelligence is also an important tool in assessing and analyzing student knowledge. Automated systems quickly check test results, identify errors, and show which topics a student is struggling with. This allows the teacher to implement an individual approach and improves the quality of education. Game-based learning (gamification) technology is also being further developed using artificial intelligence. For example, on platforms such as Duolingo, students learn by accumulating points, increasing levels, and receiving rewards. This method is also used in studying natural sciences, significantly increasing students' interest in the lesson. Artificial intelligence also supports teachers. It helps in creating lesson plans, preparing teaching materials, and analyzing student results. As a result, the teacher will be able to focus more on creative and pedagogical activities.

At the same time, there are some problems with the use of artificial intelligence. In particular, there is a lack of technical means, dependence on the Internet, and the risk of students becoming overly dependent on technology. Therefore, teacher control is of great importance in the use of these technologies.

In general, artificial intelligence is an effective tool for teaching natural sciences in primary schools, making the educational process interactive, interesting and effective. By using it correctly and purposefully, it is possible to increase the level of knowledge of students and form them as individuals with modern knowledge.

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