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METHODOLOGY OF TEACHING PHYSICS USING THE PRODUCTIVE METHOD WITH THE SUPPORT OF ARTIFICIAL INTELLIGENCE

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ABSTRACT

This article analyzes the methodological foundations of teaching physics using the productive teaching method. The research examines the role of learning motivation, creative thinking, and independent cognitive activity in the process of mastering physics concepts. Special attention is given to the integration of innovative pedagogical technologies and artificial intelligence tools in the educational process. Artificial intelligence technologies, including adaptive learning systems and virtual laboratories, create opportunities for individualized learning and interactive experimentation. The findings indicate that the combination of productive teaching methods and artificial intelligence significantly enhances students' motivation, cognitive engagement, and creative learning abilities.

Keywords

productive method, physics education, learning motivation, creative thinking, artificial intelligence in education, innovative pedagogy, virtual laboratories.

Introduction

Modern educational systems require pedagogical approaches that promote students' independent thinking, creativity, and research skills. In science education, particularly in physics, the learning process should encourage students to actively participate in knowledge construction rather than passively receiving information.

The productive teaching method plays an important role in achieving these goals. This method focuses on developing students' analytical thinking, encouraging them to apply theoretical knowledge in practical situations and engage in problem-solving activities [3].

Learning motivation is one of the key factors influencing students' academic performance. According to educational psychologists, motivation represents a system of internal psychological processes that stimulate individuals to engage in cognitive activities and achieve learning goals [7][8].

In recent years, the integration of digital technologies and artificial intelligence into education has opened new opportunities for improving teaching effectiveness. Artificial intelligence systems allow teachers to analyze students' learning progress, identify learning difficulties, and provide personalized instructional support [13].

Literature Review

Previous studies emphasize the importance of motivation and cognitive engagement in the learning process. Miller's theory of motivation explains that human behavior in learning activities is influenced by three main stages: need, coding, and reinforcement.

Similarly, Cattell's theory integrates biological, psychological, and social factors in explaining motivational behavior. These theories highlight the importance of creating supportive educational environments that stimulate students' curiosity and intellectual engagement.

In the field of pedagogy, researchers such as Mirzaakhmedov and Shodiev emphasize that effective physics teaching requires developing students' internal motivation and interest in scientific inquiry [6].

Modern studies also highlight the role of artificial intelligence technologies in education. AI-based learning environments provide adaptive instruction and interactive learning opportunities that support students' individual learning needs [14][15].

Methodology

The research is based on theoretical analysis of pedagogical literature and conceptual analysis of productive teaching methods in physics education.

The study focuses on how the productive teaching method influences students' motivation, independent thinking, and creative learning activity. In addition, the research analyzes the role of artificial intelligence technologies in supporting innovative teaching strategies.

Artificial intelligence tools such as intelligent tutoring systems, adaptive learning platforms, and virtual laboratories were examined as supportive technologies for organizing interactive learning environments.

These technologies enable teachers to:

- analyze students' learning progress;
- provide adaptive feedback;
- organize interactive experiments and simulations;
- create personalized learning pathways.

Results and Discussion

The analysis demonstrates that the productive teaching method significantly improves students' cognitive engagement and creative learning abilities.

Students who participate in interactive and problem-based learning activities demonstrate higher levels of motivation and curiosity. Such learning environments encourage students to analyze scientific problems, propose solutions, and apply theoretical knowledge in practice.

Artificial intelligence technologies further enhance the effectiveness of productive teaching methods. AI-supported learning platforms allow teachers to monitor students' performance and adapt instructional strategies accordingly [13].

Virtual laboratories and simulation technologies also provide opportunities for conducting experiments that may be difficult to implement in traditional classroom settings. These tools help students visualize physical phenomena and improve their conceptual understanding of scientific principles [15].

Conclusion

The productive teaching method plays an important role in developing students' creative thinking and cognitive activity in physics education.

The integration of artificial intelligence technologies into the educational process significantly enhances teaching effectiveness by providing adaptive learning environments and interactive experimental opportunities.

Therefore, combining productive pedagogy with artificial intelligence technologies represents a promising direction for improving the quality of physics education in modern digital learning environments.

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