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METHODOLOGY FOR DEVELOPING COGNITIVE INDEPENDENCE IN EXTRACURRICULAR ACTIVITIES BASED ON ARTIFICIAL INTELLIGENCE

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Abstract
This article analyzes the issue of developing students' cognitive independence through the use of artificial intelligence technologies. The didactic possibilities of digital technologies, particularly AI-based educational tools in extracurricular activities, are examined. In addition, the methodology for forming students' independent thinking, analytical skills, and creative approaches is discussed.

Keywords: Artificial intelligence, cognitive independence, extracurricular activities, digital education, interactive methods, competence, innovative education.

Introduction

In the modern education system, the rapid development of digital technologies and artificial intelligence (AI) is fundamentally transforming the content, form, and methods of the educational process. Today, education is no longer based solely on traditional textbooks and teacher explanations; instead, it is becoming an interactive, flexible, and individualized digital ecosystem. In this regard, artificial intelligence technologies play an important role in personalizing education, identifying students' abilities, and supporting their development.

In particular, AI-based tools have significant didactic value in developing students' cognitive independence. Adaptive learning platforms powered by artificial intelligence offer individual learning paths based on students' knowledge level, learning speed, and interests. This transforms students from passive recipients of knowledge into active learners who independently explore, analyze, and draw conclusions.

Chatbots, virtual assistants, and automated testing systems enable students to access knowledge anytime, answer questions, and work independently.

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At the same time, extracurricular activities provide a highly suitable pedagogical environment for developing these competencies. In such activities, students are given opportunities for free thinking, creativity, and independent decision-making. AI-based extracurricular activities, such as project work, digital laboratories, and interactive research tasks, increase students' interest and guide them toward solving real-world problems. As a result, students not only gain theoretical knowledge but also develop practical application skills.

Moreover, AI technologies encourage collaborative learning in extracurricular settings. Students develop teamwork and communication skills while working on group projects, analyzing data, and presenting results. In this way, artificial intelligence becomes an important didactic tool that supports not only cognitive development but also personal and social growth.

Main Part

Artificial intelligence (AI) is one of the most advanced fields of modern information technologies, aimed at stimulating human thinking, decision-making processes, and problem-solving mechanisms through computer systems. Today, AI is widely used not only in industry and economics but also in education. AI-based adaptive learning systems enable personalized education by considering students' individual capabilities. Virtual assistants, chatbots, automated testing systems, and interactive platforms support independent learning processes and make education more effective. This represents a shift from a teacher-centered approach to a learner-centered approach.

Cognitive independence refers to the learner's ability to independently search for, analyze, compare, and apply knowledge rather than receiving it passively. This competence is one of the key goals of modern education and plays an important role in intellectual development. A student with developed cognitive independence sets goals, selects information sources independently, analyzes various data, and draws reasoned conclusions. In this process, they not only acquire knowledge but also develop critical thinking, problem-solving, and creative skills.

Extracurricular activities are an important didactic tool for deepening knowledge, developing independent thinking, and shaping creativity. They provide a free and creative environment that encourages active participation. Modern pedagogical methods such as project-based learning, group research, and the use of digital

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platforms are widely applied in this process. As a result, students develop teamwork, responsibility, and independent decision-making skills.

The process of forming cognitive independence through artificial intelligence occurs in several stages. First, interactive tests, games, and visual materials are used to increase students' motivation. In the next stage, students independently search for information using chatbots and virtual laboratories. Then, the collected data is analyzed, compared, and generalized using AI tools. In the final stage, students independently prepare projects, presentations, or creative works. This process develops creativity, analytical thinking, and practical skills.

The use of artificial intelligence significantly increases the effectiveness of the educational process. It ensures an individualized approach by offering learning materials tailored to each student's abilities. It also increases student engagement, encourages independent exploration, and expands opportunities for practical application of knowledge. Most importantly, AI-based education develops independent thinking, analytical skills, and creativity in students, aligning with the main requirements of modern education.

Methodology

This study uses modern pedagogical and scientific research methods to investigate the formation of cognitive independence based on artificial intelligence. The methodological foundation of the research is based on the competency-based approach, constructivist learning theory, and principles of digital pedagogy.

The following methods were used: theoretical analysis, comparative analysis, pedagogical observation, experimental method, and generalization. Theoretical analysis examined the role of artificial intelligence in education, its didactic possibilities, and its importance in developing cognitive independence. Comparative analysis was used to compare traditional teaching methods with AI-based educational approaches.

During pedagogical observation, students' activity, independent learning level, and information processing skills in extracurricular activities were analyzed. The experimental method involved organizing lessons using AI tools (chatbots, interactive platforms, adaptive testing systems) and evaluating their effectiveness. The generalization method was used to systematize the results and draw scientific conclusions.

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Methodologically, the study shows that AI technologies enhance students' learning activity, develop independent learning skills, and enable individualized education. At the same time, extracurricular activities serve as an important pedagogical environment for strengthening this process in practice.

Analysis

The analysis of developing cognitive independence based on artificial intelligence shows that modern digital technologies significantly improve educational effectiveness. In particular, the use of AI tools in extracurricular activities increases students' activity and accelerates their independent learning process.

According to the results, in traditional education, the student is mainly a passive recipient of knowledge, whereas in AI-based approaches, they become active explorers and researchers. This transformation develops critical thinking, independent problem-solving, and information analysis skills.

AI tools such as chatbots, adaptive testing systems, and virtual laboratories support differentiated learning by considering individual student abilities. This creates equal learning conditions and optimizes each student's development trajectory.

Observed results in extracurricular activities show that project-based learning and digital platforms increase students' motivation. They actively develop skills in searching, processing, and presenting information. In group work, AI tools strengthen collaboration and foster collective thinking.

Overall, the analysis confirms that AI-based methodology is effective in education. It not only modernizes the learning process but also plays a key role in developing students' independent thinking and cognitive activity.

Conclusion

Extracurricular activities organized based on artificial intelligence are an effective tool for developing students' cognitive independence. This approach contributes to the modernization of the educational process and strengthens the competency-based approach.

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