

Technologies for developing students' professional-pedagogical thinking using artificial intelligence tools

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Abstract: This article examines the role of artificial intelligence technologies in the modern education system and their impact on the development of professional and pedagogical thinking. It explores the integration of artificial intelligence technologies into the educational process, as well as best practices from foreign higher education institutions. Additionally, the article discusses the development of professional and pedagogical thinking through artificial intelligence, highlighting its key factors and future prospects.

Keywords: Artificial Intelligence, Educational Technologies, Modeling, Critical Thinking, Innovative Pedagogy.

Introduction: The use of artificial intelligence technologies in the modern education system enables a more effective organization of the teaching process, ensures an individualized approach, and fosters the development of students' professional-pedagogical thinking. In particular, integrating artificial intelligence tools into the educational process allows teachers to accurately assess students' knowledge levels, provide customized recommendations, and implement innovative pedagogical technologies.

The concept of artificial intelligence first emerged in the United States and gradually gained widespread adoption in other countries. In 1956, the first meeting of ten leading American experts in computers and programming was held in the U.S. The concept of artificial intelligence and research in this field— a scientific approach to developing 'intelligent machines'— was first introduced at a conference at Dartmouth University in 1956, initiated by Stanford University professor John McCarthy.

Artificial intelligence is primarily focused on developing capabilities associated with human intelligence, such as language comprehension, learning, reasoning, problem-solving, and translation. This emerging technology is also making its way into education, facilitating the introduction of innovative solutions.

In our country, the expansion of digital technologies in education remains a relevant issue within the framework of the Presidential Resolution of the

Republic of Uzbekistan, 'On Measures to Create Conditions for the Accelerated Introduction of Artificial Intelligence Technologies, and the Decree, 'On the Concept of Development of the Higher Education System of the Republic of Uzbekistan until 2030. The effective implementation of artificial intelligence technologies, particularly innovative approaches aimed at developing students' professional and pedagogical thinking, plays a crucial role in this process.

Professional-pedagogical thinking plays a crucial role in the pedagogical process, as it fosters not only theoretical knowledge but also analytical and creative thinking skills related to professional activities. The automation and optimization of this process through artificial intelligence technologies also positively impact teachers' professional development.

Artificial intelligence technologies are widely used in modern education, enhancing teaching efficiency, enabling an individualized approach, and adapting the learning process. The impact of artificial intelligence tools on education is reflected in the following key aspects:

- Individualized approach and personalized learning
- Automation and increased efficiency of the learning process
- Virtual assistants and chatbots
- Interactive learning with artificial intelligence

- Monitoring and analysis of the learning process

Artificial intelligence consists of computer systems and software that simulate certain aspects of human thinking, enabling self-learning and independent decision-making. AI systems possess the following key capabilities:

- Analyzing data and drawing conclusions
- Self-learning and acquiring experience
- Understanding and responding to human speech
- Making decisions and solving problems

Today, artificial intelligence technologies are widely used not only in education but also in industry, medicine, finance, and other fields. Leading higher education institutions worldwide have already integrated artificial intelligence into various aspects of their activities, making it a valuable assistant to both professors and students. The experiences of top foreign universities in implementing AI in higher education serve as important examples.

Georgia State University in the U.S. has introduced an artificial intelligence chatbot called Pounce to enhance students' academic performance and prevent academic setbacks. The chatbot provides academic guidance while also helping students improve their overall performance.

The University of Technology Sydney in Australia has integrated artificial intelligence into its online learning platform to deliver personalized learning content to students.

Imperial College London has been at the forefront of integrating artificial intelligence into research. Researchers at the college use machine learning algorithms to analyze complex data sets and make accurate predictions in fields such as healthcare, climate science, and engineering.

The University of Bergen in Norway has incorporated artificial intelligence technology into its foreign language courses. The AI-powered platform provides flexible exercises, pronunciation feedback, and text-based language training for students learning various foreign languages.

The National University of Singapore has implemented a predictive modeling approach to identify students at high risk of academic difficulties. AI helps enhance overall academic performance by providing targeted support to struggling students, helping them avoid academic setbacks.

Professional-pedagogical thinking emerges during the development of professional competence and pedagogical skills in individuals engaged in teaching. It

reflects a teacher's ability to creatively approach professional tasks, effectively educate students, and develop strategies that foster their growth.

Professional-pedagogical thinking is characterized by the following key aspects:

- A deep understanding of the pedagogical process
- Analyzing problems and proposing innovative solutions
- Applying flexible teaching methods that consider students' individual characteristics
- Selecting and effectively integrating educational technologies

Professional-pedagogical thinking is essential for a teacher's professional development and success in the educational process. By enhancing the theoretical, practical, critical, creative, and reflective aspects of thinking, teachers can organize the learning process more effectively and innovatively. In particular, artificial intelligence tools play a crucial role in developing these components by enabling the adaptation, automation, and personalization of education.

Professional thinking is the ability of students to consciously acquire, apply, and analyze knowledge and skills in their field. This type of thinking is essential for future professionals to solve problems, make independent decisions, develop innovative approaches, and advance in their careers.

The modern education system should not only impart knowledge but also foster students' critical thinking, creativity, and independent learning skills. In this context, developing professional thinking is a key factor in ensuring future specialists' success in their fields.

Key Aspects of Developing Professional Thinking

Developing professional thinking in students is essential for the following reasons:

1. Enhancing the ability to think independently and make decisions
2. Fostering an innovative mindset and creative thinking
3. Promoting a practice-oriented approach to education
4. Strengthening problem-solving and analytical skills
5. Encouraging continuous professional growth and lifelong learning

Modern technologies, particularly artificial intelligence tools, play a crucial role in developing professional thinking. AI tools enable students to:

Here's a refined version of your text for better clarity, consistency, and readability:

- Selecting an individualized educational path (providing learning materials tailored to the student's knowledge level)
- Analyzing problem situations (gaining experience in modeling and solving real-world problems)
- Enhancing creative and critical thinking (engaging in practical exercises through AI-powered educational simulations and virtual environments)
- Developing automated advisory systems for students (offering recommendations on professional pathways)

The development of professional and pedagogical thinking depends on various factors, including students' ability to think independently during the learning process, their readiness for professional activities, and their mastery of modern pedagogical approaches.

The development of professional and pedagogical thinking depends on various factors, including pedagogical, technological, psychological, socio-cultural, and practical experience. When these factors are integrated, students' professional and pedagogical thinking develops more effectively, laying a strong foundation for their future teaching careers. In particular, artificial intelligence technologies, interactive teaching methods, and innovative pedagogical approaches can accelerate this process.

The modern educational process is closely connected with innovative technologies, and AI-based educational tools play a crucial role in its effective organization. Artificial intelligence enables adaptation to students' individual needs, automates the learning process, and assists teachers.

AI-driven educational technologies create new opportunities in modern education. Personalized learning, intelligent assessment systems, virtual teachers, VR/AR technologies, and LMS platforms enhance the efficiency of the learning process. In the future, these technologies will continue to evolve, making education even more innovative and accessible.

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