



## **THE ROLE OF ARTIFICIAL INTELLIGENCE (AI) IN TEACHING INFORMATICS**

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### **Abstract**

This article analyzes the role of artificial intelligence (AI) technologies in the teaching of informatics. The study examines the concept of AI, its pedagogical potential, and the methods of its application in the educational process. Using various examples, it describes how AI capabilities—such as adaptive learning systems, virtual tutors, chatbots, and automated assessment systems—contribute to the effective teaching of informatics. Furthermore, the article analyzes technical, qualification, and information security challenges arising from the implementation of AI technologies and presents future prospects. The article is aimed at developing informatics education based on modern information technologies and exploring ways to effectively utilize AI tools.

**Keywords:** Informatics education, artificial intelligence, adaptive learning systems, virtual tutor, automated assessment.

### **Introduction**

Today, the rapid development of information and communication technologies (ICT) is fundamentally transforming the educational process. In particular, artificial intelligence (AI) technologies are taking a central role in education, much as they have in healthcare, transport, and industry. Informatics serves as the foundation for both studying and practically applying AI. Therefore, integrating AI concepts into the informatics educational process has become a requirement of the modern era.

### **The concept of artificial intelligence and its pedagogical potential**

Artificial Intelligence is a collection of algorithmic and modeling technologies that simulate human mental activities (learning, logical decision-making, language



understanding, etc.) through computer systems. In the field of education, AI provides the following opportunities:

- **Individual Approach to Students:** AI-based systems offer lesson plans tailored to each student's knowledge level.
- **Continuous Assessment and Analysis:** It analyzes the effectiveness of the learning process in real-time.
- **Interactive Learning Environments:** The educational process is brought to life through virtual tutors, chatbots, and simulations.

### **The Place of Informatics in Educational Content**

Informatics provides not only fundamental knowledge of computer science but also deep concepts in information technology, algorithmization, programming, data structures, and system architecture. Today, informatics curricula include:

- Algorithms and Data Structures;
- Programming Languages and Environments;
- Operating Systems;
- Networks and Information Security;
- AI and its Applications.

Elements of AI are integrated into the teaching of informatics, providing students with not only theoretical knowledge but also practical skills, preparing them for the modern labor market.

### **Application of AI Technologies in Informatics Education**

AI technologies play a vital role in making informatics education interactive, individualized, and effective. They help increase students' knowledge levels while reducing the teacher's workload through automation. The main directions of AI application in informatics education include:

#### **1. Adaptive Learning Systems**

Adaptive systems analyze each student's knowledge level and provide appropriate lessons and exercises.

- *Benefit:* Students have the opportunity to study based on their strengths and weaknesses.
- *Example:* Systems like Khan Academy or ALEKS adapt subsequent topics based on student responses.



## **2. Virtual Tutors and Chatbots**

Virtual tutors provide real-time assistance to students, answering questions and analyzing code or algorithms.

- *Benefit:* Students can learn independently, while the teacher focuses on more complex explanations.
- *Example:* AI chatbots that assist with Python or Java programming.

## **3. Automated Assessment**

AI systems evaluate tests quickly and fairly, check written assignments, and detect plagiarism.

- *Benefit:* Teachers save time on grading and gain the ability to analyze results more deeply.
- *Example:* Gradescope, Turnitin.

## **4. Simulations and Virtual Laboratories**

AI technologies allow students to experiment with complex systems, algorithms, or software models in a virtual environment.

- *Benefit:* Increased opportunities for practical experience without the need for dangerous or expensive laboratory equipment.
- *Example:* Virtual robots, network simulators, and physics or electronics labs.

## **5. Analysis and Optimization of the Learning Process**

AI systems analyze student activity to identify difficulties in understanding specific topics and provide recommendations to the teacher.

- *Benefit:* The learning process is personalized, and efficiency is increased.

## **Advantages of AI in Teaching**

- **Customized Learning Path:** Individualized instruction for every student.
- **Resource Conservation:** Reduced burden of repetitive grading tasks for teachers.
- **Increased Motivation:** Interactive and engaging educational processes.
- **Instant Feedback:** Immediate feedback for students.



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## **Challenges and Constraints**

Several problems exist in implementing AI technologies into education:

- **Technical Infrastructure Deficiencies:** High-speed internet and computers are not available in all schools.
- **Teacher Qualification Levels:** Additional training is required for teachers who do not have a deep understanding of AI fundamentals.
- **Information Security and Privacy:** Personal data of students must be protected.

## **Future Prospects**

AI technologies are developing at a rapid pace. Future expectations include:

- Autonomous AI-based learning platforms;
- Educational experiences through real-time simulation and virtual reality;
- Large-scale adaptive learning systems.

These advancements will make informatics education not only more effective but also more interactive and engaging.

The role of artificial intelligence in teaching informatics is immense. AI not only enriches the educational process with individualization, assessment, and interactivity but also provides teachers with effective tools. Therefore, implementing AI into education is not only beneficial but a necessary strategic direction.

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