

THE CONCEPT OF ARTIFICIAL INTELLIGENCE AND ITS ROLE IN EDUCATION

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Annotation: Information technologies, particularly artificial intelligence (AI), are creating new opportunities in the field of education by making the educational process more effective and personalized. This article analyzes the role and impact of artificial intelligence in education (AIED). The introduction of AI technologies in education provides opportunities to improve learning, support students and teachers, and optimize various educational activities. Prominent educational platforms such as Khan Academy and Duolingo use AI systems to deliver personalized learning experiences. Companies like iFlyTek in China are using AI for exam grading. The article also presents research and approaches implemented in the AIED field, along with statistical data demonstrating the effectiveness and positive impact of AI on education, such as improved test results and reduced anxiety. Additionally, the article reviews existing research and methodologies, highlighting emerging areas for further investigation. Overall, the article emphasizes the importance of applying AI in education and its potential to transform the educational sector.

Keywords: artificial intelligence, education, personalized learning, adaptive learning, AIED, educational technology, AI effectiveness, educational innovation.

Аннотация: Технологии искусственного интеллекта (ИИ) создают новые возможности в области образования, помогая сделать образовательный процесс более эффективным и персонализированным. В данной статье анализируется роль и влияние применения ИИ в образовании (AIED). Внедрение технологий ИИ в образование создает возможности для улучшения обучения, поддержки учеников и преподавателей, а также оптимизации различных образовательных процессов. Известные образовательные платформы, такие как Khan Academy и Duolingo, используют системы ИИ для предоставления персонализированного образовательного опыта. Компании, такие как iFlyTek в Китае, используют ИИ для оценки экзаменов. В статье также представлены исследования и подходы, реализованные в области AIED, а также статистические данные, демонстрирующие эффективность и положительное влияние применения ИИ в образовании, такие как улучшение результатов тестов и снижение тревожности. В статье также рассматриваются существующие исследования и методы, а также выявляются новые направления для дальнейших исследований. В целом, статья подчеркивает важность применения ИИ в образовании и его потенциал в трансформации образовательной отрасли.

Ключевые слова: искусственный интеллект, образование, персонализированное обучение, адаптивное обучение, AIED, образовательные технологии, эффективность ИИ, инновации в образовании.

Introduction

Information technologies, especially artificial intelligence (AI), are drastically changing modern education. AI algorithms and educational robots have become an integral part of educational management and teaching systems, supporting various learning and teaching activities (Costa et al., 2017; García et al., 2007). The use of AI educational programs (AIED) in education can be observed in many applications. For instance, Khan Academy offers its Khanmigo AI teacher, which utilizes GPT-4 capabilities to provide personalized learning support and intelligent feedback on various topics such as mathematics, programming, and language learning. Additionally, the Duolingo language learning platform uses advanced AI systems to improve learners' progress (Bicknell et al., 2023). iFlyTek offers intelligent assessment systems for various evaluation scenarios, such as China's national college entrance exam (iFlyTek, 2024). AI-powered learning management systems (LMS), such as Absorb LMS and Docebo, provide various AI capabilities to support learning and teaching activities, including smart content creation, administrative task automation, and personalized learning (Leh, 2022). In the field of educational robotics, SoftBank Robotics has developed the Nao and Pepper robots as social robots for teaching languages (Belpaeme & Tanaka, 2022).

The Concept of Artificial Intelligence

Artificial Intelligence (AI) refers to a set of technologies and systems aimed at simulating human cognitive activities. AI primarily focuses on learning, communication, decision-making, and imagination capabilities. The main goal of artificial intelligence is to define human intellectual activity and automate it.

AI technologies are associated with three main fields:

1. **Machine Learning**
2. **Deep Learning**
3. **Natural Language Processing (NLP)**

Through these technologies, computers and systems can learn on their own and perform various tasks. Examples of artificial intelligence include voice assistants (such as Siri, Google Assistant), automatic translators (Google Translate), and autonomous vehicle control systems (such as Tesla).

The Role of Artificial Intelligence in Education

AI technologies are widely applied in education to enhance the quality and effectiveness of the learning process. The main goal of applying AI in educational systems is to provide an

individualized approach to students, assist teachers, and improve the quality of education. Below, we discuss some of the key areas where artificial intelligence is used in education:

1. **Personalization and Individualized Teaching** AI allows for the personalization of the learning process according to students' individual needs and comprehension levels. AI systems analyze students' successes and challenges, offering them tailored learning plans. This, in turn, enables improving the quality of education according to each student's unique learning style.

Example: Platforms like Khan Academy and Duolingo use AI to continuously assess students' learning levels and provide them with appropriate lessons and exercises.

2. **Assistance to Teachers and Reducing Their Workload** AI enables the automation of tasks for teachers, such as grading, analyzing data, and working with individual students. AI systems help teachers optimize lesson plans and evaluate tests and exams, allowing them to manage their time more effectively.

Example: Platforms like Gradescope assist teachers in automatically grading exams and assignments.

3. **Improving Education Quality** AI technologies help improve education quality by enabling efficient assessment of students, adapting individual learning processes, and enhancing the use of general educational resources. AI systems allow teachers to identify students' strengths and weaknesses and develop personalized approaches for their growth.

Example: AI tutor systems, such as Socratic by Google, help students better understand the material being taught.

4. **Distance Learning and Online Classes** AI enhances distance learning and online courses by managing remote learning processes and tracking student participation. It also assists in delivering lessons and materials and developing interactive exercises.

Example: Platforms like Coursera and EdX use AI to organize online education effectively. These systems offer courses and lessons tailored to students' needs.

5. **Automatic Translation and Language Learning** AI uses Natural Language Processing (NLP) technologies to simplify the process of teaching reading and writing in different languages. Students can learn new languages quickly and efficiently by using AI-powered automatic translators and language learning platforms.

Example: Systems like Google Translate and Duolingo help users learn new languages and expand global educational opportunities.

6. **Optimizing Time and Resources** AI helps optimize the distribution of resources in educational systems and streamline the learning process for students. For example, AI

systems assist in creating educational materials and modifying lessons, speeding up and enhancing the educational process.

Example: Platforms like Smart Sparrow help teachers optimize resources in education.

Conclusion

Artificial intelligence may bring significant changes to the education sector in the future. It helps meet students' individual needs, assists teachers, improves education quality, and makes the learning process more efficient. However, to successfully implement AI in education, attention must be given to ethical concerns, privacy issues, and monitoring. The role of AI in education will continue to grow, and more effective systems will be developed in the future.

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