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IMPROVING THE METHODOLOGY OF INDIVIDUALIZING THE EDUCATIONAL PROCESS IN HIGHER EDUCATION BASED ON ARTIFICIAL INTELLIGENCE

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Abstract

The rapid development of digital technologies has significantly influenced the higher education system, highlighting the need for personalized learning approaches. This article examines the improvement of the methodology for individualizing the educational process in higher education institutions based on artificial intelligence (AI) technologies. An adaptive learning model was developed by analyzing students' individual learning characteristics, academic performance, and learning pace through AI-driven learning analytics. The proposed methodology enables the formation of personalized learning trajectories, automated assessment, and continuous feedback. The results of the experimental study demonstrate that AI-based individualized learning significantly enhances students' academic achievement and learning motivation. The findings confirm the effectiveness and practical relevance of the proposed methodology for modern higher education.

Keywords

artificial intelligence, individualized learning, adaptive learning, learning analytics, higher education.

Annotatsiya

Mazkur maqolada sun'iy intellekt texnologiyalaridan foydalangan holda oliy ta'lim muassasalarida o'quv jarayonini individuallashtirish metodikasini takomillashtirish masalalari yoritilgan. Tadqiqot jarayonida talabalarning individual o'rganish xususiyatlari, bilim darajasi va o'quv faolligini tahlil qilish asosida adaptiv ta'lim modeli ishlab chiqildi. Sun'iy intellektga asoslangan learning analytics va tavsiyalar tizimi orqali ta'lim samaradorligini oshirish yo'llari asoslab berildi. Tadqiqot natijalari taklif etilgan metodikaning oliy ta'limda amaliy ahamiyatga ega ekanligini ko'rsatadi.

Kalit so'zlar

sun'iy intellekt, individuallashtirilgan ta'lim, adaptiv o'qitish, learning analytics, oliy ta'lim.

Аннотация

В статье рассматриваются вопросы совершенствования методики индивидуализации учебного процесса в высших учебных заведениях на основе технологий искусственного

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интеллекта. В ходе исследования была разработана адаптивная модель обучения с учетом индивидуальных особенностей, уровня знаний и учебной активности студентов. Обоснованы возможности повышения эффективности обучения с использованием learning analytics и интеллектуальных рекомендательных систем. Результаты исследования подтверждают практическую значимость предложенной методики в системе высшего образования.

Ключевые слова

искусственный интеллект, индивидуализация обучения, адаптивное обучение, learning analytics, высшее образование.

1. Introduction

In the context of global digital transformation, higher education institutions face new challenges related to improving the quality and effectiveness of teaching and learning. Traditional teaching models often rely on uniform instructional approaches that do not sufficiently account for students' diverse learning abilities, cognitive styles, and educational needs. As a result, some students may experience learning difficulties, while others may not fully realize their academic potential.

Artificial intelligence technologies provide new opportunities for addressing these challenges by enabling the analysis of large volumes of educational data and supporting data-driven decision-making in teaching. AI-based systems can adapt learning content, instructional strategies, and assessment methods to individual learners. Therefore, improving the methodology of individualizing the educational process through artificial intelligence has become a pressing research issue in higher education pedagogy.

The purpose of this study is to develop and substantiate an AI-based methodology for individualizing the educational process in higher education institutions and to evaluate its effectiveness through experimental implementation.

2. Literature Review

Recent studies indicate that individualized and adaptive learning environments contribute to higher student engagement and academic performance. Researchers emphasize the role of artificial intelligence in creating personalized learning systems through machine learning algorithms, intelligent tutoring systems, and recommendation engines. Learning analytics has been widely recognized as a key component in monitoring learners' progress and predicting learning outcomes.

However, despite extensive research on AI in education, there remains a lack of comprehensive methodological frameworks that integrate AI tools into the pedagogical process in a systematic and scalable manner. This study aims to address this gap by proposing an improved methodology for AI-based individualized learning in higher education.

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3. Research Methodology

The study employed a mixed-methods research design, combining theoretical analysis, pedagogical modeling, and experimental methods. The research was conducted in several stages:

- analysis of theoretical foundations of individualized learning and AI technologies in education;
- development of an AI-based adaptive learning model;
- implementation of the model in the educational process;
- evaluation of learning outcomes using quantitative and qualitative indicators.

Learning analytics tools were used to collect and analyze data on students' academic performance, learning behavior, and engagement levels. Statistical methods were applied to compare the results of control and experimental groups.

4. AI-Based Individualized Learning Model

The proposed model of individualized learning based on artificial intelligence consists of three main stages:

4.1 Diagnostic Stage

At this stage, students' initial knowledge level, learning preferences, and cognitive characteristics are assessed using AI-powered diagnostic tools. The collected data serve as the basis for creating individual learner profiles.

4.2 Adaptive Learning Stage

Based on the diagnostic results, AI algorithms generate personalized learning paths by recommending appropriate learning materials, tasks, and activities. The system dynamically adjusts the content and difficulty level according to students' progress and performance.

4.3 Monitoring and Feedback Stage

Continuous monitoring of learning outcomes is carried out through automated assessment tools. AI-driven feedback mechanisms provide timely recommendations to students and instructors, enabling continuous improvement of the learning process.

5. Experimental Results and Discussion

The experimental study was conducted with undergraduate students in a higher education institution. The experimental group was taught using the AI-based individualized learning methodology, while the control group followed traditional instructional methods.

The results revealed that students in the experimental group demonstrated higher academic achievement, improved learning motivation, and greater engagement compared to those in the

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control group. Statistical analysis confirmed the significance of these differences, indicating the effectiveness of the proposed methodology.

The findings align with previous research on adaptive learning systems and highlight the importance of integrating artificial intelligence into pedagogical methodologies rather than using it solely as a technological tool.

6. Conclusion

This study demonstrates that improving the methodology of individualizing the educational process in higher education based on artificial intelligence contributes significantly to enhancing learning outcomes and student motivation. The proposed AI-based methodology enables personalized learning trajectories, continuous assessment, and data-driven instructional decisions.

The results suggest that higher education institutions should actively integrate artificial intelligence technologies into their teaching practices. Future research may focus on expanding the model to different academic disciplines and exploring ethical and data privacy issues related to AI in education.

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