BG Pulse Journal USA

ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg

THE ISSUES OF FORMATION AND DEVELOPMENT OF THE INDIVIDUAL EDUCATION SYSTEM WITH THE HELP OF ARTIFICIAL INTELLIGENCE

Djalilov Ma'rufjon Mirtimurovich

Senior teacher of the Department of English Language Integrated Course 1

English Language Faculty 1 Uzbekistan State World Languages University

Tashkent, Uzbekistan

marufdjalilov77@gmail.com

Doi: https://doi.org/10.5281/zenodo.24240046

Annotation: Artificial intelligence (AI) technologies are increasingly used in education and significantly expand the possibilities for personalizing learning. This article analyzes the formation and development of individualized education systems based on AI, the organization of a learning process adapted to students' level of knowledge and needs, and the role of adaptive systems and intelligent tutoring in learning outcomes. It also examines the impact of AI on teachers' work, discusses information security, data privacy and ethical issues, and offers practical recommendations for responsible implementation in higher education. The study is based on the analysis and synthesis of recent scholarly literature and national policy documents. The findings show that AI can support personalized learning and reduce teachers' routine workload, but its effectiveness depends on pedagogical design, teacher involvement, transparency of algorithms and protection of student data.

Key words: artificial intelligence, individual education, personalized education, adaptive systems, digital education, educational efficiency.

ВОПРОСЫ ФОРМИРОВАНИЯ И РАЗВИТИЯ СИСТЕМЫ ИНДИВИДУАЛЬНОГО ОБУЧЕНИЯ С ПОМОЩЬЮ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА

Аннотация: Технологии искусственного интеллекта (ИИ) всё шире применяются в образовании и значительно расширяют возможности персонализации обучения. В статье анализируются формирование и развитие систем индивидуального обучения на основе ИИ, организация учебного процесса, адаптированного к уровню знаний и потребностям студентов, а также роль адаптивных систем и интеллектуальных обучающих систем в результатах обучения. Рассматриваются влияние ИИ на работу преподавателей, вопросы информационной безопасности, защиты персональных данных и этики, предлагаются практические рекомендации по ответственному внедрению ИИ в высшем образовании. Исследование основано на анализе и обобщении современной научной литературы и национальных нормативных документов. Результаты показывают, что ИИ может поддерживать персонализированное обучение и снижать рутинную нагрузку преподавателей, однако его эффективность зависит от педагогического проектирования, участия преподавателя, прозрачности алгоритмов и защиты данных студентов.

Ключевые слова: искусственный интеллект, индивидуальное образование, персональное образование, адаптивные системы, цифровое образование, образовательная эффективность.

SUN'IY INTELLEKT YORDAMIDA INDIVIDUAL O‘QITISH TIZIMINI SHAKLLANTIRISH VA RIVOJLANTIRISH MUAMMOLARI

Annotatsiya: Sun'iy intellekt (SI) texnologiyalari ta'limda tobora keng qo'llanilmoqda va ta'lim jarayonini shaxsiylashtirish imkoniyatlarini sezilarli kengaytirmoqda. Maqolada SI asosida individuallashtirilgan o'quv tizimlarini shakllantirish va rivojlantirish, o'quv jarayonini talabalarning bilim darajasi va ehtiyojlariga moslashtirish hamda moslashuvchan tizimlar va intellektual repetitorlarning ta'lim natijalariga ta'siri tahlil qilinadi. SIning o'qituvchilar faoliyatiga ta'siri, axborot xavfsizligi, shaxsiy ma'lumotlarni himoya qilish va axloqiy masalalar muhokama qilinadi, oliy ta'limda SIni mas'uliyatli joriy etish bo'yicha amaliy tavsiyalar beriladi. Tadqiqot so'nggi ilmiy adabiyotlar va milliy me'yoriy hujjatlarni tahlil qilish hamda umumlashtirishga asoslangan. Natijalar SI shaxsiylashtirilgan ta'limni qo'llab-quvvatlashi va o'qituvchining muntazam yukini kamaytirishi mumkinligini, biroq samaradorlik pedagogik loyihalash, o'qituvchi ishtiroki, algoritmlar shaffofligi va talabalar ma'lumotlarini himoya qilishga bog'liqligini ko'rsatadi.

Kalit so'zlar: sun'iy intellekt, individuallashtirilgan ta'lim, shaxsiylashtirilgan ta'lim, moslashuvchan tizimlar, raqamli ta'lim, ta'lim samaradorligi.

In recent years, Uzbekistan has been implementing comprehensive reforms in all areas, and the development of artificial intelligence (AI) technologies is one of their priorities. Presidential Resolution No. PQ-4996 of 17 February 2021 created conditions for the accelerated introduction of AI technologies, and Resolution No. PQ-358 of 14 October 2024 approved the Strategy for the Development of Artificial Intelligence Technologies until 2030, which aims at creating favorable conditions for using AI in the social sphere and in the economy (President of the Republic of Uzbekistan, 2021, 2024). Education is one of the fields in which these technologies are taking their place most intensively. AI plays a major role in creating information systems that are able to study, analyze, transform and visualize data.

Every student has a different level of knowledge, different interests and a different learning pace. The traditional education model often offers the same approach to all learners, which makes it difficult for some students to master the material and causes boredom in others. The significance of this problem has long been recognized. Bloom (1984) reported that students taught through one-to-one tutoring performed about two standard deviations better than students in a conventional class, and called the search for group methods that are as effective as tutoring the "2 sigma problem". Later research suggested more moderate figures: in a review of studies, VanLehn (2011) found that human tutoring raised test scores by about 0.79 standard deviations compared with no tutoring. Even so, individual tutoring for every student is hardly possible in mass higher education, and this is where AI-based systems are expected to help.

The aim of this article is to analyze the formation and development of individualized education systems based on AI and to identify the conditions for their effective and responsible use in higher education. The article is based on the analysis and synthesis of recent scholarly literature and national policy documents.

Individualized, personalized and adaptive learning: key concepts

In the literature, the terms individualized, personalized and adaptive learning are often used close to each other. Individualized learning usually means that the pace of learning is adjusted to the learner; personalized learning goes further and adapts content, methods and goals to the learner's needs and interests; adaptive learning refers to technological systems that change tasks and feedback automatically on the basis of the learner's data. The systematic review by Farhood et al. (2025), which examines the influence of AI-enabled personalized learning on the educational system, shows how much research attention this topic now receives.

An AI-based individual education system usually consists of three interconnected parts: a model of the learner, which stores data on knowledge, mistakes and progress; a model of the subject, which describes topics and the relations between them; and a tutoring component, which selects the next task, hint or explanation. Intelligent tutoring systems built on this logic have been studied for decades. Recent generative AI tools, such as chatbots based on large language models, add a conversational interface: a student can ask questions in natural language, practice dialogue and receive explanations at a suitable level. At the same time, such tools require careful pedagogical control, because their answers may be inaccurate.

Advantages of adaptive learning systems

Adaptive learning systems based on AI allow real-time monitoring of student activity. Such systems identify student errors and automatically provide additional explanations or exercises. As a result, the student learns at a comfortable pace and understands complex topics more deeply. For example, in mathematics an adaptive platform can identify students who struggle with solving equations and offer them additional video lessons, simplified examples and step-by-step explanations, while students who have mastered the topic quickly receive more complex problems or creative tasks. In English language teaching, an adaptive system can analyze a student's written work, find recurring errors, such as article or tense errors, and generate extra practice for exactly these errors, while a chatbot can offer speaking practice in a low-stress environment.

The available evidence is encouraging. Kulik and Fletcher (2016) analyzed 50 controlled evaluations of intelligent tutoring systems and found that the median effect was to raise test scores by 0.66 standard deviations over conventional levels, that is, from the 50th to the 75th percentile. At the same time, the effects were considerably smaller on standardized tests, which means that the results depend on how learning is measured. Vieriu and Petrea (2025) studied 85 second-year university students who had direct experience with AI-enhanced learning environments and found that AI offered significant benefits, including personalized learning, improved academic outcomes and enhanced student engagement. According to these authors, AI tools help students understand complex materials more deeply by quickly providing resources tailored to their needs. This approach not only increases the level of knowledge but also strengthens students' self-confidence. Adaptive systems may also help to reduce inequality in education, since each student is offered an approach that corresponds to his or her capabilities, provided that access to the technology is equal.

The role of artificial intelligence in the pedagogical activity of a teacher

Artificial intelligence creates many conveniences not only for students but also for teachers. With the help of AI, a teacher can study the topics that interest students, prepare more interesting lessons, automate assessment and receive ready-made statistical data about students' results. For example, in online testing systems, AI-based platforms automatically check students' answers, identify the topics in which the most mistakes are made and provide the teacher with an overall analysis of the class in the form of graphs and tables. This allows the teacher to focus the following lessons precisely on problematic topics.

Luckin and Cukurova (2019) argue that educational AI should be designed on the basis of learning sciences and in partnership with educators, so that the analysis of educational data helps to scaffold students and support teachers. Baker and Inventado (2014) describe how educational data mining and learning analytics turn the data collected by learning systems into information that can be used for decisions about teaching. In this way, routine tasks such as checking tests and collecting statistics can be automated, which gives teachers more time for direct communication with students, feedback on creative work and mentoring. Therefore, AI is better understood as a pedagogical assistant than as a replacement for the teacher: decisions about goals, assessment criteria and support for individual students remain a human responsibility.

Challenges and limitations

Despite its advantages, the use of AI for individual learning has limits. First, over-reliance on AI can weaken students' independent and critical thinking; among the challenges identified by Vieriu and Petrea (2025) are over-reliance on AI, diminished critical thinking skills, data privacy risks and academic dishonesty. Second, the quality of adaptive systems depends on the quality of data and algorithms, and incorrect or biased recommendations may reinforce inequality instead of reducing it. Third, access matters: adaptive systems reduce inequality only if all students have reliable internet and devices. Fourth, as noted above, positive effects found in controlled studies do not automatically transfer to every course and every kind of assessment. Finally, teachers need training: without digital and pedagogical competence, even a well-designed system will be used only superficially. For these reasons, AI should be integrated into a blended model in which adaptive online work is combined with face-to-face discussion, project work and teacher support.

Information security and ethical issues

The issue of working with students' personal data is important when using AI. Individual education systems collect and analyze large amounts of data, which raises information security issues. If the data is not adequately protected, its confidentiality may be violated. For example, online learning platforms store students' personal profiles, test scores and study histories. If these data are not protected by strong encryption and permission levels, they are likely to be exposed through cyberattacks. It is also important to ensure fairness and transparency in the decision-making of AI systems. The importance of these questions is recognized at the international level: the UNESCO Recommendation on the Ethics of Artificial Intelligence (UNESCO, 2021) and the guidance for policy-makers on AI in education (Miao et al., 2021) draw attention to the need to protect privacy and to keep human control over AI systems.

In practice, this means collecting only the data that is necessary for learning, informing students about what data are used and why, limiting access to the data according to roles, and explaining the logic of automated decisions. For example, if an AI-based automatic assessment system checks a student's written work only on the basis of predetermined criteria, and these criteria are open to both the teacher and the student, transparency and reliability are ensured in the assessment process. In this way, students' rights are protected and the quality of education is maintained. Therefore, educational institutions should adhere to ethical standards and conduct constant monitoring when introducing artificial intelligence.

Recommendations for implementation in higher education

On the basis of the analysis, the following recommendations can be made: (1) start with pilot projects in selected courses and evaluate the results using both learning data and student feedback; (2) combine adaptive online work with face-to-face activities in a blended model; (3)

train teachers in the pedagogical and ethical use of AI; (4) keep the teacher in the loop, so that AI recommendations support but do not replace pedagogical decisions; (5) adopt clear rules for data protection and for students' use of AI tools, including declaring the use of AI and checking AI-generated information against reliable sources; (6) regularly monitor the quality, fairness and transparency of algorithms.

Conclusion

In conclusion, the development of an individual education system using artificial intelligence is of great importance for increasing educational efficiency. AI technologies make it possible to personalize education taking into account the individual needs of students, facilitate the work of teachers and make the educational process more effective. The evidence from controlled studies is encouraging, but it also shows that the results depend on pedagogical design, the way learning is measured and the quality of implementation. At the same time, serious attention should be paid to information security, fairness and ethical issues. With a right and responsible approach, artificial intelligence can become an integral part of the future education system.

The analysis makes it possible to formulate several findings. First, AI-based systems can adapt content, pace and feedback to each student, and the research reports positive effects on learning outcomes (Kulik & Fletcher, 2016) and favorable student perceptions (Vieriu & Petrea, 2025). Second, AI is most useful for teachers when it takes over routine tasks, such as checking tests and collecting statistics, while pedagogical decisions remain with the teacher (Luckin & Cukurova, 2019). Third, these benefits are accompanied by risks: over-reliance on AI, weaker critical thinking, academic dishonesty, unequal access and threats to personal data. These risks can be reduced by clear rules, teacher training, transparent algorithms and a blended approach in which adaptive online work is combined with face-to-face learning.

This study is based on the analysis of the literature and policy documents and does not include an empirical experiment, so its conclusions are theoretical in nature. Further research could test AI-based individual learning in Uzbek universities, for example in foreign language teaching, and compare learning outcomes, student motivation and teachers' workload with traditional instruction. Special attention should also be given to the effect of generative AI tools on students' independent work and academic integrity.

References

1. Baker, R. S., & Inventado, P. S. (2014). Educational data mining and learning analytics. In J. A. Larusson & B. White (Eds.), Learning analytics: From research to practice (pp. 61–75). Springer.
2. Bloom, B. S. (1984). The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. Educational Researcher, 13(6), 4–16.
3. Farhood, H., Nyden, M., Beheshti, A., & Muller, S. (2025). Artificial intelligence-based personalised learning in education: A systematic literature review. Discover Artificial Intelligence, 5, Article 331.
4. Kulik, J. A., & Fletcher, J. D. (2016). Effectiveness of intelligent tutoring systems: A meta-analytic review. Review of Educational Research, 86(1), 42–78. https://doi.org/10.3102/0034654315581420
5. Luckin, R., & Cukurova, M. (2019). Designing educational technologies in the age of AI: A learning sciences-driven approach. British Journal of Educational Technology, 50(6), 2824–2838. https://doi.org/10.1111/bjet.12861

6. Miao, F., Holmes, W., Huang, R., & Zhang, H. (2021). AI and education: Guidance for policy-makers. UNESCO.
7. President of the Republic of Uzbekistan. (2021, February 17). On measures to create conditions for the accelerated introduction of artificial intelligence technologies (Resolution No. PQ-4996). https://lex.uz/uz/docs/5297046
8. President of the Republic of Uzbekistan. (2024, October 14). On approval of the strategy for the development of artificial intelligence technologies until 2030 (Resolution No. PQ-358). https://lex.uz/acts/-7158604
9. UNESCO. (2021). Recommendation on the ethics of artificial intelligence. https://unesdoc.unesco.org/ark:/48223/pf0000381137
10. VanLehn, K. (2011). The relative effectiveness of human tutoring, intelligent tutoring systems, and other tutoring systems. Educational Psychologist, 46(4), 197–221.
11. Vieriu, A. M., & Petrea, G. (2025). The impact of artificial intelligence (AI) on students' academic development. Education Sciences, 15(3), 343. https://doi.org/10.3390/educsci15030343