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MODERN TECHNOLOGIES IN EDUCATION

Abstract*: the article is devoted to the study of modern digital technologies that have a significant impact on the transformation of educational processes. The key areas of technology integration are considered: adaptive learning systems based on artificial intelligence, virtual and augmented reality (VR/AR) technologies, the use of big data and learning analytics, as well as the development of massive open online courses (MOOCs) and blended learning formats. Special attention is paid to the practical aspects of implementing these technologies in the higher education process and their impact on the development of students' digital competencies. An analysis of potential benefits is carried out, including increasing the level of personalization, interactivity and accessibility of education. In parallel, the main challenges are explored, such as the problem of the digital divide, cybersecurity and personal data protection, and the*

risk of digital fatigue. The methodological basis of the work was the analysis of current scientific publications, a review of existing technological solutions and platforms. The conclusion is made about the need for a balanced approach in which technological tools serve to expand the capabilities of traditional pedagogy, and not its complete replacement.

***Keywords**: digital technologies, artificial intelligence, virtual reality, blended learning, learning analytics, MOOC, digital transformation, higher education.*

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СОВРЕМЕННЫЕ ТЕХНОЛОГИИ В ОБРАЗОВАНИИ

***Аннотация**: статья посвящена вопросу изучения современных цифровых технологий, которые оказывают существенное влияние на трансформацию образовательных процессов. Рассматриваются ключевые направления технологической интеграции: адаптивные системы обучения на основе искусственного*

интеллекта, технологий виртуальной и дополненной реальности (VR/AR), использование больших данных и учебной аналитики, а также разработка массовых открытых онлайн-курсов (МООС) и форматов смешанного обучения. Особое внимание уделяется практическим аспектам внедрения этих технологий в процесс высшего образования и их влиянию на развитие цифровых компетенций студентов. Проводится анализ потенциальных преимуществ, включая повышение уровня персонализации, интерактивности и доступности образования. Параллельно исследуются основные вызовы, такие как проблема цифрового неравенства, кибербезопасность и защита персональных данных, а также риск цифровой усталости. Методологической основой работы стал анализ

***Ключевые слова**: цифровые технологии, искусственный интеллект, виртуальная реальность, смешанное обучение, аналитика обучения, МООС, цифровая трансформация, высшее образование.*

Introduction. The current stage of society's development, inextricably linked with the processes of global digitalization, imposes fundamentally new requirements on all social institutions, and the education system is no exception. The traditional lecture-seminar model, which has dominated for decades, demonstrates its limitations in the context of the need for graduates to develop soft skills, digital literacy, and the ability to continuously self-study. The answer to these challenges is the active integration of modern technologies, which transform not only the teacher's tools, but also the very philosophy of the educational process, shifting the focus from passive assimilation of information to active construction of knowledge and the development of practical skills. The purpose of this article is a comprehensive analysis of the most significant technological trends in education, assessment of their pedagogical potential for the higher school system and identification of key barriers to their successful adaptation. The relevance of the research is due to the rapid technological changes and the need to form scientifically based approaches to their implementation in the academic environment, which directly correlates with the future professional success of graduates of technical and classical universities, including MIREA.

1. Artificial intelligence technologies and adaptive learning. One of the most promising areas is the use of artificial intelligence (AI) technologies to create personalized educational environments. Adaptive training systems based on machine learning algorithms are able to analyze the student's digital footprints: the time spent on studying the material, the sequence of actions, the results of intermediate testing, and the nature of the mistakes made [1, p. 58]. Based on this analytics, the system dynamically adjusts the educational trajectory, offering an individual set of content, tasks of various levels of complexity and additional explanatory materials. For example, if a student has difficulty understanding a certain topic in calculus, the AI platform can automatically offer them an interactive visualization of the concept, additional exercises with step-by-step prompts, or a link to an alternative video lecture. Thus, the principle of «mastery learning» is implemented, where the goal is the complete assimilation of the material at an individual pace, and not the average progress in the program of the entire study group.

2. Immersive Technologies: VR and AR in Education. Virtual (VR) and augmented (AR) reality open up access to fundamentally new forms of educational activities, overcoming physical and time limitations. VR creates fully synthesized digital worlds, enabling safe and cost-effective training in situations that would actually involve high risks or costs. For students of technical specialties, these can be virtual laboratories for microelectronics, where you can assemble and test complex circuits without the risk of damaging expensive equipment, or simulators for practicing the skills of controlling industrial robotic systems. Augmented reality, by superimposing digital layers on the physical world, «animates» textbooks. In medical education, an AR application can project a three-dimensional model of human anatomy onto a training mannequin, and in engineering graphics, it can show the internal structure of a mechanism directly on its drawing. These technologies significantly increase visibility, engagement and contribute to the development of spatial thinking.

Table 1

Comparison of the Possibilities of Traditional and Technologically Enriched Education

Aspect	Traditional approach	Approach with the integration of modern technologies
Content Format	Static (textbook, lecture)	Dynamic, multimedia (video, simulations, interactives)
Learning Pace	Single for the group	Customized, adaptive
Feedback	Delayed, from the teacher	Immediate, automated, and instructor-driven
Practical training	Limited by laboratory stock, risks	Extended with simulators and virtual environments
Accessibility	Tied to place and time	Partially provided by remote access to resources

3. Educational analytics and big data. Effective implementation of digital tools generates huge amounts of data – Big Data. Learning Analytics is the process of collecting, measuring, analyzing, and visualizing this data in order to optimize learning and the environment in which it takes place [2]. For the teacher, dashboards can show which topics caused the greatest difficulties for the entire group, which resources remained unclaimed, and which students are at risk of academic failure. This allows you to move from a reactive to a proactive format of work, providing targeted support in a timely manner. At the institutional level, the analysis of aggregated data helps to assess the effectiveness of training programs, adjust the workload and make management decisions based on objective indicators.

4. Massive Open Online Courses (MOOCs) and blended learning. MOOC platforms such as Coursera, edX, Open Education have become a catalyst for the democratization of access to knowledge from the world's leading universities. They allow students to supplement the core curriculum with courses in related or promising areas (e.g., Data Science, Cybersecurity, UX/UI Design), forming a unique educational profile. The most effective model for integrating MOOCs into formal education is blended learning, which combines online and offline activities. Students can independently study theoretical material in an asynchronous mode through an online course, and devote classroom time with a teacher to in-depth discussions, case solving, project work and practical application of knowledge. This inverts the traditional model («flipped classroom»), making learning more active and student-centered.

Conclusion. The analysis allows us to assert that modern technologies act as a powerful catalyst for the transition to a more flexible, personalized and practice-oriented model of education. They have significant potential to increase student motivation, develop critical thinking, and build competencies that are in demand in the digital labor market. However, technological transformation is not a panacea and is associated with significant risks: the deepening of the digital divide, the problems of personal data protection, the need for large-scale retraining of teaching staff and the danger of digital overload. Thus, the future of effective education lies not in the blind replacement of traditional methods with digital tools, but in their reasonable and pedagogically justified integration. The key task for universities, including IREA, is to create a hybrid educational ecosystem where technology expands the capabilities of teachers and students, and the humanitarian component and direct interpersonal interaction retain their enduring value in the process of forming a holistic, creative and socially responsible personality.

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