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DIGITAL LEARNING TECHNOLOGIES IN MODERN EDUCATION

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Abstract
This article analyzes modern pedagogical and information technologies used in the education system in the 21st century. The advantages and problems of such areas as digital transformation, distance learning, artificial intelligence, digital didactics, the STEAM approach, adaptive learning systems, and learning in a virtual environment are highlighted. Scientific opinions are also expressed on the prospects for the development of digital educational platforms in the context of the education system of Uzbekistan.

Keywords: Modern education, digital pedagogy, artificial intelligence, distance learning, digital technologies, STEAM, metaverse, teaching methodology.

Introduction

ZAMONAVIY TA’LIMDA RAQAMLI TA’LIM TEXNOLOGIYALARI

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Annotatsiya
Ushbu maqolada XXI asrda ta’lim tizimida qo‘llanilayotgan zamonaviy pedagogik va axborot texnologiyalari tahlil qilinadi. Raqamli transformatsiya, masofaviy ta’lim, sun’iy intellekt, raqamli didaktika, STEAM yondashuvi, adaptiv o‘qitish tizimlari va virtual muhitida o‘qitish kabi yo‘nalishlarning afzalliklari va muammolari yoritiladi. Shuningdek, O‘zbekiston ta’lim tizimi

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kontekstida raqamli ta’lim platformalari rivojlanish istiqbollari haqida ilmiy mulohazalar bildirilgan.

Kalit so‘zlar: zamonaviy ta’lim, raqamli pedagogika, sun’iy intellekt, masofaviy ta’lim, raqamli texnologiyalar, STEAM, metaverse, o‘qitish metodikasi.

Аннатация

В данной статье анализируются современные педагогические и информационные технологии, используемые в системе образования в XXI веке. Выделены преимущества и проблемы таких областей, как цифровая трансформация, дистанционное обучение, искусственный интеллект, цифровая дидактика, подход STEAM, адаптивные системы обучения и обучение в виртуальной среде. Также высказаны научные мнения о перспективах развития цифровых образовательных платформ в контексте системы образования Узбекистана.

Ключевые слова: современное образование, цифровая педагогика, искусственный интеллект, дистанционное обучение, цифровые технологии, STEAM, метавселенная, методика преподавания.

The twenty-first century represents one of the most dynamic stages in the evolution of human civilization. The rapid advancement of information technologies, the widespread expansion of the Internet, and the growing influence of artificial intelligence and automated systems have triggered fundamental transformations within the educational sphere. Today, the learning process is no longer confined to the physical boundaries of the classroom but is increasingly mediated through digital platforms, virtual laboratories, and interactive multimedia environments.

The integration of digital technologies into education not only enhances the efficiency of teaching but also cultivates learners’ abilities for independent thinking, creative problem-solving, and analytical decision-making. Consequently, the comprehensive study of digital learning technologies holds both scientific and practical significance within the context of modern education.

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The contemporary educational paradigm is grounded not in the mere transmission of knowledge, but in the formation of competencies. International organizations such as UNESCO, the OECD, and the United Nations explicitly define education as a critical component of global digital transformation.

At present, pedagogical communities and researchers widely employ approaches such as constructivism, competency-based learning, digital didactics, and the flipped classroom model.

In the twenty-first century, the education system has entered a phase of conceptual reconfiguration driven by the necessity to adapt to rapidly evolving social, economic, and technological conditions. Unlike traditional instructional models, these emerging educational paradigms place the learner at the center of the pedagogical process and embody the principles of competency-based education, digital didactics, constructivist methodology, and innovative pedagogy.

Toward the end of the twentieth century and the beginning of the twenty-first, the global shift from the paradigm of "knowledge delivery" to that of "knowledge construction" gained momentum. This transformation reconceptualized the learner as an active participant, researcher, and autonomous problem-solver.

The new paradigm is characterized by the following key dimensions:

• Learner-centered education — the design of individual learning trajectories aligned with students' needs, interests, and preparedness.

• Constructivist theory — knowledge is not transmitted in a ready-made form, but actively constructed by the learner based on personal experience (J. Piaget, L. Vygotsky).

• Digital pedagogy — the enhancement of instructional effectiveness through the integration of digital technologies.

• Lifelong learning — an educational philosophy premised on continuous knowledge acquisition throughout an individual's professional and social life.

In recent years, Uzbekistan's education system has likewise undergone a series of reforms grounded in modern educational concepts. The "Digital Uzbekistan – 2030" strategy, the revised "Law on Education," and the "Concept for the Development of a Continuous Education System" collectively ensure the

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transition of the national education model toward a digital and competency-oriented framework.

The introduction of new academic disciplines such as "Digital Pedagogy," "Educational Technologies," and "Innovative Teaching Methods" within pedagogical universities serves as a practical manifestation of these contemporary concepts in the training of future educators.

Since 2019, within the framework of the "Digital Uzbekistan — 2030" strategy, extensive reforms have been implemented to integrate digital technologies into the field of education. In particular, platforms such as Maktab.uz, EduMarket, and Kundalik are actively in operation. Learning management systems such as Moodle and Platonus have been introduced across higher education institutions. Additionally, e-textbooks, interactive assessments, and video lectures are being widely utilized in the teaching and learning process.

Digital pedagogy represents an instructional paradigm grounded in the systematic use of digital technologies, artificial intelligence, and interactive environments within the learning process. This model is distinguished by its adaptability and learner-centered nature, high interactivity and real-time feedback, unrestricted access to educational resources, and the ability to automatically analyze learning activities.

For instance, platforms such as Google Classroom, Moodle, Edmodo, and Khan Academy significantly facilitate lesson planning, assessment, and data-driven instructional analysis for educators.

During the global pandemic, educational systems worldwide were compelled to transition to remote learning. Within this context, the hybrid learning model — integrating traditional face-to-face instruction with online modalities — emerged as an effective solution.

Remote learning platforms include Zoom, Microsoft Teams, and Google Meet (synchronous communication tools), as well as Coursera, Udemy, edX, Telegram channels, YouTube, and podcasts as informal learning resources.

Artificial intelligence (AI) significantly facilitates the work of educators by enabling the development of highly personalized learning trajectories for students. AI-driven adaptive learning systems — such as Smart Sparrow, Knewton, and

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Duolingo — automatically assess a learner's knowledge level and provide customized learning tasks accordingly. This not only enhances educational efficiency but also optimizes the use of time and resources.

One of the most strategic directions of 21st-century education is the implementation of the STEAM model (Science, Technology, Engineering, Arts, Mathematics). This approach fosters scientific reasoning, creativity, and decision-making skills in problem-based situations.

In Uzbekistan, the number of STEAM-oriented schools, robotics laboratories, and startup incubation programs is steadily increasing within the national education system.

The concept of the metaverse refers to an immersive learning environment based on virtual and augmented reality (VR/AR), enabling learners to engage in virtual historical excursions, conduct chemical experiments in safe simulated settings, or practice medical procedures through lifelike simulations.

Competency-based education lies at the core of contemporary educational policy. Unlike traditional models that prioritize knowledge acquisition alone, this approach emphasizes the development of learners' ability to effectively apply knowledge in real-world contexts. According to modern global competency frameworks developed by UNESCO and the OECD, the essential competencies of 21st-century learners include:

- Critical and systemic thinking
- Information literacy and data-handling culture
- Digital literacy
- Collaboration and communication skills
- Creativity and innovative problem-solving

The cultivation of these competencies necessitates the revision of curricular design, the modernization of assessment systems, and the redefinition of the teacher's role — transitioning from a "source of knowledge" to a designer, facilitator, and manager of the learning process.

Digital didactics is a conceptual framework that encompasses the design, management, and analytical evaluation of the learning process through digital

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tools. It is grounded in the TPACK model (Technological Pedagogical Content Knowledge), which requires educators to integrate:

• expertise in subject-matter content
• mastery of pedagogical strategies
• proficiency in the effective application of technological tools

This approach enables the learning process to become individualized, flexible, and outcome-oriented.

The constructivist theory serves as the methodological foundation of modern education. According to this approach, learners do not receive knowledge in a ready-made form; rather, they construct understanding independently through active cognitive engagement. The role of the teacher, therefore, is to design, facilitate, and guide this process. As a result, instructional models such as problem-based learning, project-based learning, and research-oriented education are fundamentally rooted in constructivist principles.

Innovative pedagogy encompasses the integration of digital ecosystems, social networks, the metaverse, and artificial intelligence into the learning process. In contemporary global practice, the hybrid learning model — which merges traditional classroom instruction with online education — is widely recognized as an effective pedagogical strategy. This model enables real-time monitoring of learner activity, collaborative interaction at a distance, and the construction of personalized learning trajectories.

However, several key barriers continue to hinder the widespread application of educational technologies. These include the unequal development of internet infrastructure, insufficient digital competencies among teachers, low digital culture among learners, and the limited localization of educational software.

In conclusion, the formation of modern educational concepts is the outcome of global technological transformation, evolving societal demands, and the strategic imperative to enhance human capital. These paradigms redefine the learning process, position the learner as an active subject, and facilitate the development of competencies aligned with the requirements of the digital era.

Contemporary educational technologies play a pivotal role in human capital development and the preparation of highly qualified specialists for the digital

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economy. The educator of the 21st century must therefore be a digitally competent, innovation-oriented professional who places the learner at the center of the pedagogical process and effectively leverages technological tools to achieve high-impact educational outcomes.

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