Development prospects in the context of dynamic technological change

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Annotation. Digital technologies are rapidly transforming all spheres of society. The foundation of these transformations is stimulating the growth of innovation. The development of information technologies allows for significant improvements in the effectiveness of education, so it makes sense to actively implement them.

Keywords – digital technologies, transformations, incentives.

Анотація. Цифрові технології стрімко трансформують усі сфери суспільства. Основою цих трансформацій є стимулювання зростання інновацій. Розвиток інформаційних технологій дозволяє суттєво покращити ефективність освіти, тому є сенс активно їх впроваджувати.

Ключові слова – цифрові технології, трансформації, стимулювання.

Problem statement. Digital technologies are rapidly transforming all areas of society—from education, healthcare, manufacturing, communications, tourism, and trade. These transformations are underpinned by the stimulation and resulting growth of innovation, which improves access and the efficient use of resources. However, uneven in access to digital infrastructure and skills in its use are observed, which underpins existing socioeconomic inequalities and widens the gap between those with digital rights and opportunities and those without. As Blomberg et al. note, the 2021 COVID-19 pandemic has further highlighted the need to overcome the digital divide, as distance learning, telemedicine, and remote work have become integral to society. Furthermore, in times of military conflict, there is a growing need to use innovative technologies related to the security and high-quality educational services, addressing many issues connected to healthcare, and addressing life support challenges. Therefore, there is a need to develop appropriate innovative strategies that will make it possible to use the existing dynamic potential of digital technologies to optimally ensure development in the strategic period on a global scale.

Formulation of the objectives of the theses. A description of the transformation of information technology generations and their relationship with educational processes, and an analysis of current educational technologies.

Presentation of the main research material. With the increasingly rapid development of digital technologies, especially over the past 20 years, many scholars believe that understanding the multiple aspects of digitalization's impact on socioeconomic development is even more important. According to Md. Mominur Rahman and Md. Emran Hossain [4], there is a direct link between digital aspects such as the availability of digital infrastructure, stakeholder attitudes toward educational technologies, level of digital technologies knowledge, and the potential for e-learning integration and socioeconomic mobility. Furthermore, the study examines the indirect impact of these digital factors on socioeconomic development through the digital integration of communities and socioeconomic mobility. The results of Md. Mominur Rahman and Md. Emran Hossain's research indicate a high level of correlation between various digital aspects and the level of digital integration of societies, as well as the level of socioeconomic mobility [4].

Thus, the evolution of information technology has had a significant impact on educational processes, constantly improving teaching methods, the structure of the educational environment, teaching methods and techniques, and educational outcomes. Let's consider the transformation of information technology generations. The first stage of development is characterized by the introduction of computers into educational processes, when only the automation of administrative tasks and the processing of large data sets was implemented [1]. The second stage is associated with the advent of personal computers and the internet, which changed the methods of accessing information, the speed of its transmission, and the dissemination of information in the educational sphere. The subsequent advent of email and web browsers enabled collaborative research, the rapid dissemination of information, providing all participants in the educational process with access to digital resources and the opportunity to participate in online learning [1]. The third stage is registered by the appearance of multimedia and digital educational technologies, which have significantly expanded the scope and potential of teaching methods, techniques, and forms. Interactive multimedia resources, e-books, and learning management systems (LMS) have provided new

opportunities to increase student engagement, enhance learning effectiveness, and assess learning outcomes, while fostering engaging, dynamic, and interactive learning environments. The fourth phase of educational information technology (EIT) development is characterized by the growth of mobile devices, cloud computing, and digital analytics, which provide access to educational resources and personalized learning anytime, anywhere. This allows for increased flexibility in the learning process, reaching a significantly wider audience, and ensuring continuous learning [1]. The fifth phase of educational technology transformation continues to unfold and is based on the application of artificial intelligence, virtual reality, and augmented reality [1].

One of the potential development opportunities is the emergence of new educational technologies (Edu-Tech), which have revolutionized education through the use of innovative solutions to improve teaching and learning [2]. Edu-Tech encompasses various digital tools, platforms, and resources designed to facilitate communication between teachers and students, provide information support to teachers, and engage and increase student activity through increased personalization of learning. There is a gradual shift from online learning platforms and virtual classrooms to interactive educational applications and digital textbooks. Edu-Tech has significant potential to increase access to quality education, bridge educational gaps, meet the ever-changing needs of the labor market, and create opportunities for lifelong learning for students of all ages and educational levels. One cannot but agree with Md. Mominur Rahman and Md. Emran Hossain [4] that digital literacy is becoming increasingly important in the modern world, and efforts to integrate Edu-Tech into the educational environment are essential for successfully preparing students for the digital age.

AI-powered tools and intelligent learning systems also play a key role in education, significantly improving the personalization of learning, automating most administrative tasks, and enabling real-time interaction with students. Robotics, based on laboratory experiments, modeling, and hands-on demonstrations, plays a special role [3].

The use of business analytics technologies allows institutions to analyze large volumes of data to identify current and future trends, which forms the basis for informed decision-making.

Blockchain technologies ensure the security, integrity, and transparency of information, educational documents, and certificates. They enable the creation of tamper-proof digital transcripts and certificates, facilitating the verification and recognition of educational documents across institutions and countries [1-3].

Cloud computing technologies provide real-time, continuous access to educational resources, collaboration tools, and learning management systems. Cloud technologies also enable the creation of a scalable infrastructure for hosting online courses, digital libraries, and research databases, increasing the accessibility and reliability of educational services.

Mobile and digital marketing technologies enlargement student inclusion and the effectiveness of communications and promotion of educational services. 3D printing technology facilitates hands-on learning in engineering, architecture, design, healthcare, and other fields of study.

Digital storage technologies provide secure and scalable storage of data, multimedia resources, and many other important data. They also enable efficient searching, sorting, sharing, and storage of data [1-3].

Virtual and enhance reality technologies expand the possibilities of immersive learning, simulations, and virtual tours. They allow students to visualize various things, explore complex concepts, interact with digital artifacts, and engage in experiential learning, improving understanding and retention of course material.

Conclusions. Thus, each stage of information technology development leads to significant changes in education, gradually expanding accessibility and improving the means, forms, and methods of teaching, thereby increasing its effectiveness, personalization, and improving learning outcomes. As information technology advances, the educational environment must improve, innovate, adapt to new trends, actively and systematically participate in this process.

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