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TYPES AND RAPID DEVELOPMENT OF DIGITAL TECHNOLOGIES IN MODERN EDUCATION

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ABSTRACT

Abstract: This article analyzes the types of digital technologies, their distinctions and interrelations, and their impact on the educational process. The role of information and communication technologies (ICT), artificial intelligence, cloud technologies and open educational resources (OER) in individualizing learning, enhancing flexibility and improving educational quality is examined on the basis of scientific literature. The necessity for the modern younger generation to possess digital competencies, and for the education system to adapt to this demand, is substantiated.

Keywords: information and communication technologies, internet, multimedia tools, artificial intelligence, cloud technologies, open educational resources (OER), digital competencies, blended learning, education system.

INTRODUCTION

The rapid development of digital technologies in modern society has created an urgent need for a fundamental renewal of the education system. Today, digitalization in education is no longer a matter of choice; it has become an objective necessity driven by socio-economic development, labor market demands and global competition.

The development of digital technologies has passed through several stages: from the widespread adoption of information and communication technologies to the current era of artificial intelligence, big data and cloud computing. This process has transformed the education system in terms of both content and form.

At the same time, the younger generation living in a digital society is increasingly required to possess not only traditional knowledge but also digital competencies — the ability to search for, analyze, critically evaluate and effectively use digital tools has become an inseparable characteristic of the modern individual.

The purpose of this article is to analyze the main types of digital technologies and to substantiate, on the basis of scientific literature, the impact they are having on the educational process.

LITERATURE REVIEW AND METHODOLOGY

Research on digital technologies and education constitutes a broad international scientific base. Manuel Castells links the development of ICT to the formation of an 'information society' and

emphasizes that knowledge and education have become its primary resources [1]. This reality has required the education system to adapt to new communicative forms.

Diana Laurillard describes the digital learning environment as a complex pedagogical system that ensures interactive communication between learners and educational content [2]. George Siemens emphasizes that big data and artificial intelligence are expanding opportunities for personalizing and adapting knowledge in education [3].

OECD research underlines that effective use of digital technologies improves learners' knowledge acquisition levels and ensures transparency of educational outcomes [4]. Tony Bates evaluates blended learning as the most effective educational model in the digital age, demonstrating that it simultaneously improves teaching quality and maintains pedagogical oversight [5].

The UNESCO Digital Competency Framework stresses that educational institutions must prepare learners for active and responsible participation in digital environments [6]. Michael J. Spector demonstrates that in the global educational space, digital technologies are narrowing boundaries between education systems and ensuring the openness and free exchange of knowledge [7].

The research methodology includes: systematic analysis and synthesis of existing international scientific literature; comparative analysis of digital technology types; observation and systematization of methodological changes in the education system.

RESULTS

The research results show that modern digital technologies influence the education system in three main directions: (1) enriching educational content; (2) expanding educational forms; (3) updating teaching methods.

Main Types of Digital Technologies

Information and communication technologies (ICT) — including the internet, e-mail and multimedia tools — have accelerated the exchange of information in the educational process and given rise to distance learning and virtual communication formats [1]. Electronic textbooks and open educational resources (OER), unlike traditional textbooks, are rapidly updated, incorporate interactive elements and broaden learners' opportunities for independent study [9].

Artificial intelligence and big data technologies make it possible to conduct in-depth analysis of the educational process, identify individual learning trajectories and forecast educational outcomes [3]. Cloud technologies, in turn, provide continuous and open access to educational resources, ensuring the uninterrupted nature of learning.

Table 1

Types of Digital Technologies and Their Functions in Education

Technology	Key Capability	Application in Education

Type		
ICT (Internet, e-mail, multimedia)	Fast information exchange and communication	Distance learning, virtual classrooms, video lessons
Cloud Technologies	Continuous and open access	Learning platforms, resource sharing
Artificial Intelligence & Big Data	Personalized analysis	Forecasting and adapting the learning process
Open Educational Resources (OER)	Free and global access	Online courses, e-textbooks
Blended Learning	Integration of traditional + digital	Classroom + online sessions

Impact on Educational Content

Digital technologies have broadened the ways in which educational content is presented, enabling learning materials to be transferred into digital formats. Alongside textual materials, graphic, audio, video and interactive elements have become integral components of educational content. International research emphasizes that the digitalization of educational content raises learners' comprehension and retention levels [8].

Digital platforms enable the rapid updating of curricula, the introduction of new topics and the implementation of cross-disciplinary integration. Spector notes that the flexibility of educational content is one of the primary advantages of digital learning [10]. For this reason, educational content is now regarded not as a static system, but as a dynamic one.

Impact on Teaching Methods and Forms

The introduction of digital technologies has led to the renewal of teaching methods and forms. Distance learning provides learners with the opportunity to acquire knowledge unconstrained by place or time, while blended learning combines traditional classroom sessions with online learning [5].

Interactive platforms, simulations and virtual environments encourage learners to think actively, analyze problems and find independent solutions. Diana Laurillard emphasizes that interactive teaching yields high educational outcomes only when it is effectively organized within a digital environment [12]. Digital collaboration tools and cloud technologies facilitate learners' work on both collaborative and individual projects [13].

DISCUSSION

Analysis of the research results shows that each type of digital technology fulfills a specific function within the educational process and complements the others. While ICT provides the communicative foundation of education, cloud technologies expand its flexibility, and artificial intelligence broadens the scope of individualization.

However, the integration of technologies into the educational process is also associated with a number of challenges. First, the digital divide — unequal access to technologies among learners — poses a threat to equity in education. Second, if teachers' digital competencies are insufficient, technological capabilities cannot be fully utilized.

From the perspective of integration into the global educational space, digital technologies are narrowing boundaries between education systems and ensuring the free exchange of knowledge [7]. International rankings, open online courses and academic mobility programs require the education system to adapt to the digital environment. UNESCO has emphasized within its framework that educational institutions must prepare learners for active participation in digital environments [6].

According to Siemens, independent and project-based learning activity in the digital environment reinforces knowledge acquisition through networks and develops modern competencies [13]. It is also scientifically substantiated that technologies cannot deliver the expected results unless methodological approaches are simultaneously updated.

CONCLUSION

The necessity for digital technologies to enter the education system is determined by the need to improve educational quality and effectiveness, ensure the flexibility and continuity of learning, develop learners' digital competencies and integrate into the global educational space. For this reason, digitalization is not a choice for the modern education system, but an essential condition for sustainable development.

The research confirms that ICT, artificial intelligence, cloud technologies and open educational resources, working together, play an important role in individualizing education, creating adaptive learning environments and improving educational outcomes.

The following are recommended: continuously enhancing teachers' digital competencies; equipping educational institutions with modern technical infrastructure; supporting the widespread use of open educational resources; and consistently implementing measures to reduce the digital divide.

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