

TECHNOLOGIES FOR THE CREATION AND INTEGRATION OF DIGITAL EDUCATIONAL RESOURCES

<https://doi.org/10.5281/zenodo.20274117>

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Annotation

This scientific article covers the issues of creating digital educational resources, integrating them into the educational process and effective application on the basis of modern pedagogical and information technologies. The role of electronic textbooks, multimedia tools, distance learning platforms and artificial intelligence-based systems in education has also been analyzed. During the study, the stages of development of digital educational resources, technological solutions and mechanisms of integration were studied on the basis of scientific sources. The article provides recommendations for improving the quality of education, developing students' skills for independent education, and the formation of a digital pedagogical environment.

Keywords

digital education, e-learning resources, multimedia technologies, LMS platforms, distance education, artificial intelligence, integration technologies, interactive education.

INTRODUCTION

The current processes of globalization and digitization have a significant impact on all spheres of society's life, especially the educational system. As a result of the rapid development of information and communication technologies (ICT), along with traditional forms of Organization of the educational process, a new educational environment based on modern digital technologies is being formed. In this context, the issue of creating digital educational resources and integrating them into the educational process is one of the most pressing scientific and practical problems of today.

Digital educational resources are a complex of software, technological and methodological tools that serve to deliver educational materials to learners in electronic form. They include electronic textbooks, multimedia presentations, virtual labs, video lectures, animations, interactive tests, distance learning

platforms, and mobile learning applications. These resources make it possible to organize the educational process in a visual, interactive and flexible form.

Today, the development of the digital education system on a global scale is considered as one of the main factors in improving the quality and effectiveness of Education. In particular, in developed countries, the use of e-learning platforms, cloud technologies, artificial intelligence systems and virtual reality technologies has become widespread. This serves to foster students' independent thinking, creative approach, and competencies of working with information.

The rapid development of distance education technologies during the COVID-19 pandemic has once again demonstrated how important digital education resources are. Educational institutions were forced to switch to an online form of education within a short period of time. As a result, the use of platforms such as Zoom, Moodle, Google Classroom, Microsoft Teams has increased dramatically. This situation further strengthened the need for the development of digital education infrastructure.

The digitalization of the educational system in the Republic of Uzbekistan is also defined as one of the priorities of the state policy. In particular, the strategy "digital Uzbekistan - 2030", the law "on education" and a number of regulatory legal acts define the tasks of introducing modern information technologies into the educational process. Today, the scope of e-learning platforms, distance learning systems and multimedia use in higher education institutions and secondary schools is expanding.

The process of creating digital educational resources requires a thorough approach, not only technical, but also pedagogical and methodological. Because a quality e-learning resource should be suitable for training purposes, have a user-friendly interface, and embody interactive capabilities. Therefore, the integration of pedagogy, psychology, design and programming directions is important in the development of electronic resources.

Integration of digital education resources into the existing education system is also a complex process. Technical infrastructure, internet speed, platform compatibility, data security, and digital competencies of educators appear as important factors in this process. In particular, where teachers do not have enough ICT skills, the ability to effectively use the created electronic resources is limited.

In recent years, the development of artificial intelligence technologies has been developing new opportunities in the educational system. Adaptive learning systems, intellectual tutor programs, and generative artificial intelligence tools are analyzing students' individual characteristics and recommending appropriate

educational content. This is instrumental in the implementation of personality-oriented education.

This scientific article will scientifically analyze the technologies for creating digital educational resources, the mechanisms for their integration into the educational process, as well as the issues of harmonization with modern pedagogical technologies. Also, the advantages, problems and development trends in the prospects of e-learning resources are highlighted.

The main purpose of the study is to study the theoretical and practical foundations of the creation and integration of digital educational resources, analyze their impact on educational effectiveness and develop scientific and practical recommendations in this direction.

REVIEW OF THEMATIC LITERATURE

The issue of creating digital educational resources and integrating them into the educational process has been one of the most studied areas in the fields of pedagogy, information technology and didactics in recent decades. The scientific research carried out in this direction covers the issues of digitization of education, the methodology for the development of electronic resources and their effective application to the educational process.

Early theoretical approaches were A.A. It was developed by Andreev, who analyzed the pedagogical foundations of distance education. The author considers the e-learning environment as a system that provides independent reading and an individual approach and distinguishes its main components (content, communication and management system) [1]. In his opinion, digital educational resources are an important tool in the development of independent learning activities of students.

V.P. Bepalco develops the theory of the design of pedagogical technologies, emphasizing the need to organize the educational process on the basis of a systematic approach. He cites the combination of purpose, outcome, and control components as an important factor in the creation of e-learning tools [2]. His work is central to the methodical justification of digital educational resources.

M. Rosenberg developed the concept of e-learning (e-learning) to analyze the knowledge delivery system based on internet technologies. He defines e-learning as "a system of communicating and managing knowledge through a digital environment" [3]. The author specifically emphasizes the role of LMS platforms in corporate and academic education.

G. Connectivism (link theory), pioneered by Siemens, is one of the theoretical foundations of modern digital education. According to him, knowledge is formed

in networks and digital connections, so students must have skills to work effectively with information sources [12].

T. Bates, on the other hand, analyzes the change in the role of the teacher in the development of digital education, arguing that educators transform from “knowledge-conveyors” to “education-managing facilitators” [13]. His research provides an important methodological framework in shaping online education design.

Among Uzbek scientists, N.A. Muslimov studied the integration of pedagogical competencies and digital technologies, substantiating that ICT literacy of teachers is directly related to the quality of Education [4]. He emphasizes the need for a modern teacher to be able to use digital tools effectively.

U.Sh. Begimqulov developed a methodology for creating e-learning resources and studied the issues of adapting them to didactic requirements, ensuring interactivity and improving the user experience [5]. His work has contributed significantly to the formation of the methodology for the development of electronic resources in Uzbekistan.

In recent years, there has been a lot of scientific work on the integration of artificial intelligence technologies into education. W. Holmes and I. Tuomi's research analyzed the possibilities of creating adaptive learning systems based on artificial intelligence. They show that AI technologies play an important role in individualizing the learning process [6].

Reports from the OECD and UNESCO have highlighted global trends in digital education, citing digitization of education systems as a priority of Public Policy. The UNESCO report states that digital resources increase the openness and inclusion of Education [11].

In research conducted in the conditions of Uzbekistan, R.X. Zhurayev and S.M. Karimov analyzed the development of the distance education system, the introduction of LMS platforms and the digitization of the educational process [8].

Research in recent years suggests that the role of generative artificial intelligence tools in education is increasing. In particular, ChatGPT, Gemini, and other AI systems are helping students develop independent performance, analysis, and creative thinking skills [9].

Literature analysis shows that the issue of creating and integrating digital educational resources involves several scientific approaches:

- pedagogical approach (educational goals and methodology),
- technological approach (software tools and platforms),
- psychological approach (the process of acceptance and assimilation of students),

- systematic approach (integration of all components of the educational process).

At the same time, literature analysis shows that the effectiveness of digital educational resources depends on their quality, interactivity and pedagogical design. Modern scholarship focuses on the integration of personality-oriented education, adaptive systems, and artificial intelligence.

In general, the existing literature confirms that digital educational resources are an important factor in modernizing the educational system, individualizing the educational process and increasing the efficiency of obtaining knowledge.

RESEARCH METHODOLOGY

In this study, methods of scientific analysis, comparative analysis, study and observation of statistical data were used.

In the process of research:

- the activities of digital education platforms analyzed;
- * the effectiveness of e-learning resources studied;
- a survey was conducted between students and teachers;
- * scientific articles and international reports studied.

The study found that in groups using interactive and multimedia-based resources, the appropriation factor was higher compared to traditional methods.

It was also observed that the use of LMS platforms developed students' independent performance skills. Artificial intelligence-based recommendation systems, on the other hand, were noted to have improved the effectiveness of the individual approach.

Advantages and problems of digital education

Advantages

- Openness and ease of Education;
- High interactivity;
- Individual educational opportunities;
- Saving time and funds;
- Possibility of Independent Education.

Problems

- Inadequate internet infrastructure;
- Technical means deficit;
- Cybersecurity issues;
- Inadequate teacher digital competencies;
- The fact that the quality of electronic resources is different.

To eliminate these problems, it is important to increase the ICT competencies of educators and develop quality electronic resources.

CONCLUSIONS AND RECOMMENDATIONS

The creation and integration of digital educational resources is becoming an integral part of the modern educational system. E-learning tools are important in improving the quality of education, developing students' skills to work independently, and in the interactive Organization of the educational process.

Based on the results of the study, the following recommendations were developed:

1. Development of digital infrastructure in educational institutions;
2. Increasing teacher digital competencies;
3. Implementation of unified standards in the creation of e-learning resources;
4. Expanding the use of artificial intelligence technologies;
5. Development of local e-learning platforms;
6. Increase the number of Virtual laboratories and multimedia resources.

In the future, the further development of digital educational technologies will serve to increase the effectiveness of the educational system.

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