



**THE NECESSITY OF USING DIGITAL TECHNOLOGIES IN THE EDUCATIONAL PROCESS OF ENGINEERING DEPARTMENTS**

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**ABSTRACT**

This article discusses the problems of digitalization of engineering education in higher technical educational institutions. The problems of the educational process of engineering disciplines in accordance with the requirements of the era in the conditions of digital technologies are considered.

In addition, the possibility of such an educational structure in the process of preparing future engineers for professional activity in the direction of technological processes and machines is considered, which will help to effectively use the interdisciplinary interaction of the curriculum, to find optimal connections between its specific professionally oriented and information components.

**KEYWORDS**

Higher technical educational institutions, future engineers, professional activity, digital technologies, digitalization, information society, etc.

**Introduction**

In the current information society, serious problems arise in how to use digital technologies for the benefit of humanity. Digital technologies and their further development are not another wave of scientific and technological reforms, but digitalization leads to general changes in the information society. In addition, the development of information technologies and the rapid introduction of market relations into the higher education system are developing the digitalization of the educational environment.

As the most important global trend of replacing analog technologies with digital ones, the digitalization of education has a significant impact on modern education. Digital education is characterized as future education based on other methods of processing, transmitting, and storing information, which determines modern methods of thinking, behavior, and perception. Digitalization of education is based on the use of neural network technologies, cloud, cognitive technologies, and artificial intelligence technologies, which closely contribute to the automation of a large number of functions and the creation of a special educational environment for full learning [1,14].

**Literature review**

Some aspects of the development of the higher education system have also been studied in the studies of our country's scientists, and in the scientific studies conducted by Academician S.S. Gulyomov, special attention is paid mainly to the establishment of effective management of the higher education system and the digitalization of this area in accordance with international standards. In the studies

conducted by T.Z. Teshaboyev, the feasibility of establishing innovative activities in the higher education system and their management based on digital technologies was emphasized.

## **Research Methodology**

The main objectives of this research work are: - analysis of theoretical and empirical studies of the practice of digitalization of the educational process in technical higher educational institutions; - conducting a survey on the attitudes of future engineers to the digitalization of the educational process; - helps to draw appropriate conclusions on the problems of training future engineers on the issues of the potential level and prospects of digitalization of education, which are of practical importance for the chosen profession [2,11].

## **Analysis and results**

To study the attitude of future engineers of a technical higher educational institution to the digitalization of education, the following methods were used:

- theoretical methods aimed at collecting information about the process of digitalization of education, identifying the main specific features of digitalization, affect the object of this study.

For this purpose, methods of analysis, systematization, generalization and comparison are used;

- at the present stage, empirical methods are used to study and describe the practice of digitalization of education in technical higher educational institutions.

Using empirical methods, the attitude of future engineers to studying in the current e-learning environment and the spread of electronic services were studied; social methods are used to collect and process information on the attitude of future engineers to learning in digital reality. The study is conducted through a questionnaire using a standard Google form. The questionnaire consists of 10 closed-ended questions, 3 of which are used to describe the sample of respondents, and seven are used to determine the attitude to the digitalization of education.

A systematic analysis of the introduction of digital technologies into the educational process shows that the process of digitalization of education is as follows: - development of information support; - includes components such as the development of modern methods of information that meet the requirements of the era[3,275].

It is important to note that the digital economy is a vital force that ensures sustainable economic recovery and contributes to positive changes in production activities, accelerating the transition of digital technologies from consumption to production. In this area, following the proposals of our president, who stated that “If each sector is not in sync with digital technologies, the country will not develop,” in our research work, the use of digital and information and communication technologies in the educational process of technical universities will closely contribute to the preparation of specialists who are competitive in the labor market and meet the requirements of the era.

The active penetration of digital technologies into all spheres of people's lives requires the training of appropriate specialists, and this, in turn, will lead to significant changes in the education system. Thus, the presence of higher education institutions in the current period ensures the convenience and interactivity of the educational process without the presence of a digital educational environment. At the same time, work on the digitalization of higher education is carried out by all participants in the educational process, but to a greater extent, directly, by subject teachers and practice leaders who

actively introduce digital technologies into the process of teaching subjects, as well as develop effective programs and methodological recommendations for their teaching[4,188].

Digitization has created new opportunities for education and management in accordance with the requirements of the era, facilitating data collection and analysis, interaction and communication. The advantages of digitization include increased efficiency, increased activity of future specialists, person-centered education and the use of modern teaching methods. In addition, digitization facilitates the management of higher education institutions, curricula, faculty, staff and resources.

To deepen the understanding of digitization, this study includes a systematic review of the literature, paying special attention to research related to digitization and digital technologies. In the context of our study, the terms "information and communication environment" and "information and communication educational environment" are understood as the environment in which the educational process takes place and are therefore synonymous[5,121].

The positive impact of the use of digital technologies on the development of education is as follows:

- intellectualization of information activity as a provision for the subjects of the educational process, multifaceted causal analysis of information (data) on all aspects of this process, their subsequent processing, visualization, obtaining and storing results for their open presentation and sharing with all interested participants in the educational process;
- information interaction between subjects of the educational process and other interested parties in a virtual environment (based on MS, MOOC, Moodle, Zoom, MS communities) with a person who has the ability to present, store, transfer information of any volume and in any form;
- providing future engineers with a research tool, modeling what has been learned, controlling high-tech modern equipment of an educational institution by an untrained user in terms of mastering real and virtual objects, processes, as well as designing a virtual subject environment in accordance with a certain methodological content approach;
- multi-thematic presentation of educational material as a representative of the studied object or process in the context of the substantive aspects of various subject areas (philosophical, sociological, natural sciences, etc.) based on different conceptual approaches;
- implementation of hypertext and hypermedia forms of presentation of educational material, which significantly increases its volume, expands both the subject and the scope of presentation, facilitates search, interpretation and selection of the necessary content aspect;
- the introduction of organizational forms and methods of teaching in accordance with modern scientific research, methods of knowing the laws of natural phenomena and social phenomena that practically occur and almost reflect real or abstract objects and processes on the screen;
- the emergence of modern educational tools based on information and communication technologies (ICT) in analog and digital forms of implementation (electronic textbook, information system for educational purposes, digital educational resource, computer diagnostic tools for automating educational management, etc.) and their use significantly increases motivation for learning and ensures independence in solving educational tasks;
- may include expanding the types of educational activities (search, processing, formalization, automation of production, reproduction of educational information; high-speed automation: management of any volume of educational results; creation of electronic (digital) educational resources; management of models of objects under study, processes presented on the screen; experimental research activities based on virtual laboratory equipment, etc.).

The following are possible negative effects of the use of digital technologies on future engineers:

- the loss of the linguistic (deliberative) type of thinking and the dominance of the summative type of thinking, due to which, when searching for any search (Google, Apple, etc.), users usually do not remember the content of the information and its location (the path to the necessary information);
- the dispersion of student attention, caused by the excess and openness of any amount of information, leads to the replacement of continuous, concentrated perception of educational information with "distributed" perception, which prevents the integrity of the perception of the components of the information[6,33].
- "clip-comic" perception of information, which leads not only to a superficial perception of educational materials by future engineers, but also to a lack of understanding of the substantive component of educational materials due to the preference for visualization, modeling, graphic interpretations - a meaningful description of the object under consideration or reading, process, plot;
- leads to the development of a specific way of thinking among students in connection with the direction of learning to find several solutions to one problem, and then to a reduction in the algorithmic way of thinking (precise adherence to previously studied algorithms of activity).

In the field of education, the following: provision of educational services; creation of digital educational resources; information-methodical support of the educational process; information activities; information interaction both between subjects of the educational process and with digital educational resources; education management; information support of the activities of an educational organization; organizational management of the activities of an educational organization; The educational organization ensures the information security of the individual. The processes of the subjects of the educational process are implemented in the conditions of digital technologies.

The impact of the transition to digital technologies on the entire education sector is distributed in the following areas: the processes of creating and using electronic or digital educational resources; ensuring the content of the information educational environment (high-tech software and hardware and devices, including mobile devices; means of providing remote access to educational content; digital educational resources; tools and systems for automation of management and control of educational organizations, etc.). The process of digital transformation of education itself begins to improve the entire education system, in particular: updating, changing all educational and methodological materials, including the content and structure of various educational programs, tools for assessing educational achievements and managing the educational process; organizing and equipping scientific research, experimental activities of future engineers; technological processes in the field of using digital technologies in solving professional tasks and the structure and organization of training and retraining of pedagogical and managerial personnel; The development of the information infrastructure of the educational organization is distributed in the directions.

## **Conclusions and recommendations (Conclusion/Recommendations)**

In order to implement the above at the appropriate pedagogical and technological level, it is necessary to create a theoretical, methodological, scientific and pedagogical basis for updating the existing educational paradigms (cognitive, person-oriented, functional, cultural). In addition to these main paradigms of education in modern pedagogy, in this research work we introduce the concept of the digital paradigm of education, understanding it as a set of theoretical, methodological, scientific and pedagogical rules and technological solutions, focusing on the intellectual development of the

individual and his socialization, based on the implementation of modern achievements of scientific and technical progress in the era of active use of digital technologies in terms of preventing possible negative consequences for the health of future engineers and ensuring the information security of the individual subjects of the educational process.

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