

Formation of a digitalization culture in higher education institutions of Ukraine. Analysis of the current state

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Abstract

The article presents the results of an experimental study of the current state of formation of a digitalization culture in higher education institutions of Ukraine, which was implemented by interviewing representatives of the management of 13 Ukrainian universities. Attention is drawn to the key factors that contribute to successful digital transformation and the development of a culture of digitalization in higher education institutions. The challenges, obstacles, and barriers that hinder these processes are identified. An assessment of the current state and level of digital transformation at the universities was made. The needs for the formation and implementation of a culture of digitalization at the university and the vision of the survey participants of this strategy are identified. The purpose and goals of the digitalization strategy for the university and the benefits of its implementation in the educational process and university management are formed. The role of the university management in creating and maintaining a digitalization culture among students, teachers, and administrative staff is defined.

Keywords

digital transformation, higher education, digitization culture, online education

1. Introduction

The modern development of society is aimed at a rapid transition to digital transformation. This term is usually understood as the digitalization of business processes and services. All processes of social activity, entrepreneurship, education, science, etc. are moving into the digital environment. Two business processes are basic in the higher education system: the organization of learning and research processes and the implementation of these processes. The digital transformation of both processes and the introduction of online education is a relatively young industry, whose rapid growth began in 2011-2012. The process of digitization of traditional business processes of the university and its document flow began. It was the beginning of the creation of various online courses by attracting the first venture capital investments by companies like Edutech, Coursera, Udemy, and Udacity. Despite the delayed start, this process quickly became popular, and the e-learning market attracted the attention of investors.

The use of digital technologies and online learning became especially widespread during the 2020 quarantine. Social demand and the organization of education have changed dramatically. While earlier the customers of distance learning were mature citizens who needed to improve their

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professional knowledge, during the Covid-19 period, pupils and students of colleges and universities became participants. Meetings, sessions, conferences, and dissertation defences were held remotely [13].

The IT industry was the first to respond to the needs of teachers, students, and pupils: the capacity of the channels was increased, and a large number of services and tools for learning appeared. ZOOM and Classroom became popular software products for video conferencing, and a large number of blogs with training recommendations appeared on social media. Distance learning courses on developing learning resources and organizing training were held.

On September 30, 2020, the European Union (EU) adopted a policy initiative, the Digital Education Action Plan (2021-2027), which sets out a common vision for high-quality, inclusive and accessible digital education in Europe and aims to support the adaptation of education and training systems of Member States to the digital age. This document has set the stage for greater cooperation at European level in the field of digital education to address the challenges and opportunities posed by the COVID-19 pandemic, as well as to present opportunities for the educational and professional community (teachers, students), policy makers, academia and researchers at national, European and international levels [15].

The organization of the educational process has changed since the outbreak of military action. The full-scale invasion of Ukraine by Russian troops on February 24, 2022, dealt an even greater blow to the Ukrainian higher education system than during the years of quarantine restrictions. The destruction of higher education infrastructure, the problem of human capital, and the resumption of the educational process under martial law have become real challenges. Experts estimate that the amount of damage caused by Russian troops to our country's infrastructure in mid-2022 amounted to almost \$136 billion, of which \$8.2 billion, or 6%, was damage to the Ukrainian educational infrastructure [12].

The main problems of educational activities caused by the war have been identified:

1. Destruction of educational infrastructure.
2. Impact on the organization of the educational process.
3. Impact on students and teachers.

The issue of digital transformation of universities has become a matter of survival.

Every university today is looking for its own model of effective implementation of digital transformation of its activities. Various resources are used for distance education (Moodle, Microsoft Team, Google class, etc.). Platforms for managing educational institutions are being created. For example, a good example of the digitalization of all university business processes is the introduction of a modern university management system, Digital University UA, at Zhytomyr Polytechnic State University, which allows for the implementation of digital business processes and the creation of integrated ecosystems for the effective management of educational institutions. The system can significantly improve management processes and cooperation with internal and external stakeholders [16].

The issue of digitalization of education and the search for the most effective solutions for its implementation has become the subject of scientific research.

The relevance of the problem of digitalization of higher education and the formation of a culture of digitalization in Ukrainian higher education institutions is confirmed by a significant number of scientific works by Ukrainian researchers.

Thus, scientists Bekhta I. A. and Kovalevska T. I. consider the concept of emergency digitalization of education as a response of the educational process to the current realities associated with the coronavirus crisis and the war in Ukraine [2]. Borodkina I., Borodkin G., Dukhanina N., Lesyk H., Kononenko L., Oryshak O., Selishcheva E., Karpliuk S. and other researchers identify the need to improve the level of digital competence of all participants in the educational process and study the introduction of digital literacy in universities [3, 5, 8, 9]. Scientists V. Bredniova, N. Dukhanina, and S. Karpliuk devote their works to the study of the transformation of higher education in the context of

the digitalization of society, namely, how the structure of education and the organization of the educational process are changing in order to improve the quality and accessibility of education [4, 5, 8]. The author A. Guraliuk considers the process of digitalization of higher education as a precondition for improving the quality of higher education [6]. Lykhodieieva G. V., Diorditsa I. M. and Katerynych P. V. define the digitalization of education not only as a tool for improving the quality of education, but also as an actual mechanism for implementing ideas of social progress [10].

V. Y. Areshonkov explores the process of digitalization of higher education and the creation of digital universities as a consequence of modern social challenges, and formulates tasks for university management and public administration for the successful digitalization of university education in Ukraine [1].

Works [11, 7] identify the prerequisites that affect the state of distance learning in Ukraine and determine the directions and methods of improving e-learning courses as the main element of distance education.

2. Problem

Involuntary distance learning in 2020 was a challenge for all participants in the educational process: teachers, students, pupils, and parents. They had to switch to distance learning in a short time. The readiness of Ukrainian universities for digitalization varied. There were purely technical problems, such as the lack of the Internet, computers, and online learning materials. The main problem was the lack of readiness of university administrations and teachers for distance learning. Organizing quality education using digital technologies, inspiring and motivating students and teachers, and dealing with technical problems proved to be quite difficult. The challenge was not only to stimulate students and pupils to work internally, but also to enable a dialogue. The educational process was often reduced to the distribution of materials and mechanical homework. This led to general fatigue of teachers and students, as well as a significant decline in the level of knowledge of students.

Thus, in 2020, schools and universities were unable to continue quality education in a distance format. The heads of educational institutions did not understand digital business processes, strategies for implementing digital transformation, and the need for mental changes in the educational environment. When implementing digital transformation processes, the management of a higher education institution had to take into account the need for cultural changes taking place at the university. It was difficult for managers at all levels of management and academic staff to adapt to the adoption and use of information technology. Although digital transformation creates unique opportunities for the development of higher education, a prerequisite for its effective implementation is the creation of a digital environment in which humans and computers are a single system configured to perform common tasks. Universities should form a comprehensive system of values, approaches, practices and skills that promote the active use of digital technologies in all aspects of the educational process and university management, which forms a digitalization culture in higher education institutions.

The aim of the study is to determine the capacity of Ukrainian universities for digital transformation and the level of digitalization culture formation to determine strategic directions of transition to the digital environment.

3. Analysis of the conditions for the formation of a digitalization culture in higher education institutions of Ukraine

3.1. Research methodology

The study is based on its experimental stage, implemented through an online survey of representatives of the management and heads of structural units of 13 Ukrainian universities on the existing level of digitalization culture in the institution. The analysis was conducted within the framework of the project "Ukrainian-German Teaching Network for a Digital Transformation of

Environmental Education (Consolidation and Expansion Phase 2024)” DAAD (German Academic Exchange Service) [14]. Empirical data was collected during April-June 2024. The purpose of the survey is to identify not only the technological aspects of the digitalization of the education system, but also cultural changes that are aimed at creating an accessible, innovative and open to change environment where digital tools are used to improve the quality of teaching, research, administration and communication. It also assesses the resources required for effective digital transformation of universities at all levels. The role of the manager in creating and maintaining a culture of digitalization among students, teachers and administrative staff was defined.

The research was conducted by an international team that brought together eight partner universities – Eberswalde University of Sustainable Development (Eberswalde, Germany), National Transport University (Kyiv, Ukraine), Ukrainian National Forestry University (Lviv, Ukraine), Zhytomyr Polytechnic State University (Zhytomyr, Ukraine), Odesa State Environmental University (now Odesa National University named after I.I. Mechnikov) (Odesa, Ukraine), Lviv State University of Physical Culture (Lviv, Ukraine), National University “Yuri Kondratyuk Poltava Polytechnic” (Poltava, Ukraine) and National University of Water Management and Environmental Engineering (Rivne, Ukraine).

In total, the survey contained 6 general questions and 8 questions (open and closed) on the digitalization of education in higher education institutions, one of which was more detailed.

The main issues to be studied were the following:

1. what is the understanding of the term “digitalization of higher education” in the context of university activities?
2. what are the key factors that contribute to successful digital transformation and are the basis for the development of a digitalization culture in higher education institutions?
3. what obstacles and barriers hinder the digital transformation of higher education institutions? What specific challenges do you see in the implementation of digital technologies at your university?
4. assessment of the current state of digital transformation at your university (please provide brief answers to each of the following factors)?
5. assessment of the success of digital transformation in the institution.

A separate issue is to determine the need for the formation and implementation of a digitalization culture at the university, the vision of this strategy. Participants were asked to formulate the purpose and goals of the strategy, its advantages when implemented in the educational process and university management. Anti-proposal questions:

- describe the key areas of digital transformation and the steps or initiatives that contribute to this process;
- identify risks, obstacles and barriers to digital transformation at the university
- types of resources required for effective digital transformation of universities at all levels and their direction.

At the end of the questionnaire, the participants defined their role as a leader in creating and maintaining a culture of digitalization among students, teachers, and administrative staff.

3.2. Results

The survey on the formation of a digitalization culture in Ukrainian higher education institutions involved 35 participants representing the management of 12 universities in Ukraine. Among them are 4 vice-rectors, 3 deans and 3 deputy deans, 4 institute directors and 3 deputy directors, 15 department heads, the head of the education quality department, and the director of the information and computing center. The largest number of respondents (Fig. 1) was represented by National Transport University (Kyiv) and National University of Water and Environmental Engineering (Rivne).

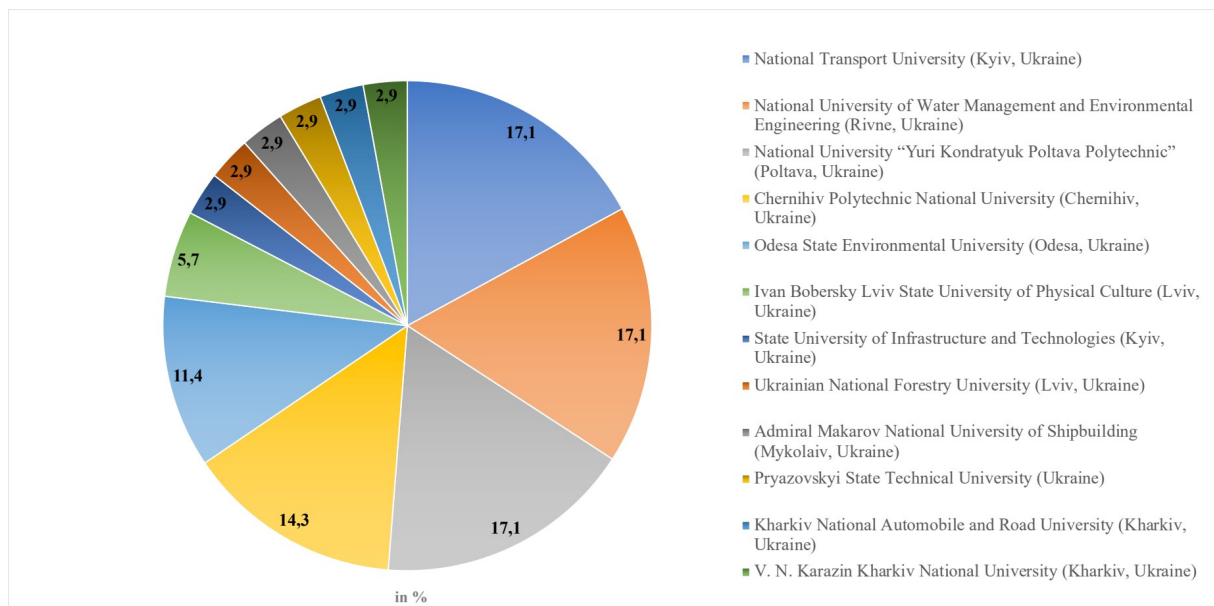


Figure 1: Statistics of the survey on higher education institutions of Ukraine.

- The question about the key theses of understanding the term “digitalization of higher education” in the context of university activities revealed quite diverse answers, but mostly such measures are considered to be:
- introduction of electronic document management (25.7%);
- use of digital technologies to improve the quality of education and their integration into the educational process (20.0%);
- introduction of distance education (14.3%);
- virtual courses of disciplines (14.3%);
- Reduction or complete absence of paperwork (14.3%);
- Introduction of mobile applications and services for students (14.3%);
- use of interactive learning platforms (11.4%);
- introduction of electronic applications for managing university activities (11.4%);
- development of digital competence and mandatory training of staff to work with electronic forms (11.4%);
- inclusiveness and accessibility of education (11.4%);
- maximizing ease of access to educational resources (11.4%).

Regarding the key factors that contribute to successful digital transformation in education and are the basis for the development of a digitalization culture in higher education institutions, 31.4% of respondents believe that it is the availability of an appropriate level of digital competencies of participants in the educational process and their continuous improvement, 28.6% of respondents indicated the importance of having an appropriate policy and strategy for the digitalization of higher education institutions. Other important components are the modernization of the educational process in terms of providing specialized licensed software products (25.7%) and the constant funding of digital technologies in higher education (20%).

Unfortunately, there are currently many obstacles and challenges in Ukraine that hinder the digital transformation of higher education institutions. Thus, 25.7% of respondents believe that such obstacles include low teacher motivation, low level of hardware and software, and lack of financial and human resources. According to 20% of the survey participants, the war is a challenge to the introduction of digital technologies in universities, and 11.4% of respondents point to problems with power supply, overloading teachers with the number of educational components, etc.

Respondents generally assessed the current state of digital transformation at the university positively according to all the proposed criteria (Fig. 2).

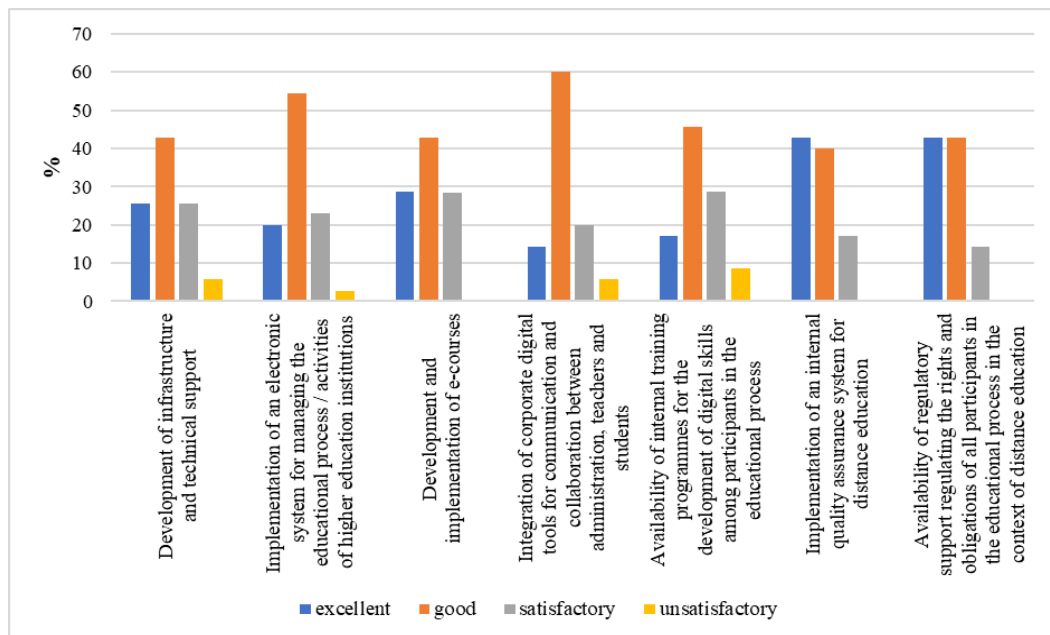


Figure 2: The state of digital transformation in Ukrainian higher education institutions.

Some questions were asked to be rated on a scale of four percentage ranges: 0-25 % (unsatisfactory level), 26-50 % (satisfactory level), 51-75 % (sufficient level) and 76-100 % (high level). The results are shown in Fig. 3. As can be seen, there is interest among university administrations, academic staff, and students, but the lack of minimum funding hinders the process of digitalization in Ukrainian higher education institutions. At the same time, it was noted that the state of development of e-courses, the availability of electronic libraries, and distance learning sites correspond to a sufficient and high level. Also, the level of regulatory support for distance education is high. That is, in the presence of fully developed regulatory documentation, a set of methodological support, the desire of both teachers and students to improve their skills in the field of digital education, the main problem is the almost complete lack of funding for this area of educational activity in Ukrainian higher education institutions.

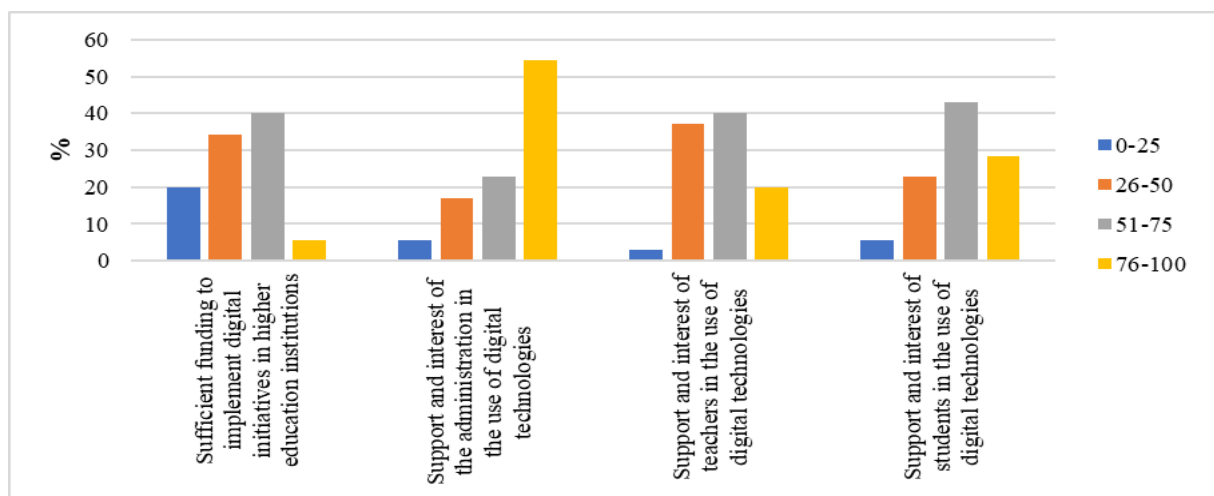


Figure 3: Successful digital transformation in Ukrainian higher education institutions.

- When asked whether it is necessary to form and implement a culture of digitalization in higher education institutions, respondents answered positively, as they believe that

digitalization is an integral part of the modern educational and cultural space and an opportunity to integrate into the global educational space, a key factor in the quality of educational services (57.1%) and competitiveness of higher education institutions (5.7%). 20% of respondents said that their higher educational institutions (hereinafter HEIs) already have a clear system of digitalization of the educational process, which is constantly being improved and supplemented with new components.

- The analysis of the potential goals and objectives of the digitalization strategy for higher education institutions revealed the following main areas:
- development of the “e-university” concept as a single information educational environment that combines services for planning, organizing and supporting the educational process at the university (28.6%)
- Providing quality educational services in today's difficult conditions and improving the quality of education (20%);
- expanding access to education (17.1%);
- Digitalization of infrastructure, management and marketing processes (11.4%);
- Development of flexibility in the educational process (11.4%).

According to the respondents, the main advantages of introducing digitalization into the educational process and university management are:

- speed of information delivery and reduction of time and effort of all participants in the educational process (14.3%);
- improving interaction between participants of the educational process and ensuring constant communication between them (14.3%).
- 24/7 availability of services (11.4%).

As for the personal steps and initiatives that the survey participants are ready to support to promote the digitalization of their university, almost 26% of them are ready to support any initiatives aimed at the digital transformation of their HEI, 23% of them mentioned the main steps to increase the digital literacy of the teaching staff by creating appropriate e-courses and trainings, 17% of respondents are ready to initiate the introduction of new knowledge in the educational process, for 11% it is important to create appropriate infrastructure in the HEI.

According to 60% of respondents, the necessary resources for the effective digital transformation of higher education institutions at all levels are the renewal and modernization of material and technical equipment and licensed software. 40% of respondents believe that effective digitalization primarily requires financial resources to be used for the purchase of modern equipment, software, staff training, and the development of digital tools. Almost 23% of respondents emphasize the importance of acquiring digital competencies by HEI and research and teaching staff through advanced training courses, workshops, and digital literacy training. Human resources are also important, including retaining and encouraging IT professionals, motivating teachers, and paying them well. This is the opinion of 20% of respondents. 14.3% of respondents noted the importance of stable energy supply and the Internet, given the current conditions.

Table 1

Evaluating the Role of Ukrainian HEI Administration in Supporting a Digitalization Culture

Role	Number of answers	%
Educational role – initiating, popularizing e-courses and methods of adapting educational materials to the individual needs and learning styles of each student, conducting consultations and training	14	40,0
Creating appropriate conditions, incentives and motivation; ensuring the renewal of fixed assets, providing resources and support; providing participants in the educational process with the necessary devices and equipment and ensuring appropriate conditions for learning and teaching	7	20,0
Highlighting the importance of digital transformation and creating a clear digitalization strategy that defines goals, steps, resources and responsible persons; monitoring the impact of digitalization on the educational process and identifying opportunities for further improvements; finding ways and stimulating improvements in digitalization	6	17,1
Example of own use of these tools, fluency in information and software tools with further promotion and training	5	14,3
Explaining and supporting effective initiatives, selecting the options that will have the greatest impact	4	11,4
Promoting training in mastering new methods of digital education, providing opportunities for self-improvement	3	8,6
Ensuring the interaction of the teacher-student system, controlling the ethics of execution	2	5,7
Supporting and implementing decisions of senior management	1	2,9
Helping students to get used to the system at the first stages, holding constant conversations about meeting deadlines and academic integrity	1	2,9

The last question of the questionnaire on the assessment of one's own role as a leader in creating and maintaining a culture of digitalization among students, teachers, and administrative staff revealed a variety of answers (Table 1). 40% of the surveyed respondents see their main role as informing, promoting, and popularizing digitalization among all participants in the educational process. Another 20% say it is to create the appropriate conditions and provide the necessary resources, as well as to maximize the development and improvement of digital skills of subordinates. For 17% of respondents, their main role is to determine the importance and implementation of digitalization, as well as to monitor its impact on the educational process. 14% of respondents also noted that their main role is to show by example the use of existing opportunities and continuous personal development in this area.

4. Conclusion

An important result of the experimental study is the confirmation that the university administration is interested in the digital transformation of higher education institutions, since it is an integral part of the modern educational and cultural space, the possibility of integration into the global

educational space, is a key factor in the quality of educational services and the competitiveness of higher education institutions. 20% of respondents noted that their higher education institution already has a clear system of digitalization of the educational process, which is constantly being improved and supplemented with new components.

The heads of universities understand the term "digitization of higher education" differently in the context of the university's activities. The most popular are the introduction of electronic document management and the use of digital technologies to improve the quality of education and their integration into the educational process. A third of the respondents consider the presence of an appropriate level of digital competences in the participants of the educational process and their constant improvement to be the key factors contributing to a successful digital transformation in education. Also important components are the availability of a university digitization policy and strategy, modernization of the educational process to provide specialized licensed software products, and permanent financing of digital technologies in higher education institutions.

Among the negative points that hinder the digital transformation of universities are the low motivation of teachers, the unsatisfactory level of material, technical and software support. The most serious challenges in the implementation of digital technologies in universities, according to the survey participants, are war, problems with energy supply, overloading of teachers with the number of educational components, etc. The main problem is actually the complete lack of funding for this area of educational activity in the higher education institutions of Ukraine, as well as the lack of human resources

The vision of leaders of Ukrainian universities regarding the goals and objectives of the digitization strategy for higher education institutions is relevant and modern. The main directions are the development of the "e-university" concept as a single informational educational environment that combines the services of planning, organizing and ensuring the educational process at the university; providing high-quality educational services in today's difficult conditions and improving the quality of higher education and expanding the availability of education.

According to 60% of respondents, the necessary resources for the effective digital transformation of HEIs at all levels are the updating and modernization of material and technical and license software. 40% of respondents believe that for effective digitalization, first of all, financial resources are needed, which will be used for the purchase of modern equipment, software, personnel training and development of digital tools. Respondents point to the importance of university employees acquiring digital competencies through advanced training courses, trainings, and digital literacy training. Personnel resources are also important, namely, retention and promotion of IT specialists, motivation of teachers, decent remuneration.

The respondents see the important role of the university management in creating and maintaining a culture of digitalization, including informing, promoting and popularizing digitalization among all participants of the educational process, creating appropriate conditions and providing the necessary resources, as well as maximally promoting the development and improvement of digital skills of subordinates. An important skill for modern managers is their own example of using existing opportunities and constant personal development in this direction.

Declaration on Generative AI

The authors have not employed any Generative AI tools.

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