# DIGITAL EDUCATIONAL ENVIRONMENT IN INSTITUTIONS OF HIGHER EDUCATION

*Monograph*

UDC 004:378.147

Approved by the Academic Council
of _____
(protocol No. __ dated _____ __, 2022)

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Digital educational environment in institutions of higher education [monograph] / N. Bondarchuk, N. Dubrova, O. Bovkunova and others. – Dnipro: Monolit, 2022. – 272 p.

ISBN 978-617-7369-__-_

The monograph presents modern educational technologies that can be used in the educational process of a higher educational institution. The monograph is aimed mainly at students of various study specialties, teachers. The monograph collects the opinions of scientists and teachers regarding the possible use of information technologies in the learning process, considers the main services and tools for evaluating written works, conducting an oral survey, and organizing online testing.

ISBN 978-617-7369-__-_

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ISBN 978-617-7369-84-3

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### 2.3. Digital technologies: opportunities, tools, advantages, ensuring implementation of planned results

Information systems have entered all spheres of life. The development of digital technologies opens up a huge range of opportunities. Progress in all fields of science and industry proceeds at a tremendous speed, never ceasing to amaze and fascinate.

The corona virus pandemic, military actions on the territory of Ukraine – became a powerful stimulus for the introduction of digital technologies in all spheres of economic and social life. Quarantine measures have provoked the transfer to the online environment of not only a significant part of trade in goods and social services, but also the development of education based on digital technologies. Of course, digitization is due not only to the quarantine, but also to the general development of the countries of the world in the post-classical era. Digitization, which has acquired a global character in recent decades, has become one of the strategically important vectors of the development of civilization, the results of which we observe everywhere

today and which in the future will determine the nature of the new civilization – the global information society. In the context of general world trends, digital technologies have been used in education before, but now their role is more significant – in quarantine conditions, all types of education work on the basis of these technologies.

The modern development of society is characterized by the growth of dynamism of all human life processes, the increase in the dependence of interpersonal interaction with the use of digital technologies in all spheres of activity. In a short period of time, they have significantly changed our everyday life, in which the signs of the digital economy are becoming more apparent every day. Universal availability of information increases the possibilities of its transparency in all spheres of human life. This determines the modern reality and relevance of the digital transformation of a teacher's professional activity. The ability to interpret and analyze information obtained with the help of digital technologies, which acquires the characteristics of Big Data, is important. In order to find any information, it is enough to have a computer, access to the Internet and access rights to it.

The relevance of the understanding of these technologies at the stage of the formation of a new civilization and during the pandemic does not fade, although many works are devoted to this issue. The studies of D. Bell, E. Toffler, I. Masudi, J. Galbraith, E. Giddens, H. McLuhan, M. Castells, T. Stoneyer and others are devoted to the study of ideas about the post-classical era of social development and technological and sociocultural changes. According to N. Zh. Shaitova and M. G. Tulengalieva, the main factors of reforming the education system in the specified period are the following: the expediency of society's transition to a new development strategy based on knowledge and highly effective digital technologies, the possibility of successful development of society based on high education and the effective use of digital technologies, a close connection between the level of the nation's well-being, national security of the state and the state of education and the use of these technologies [17]. In numerous publications, the disadvantages and advantages of the implementation of digital technologies in education are noted [8, 11–12]. O. Shpunt, in particular, attributes to the advantages the possibility of creating a fundamentally new learning model – distance learning, which is based on the use of the latest digital technologies capable of ensuring the exchange

of educational information at a distance (computer communication, satellite television, etc.) [17]. E. Pakhonina dwells in detail on the analysis of the problems that arise as a result of the distance learning format. She attributes these problems primarily to technical ones, noting that there was no adequate technical equipment, support and access to the Internet in conditions of self-isolation and remote work, especially outside the district and regional centers. The second problem is managerial, which is manifested in the insufficient organization of the remote format of work, training, preliminary training of personnel, mastering of online technologies and their implementation, or in the impossibility of implementing them "at home" due to technical problems. The distance between employees, teachers and students who are studying has outlined the problem of personal responsibility, independence in learning, mastering new types and forms of work. The third problem is psychological, because digitalization often causes constant stress due to new orders, not always satisfactory organization of remote work and reporting, increased workload, remoteness from the workplace, technical problems and responsibility for the success of students, and the prestige of the organization. The fourth problem highlights complications in acquiring knowledge, understanding it, consolidating and reproducing it, and applying it in practice [15]. O. Maiboroda outlines the main problematic points on the way to the implementation of the distance education system in Ukraine and the factors that inhibit the development of this promising form of education [13]. I. Lyashenko, analyzing the advantages of distance learning and possible obstacles in the organization and implementation of such an educational process, emphasizes the need to develop a flexible and effective system of distance learning. And this means that it is necessary to provide an informational and methodological educational base and to prepare highly qualified specialists for the remote learning process [12]. I. Holodenko and E. Korneeva emphasize the need for legal regulation of the process of providing educational services in Ukraine under the conditions of the COVID pandemic. According to the researchers, the specified regulation should be carried out taking into account the fact that the activation of distance education in Ukraine is a forced measure related to the introduction of quarantine restrictions, and not a strategy for the widespread introduction of this form of education into the educational process. At the same time, since there is a threat of new

pandemics in the modern world, it is worth developing and enshrining at the legislative level special norms aimed at regulating the provision of educational services by educational institutions in pandemic conditions [10]. Despite a fairly thorough study of various aspects of the use of digital technologies in the education system during the pandemic, some problems require detailed research. In particular, this applies to the organization of distance learning.

In order to improve the use of digital technologies for the transformation of processes in the system of education and science with the aim of their simplification, automation and convenience for users, by order of the Cabinet of Ministers of Ukraine, the Concept of Digital Transformation of Education and Science for the period until 2026 was approved.

The problems associated with the digital transformation of education and science that educational workers face today include:

– low level of digital competences of participants in the educational process;

– outdated content of education in educational subjects of the IT field;

– lack of modern equipment and technologies and sufficient coverage of the Internet in institutions and institutions of the system of education and science and others. Today's system of education and science must undergo fundamental digital changes and correspond to the global trends of digital development in order for every person to successfully realize his potential.

Today, more and more professions require the acquisition of a high level of digital skills and mastery of new technologies. This need is also deepened by the consequences of the COVID-19 coronavirus pandemic, which exacerbated the problem of development and mastery of technologies in the education system in order to ensure the rights of citizens to quality education.

Thus, the acquisition of digital competences becomes a basic need for everyone, therefore the Ukrainian education system should ensure the formation of digital competences of education seekers, pedagogical and scientific-pedagogical workers and the development of digital infrastructure and electronic services in educational institutions, as a whole.

The creation of a single digital environment that unites all subjects of educational and scientific activity, which provides space for communication

and data exchange, will significantly reduce the bureaucratic burden of the education and science system and simplify the management processes that take place in them [1]. Digital technologies are a discrete system based on methods of coding and information transmission, which allows you to perform many different tasks in the shortest possible time. It is the speed and versatility of this scheme that made IT technologies so popular [7].

Huge streams of information that anyone can get from the Internet make education more accessible. Realizing one's creative potential or simply making money without leaving home – previously one could only dream of such opportunities. Today it is a reality. All applicants have mobile phones, smartphones, iPhones and tablets. Mobile devices are the property of students and are therefore at their disposal throughout the day, not just during classes. As N. Shaitova and M. Tulengalieva rightly point out, the difficulties of mastering digital technologies in education arise due to the lack of not only a methodological base for their use in this field, but also a methodology for developing these technologies for education, which forces teachers to focus only on personal experience and the ability to empirically search for ways of effective application of these technologies [15].

Empirical experience gained during the implementation of digital technologies in the education system showed their great potential for organizing distance learning [16]. At the same time, many problems were identified during the implementation process. This is a significantly higher cost of organizing distance learning compared to traditional technologies, which is associated with the need to use a significant number of technical (computers, modems, etc.) and software (learning technology support), as well as the preparation of additional organizational and methodological manuals ( special instructions for learners and teachers, etc.), new textbooks and study guides in digital format.

Of course, teachers are searching for improving the quality of education and new forms of using digital technologies in the educational process. They use presentation preparation programs, word processors, spreadsheets, database management systems, graphic packages, etc. when organizing distance learning. World information resources (electronic libraries, databases, file repositories, etc.) are available to them through the Internet global computer network. Participants of the educational process during distance learning also use other means of information and communication

technologies – e-mail, chats, which provide an opportunity to communicate online. With the help of special equipment and software, audio and video conferences are organized over the Internet. Digital technologies enable access to educational and scientific information; help organize and model research activities, conduct training sessions. Such technologies as video recording and audio recording are significant for the distance learning system. Another technology is educational electronic publications from the Internet or those stored on digital media. Educators and students can take virtual tours of world galleries, use materials of electronic archives, catalogs and libraries [16].

During the organization of distance learning, teachers use technologies that can be classified in different ways. The approach proposed by V. Domrachev and I. Retynskyi is of considerable interest in the classification of these technologies. They took into account the didactic orientation of technologies. From this point of view, digital technologies are distinguished by the method of obtaining knowledge, the degree of intellectualization, the goals of learning, the nature of managing the cognitive activity of users in the computer curriculum. According to the method of obtaining knowledge, declarative and procedural methods are distinguished. Technologies of the declarative type are focused on providing and verifying knowledge in the form of fragments of information. These include those based on the use of digital textbooks, educational databases, test and control programs. Procedural-type technologies are built on the basis of models, with the help of which it is possible to obtain knowledge in a specific subject area. These technologies include technologies that use application software packages, laboratory workshops, and game programs. According to the degree of intellectualization, digital educational technologies are tentatively divided into two types: programmed learning systems and intelligent learning systems. Programmed learning systems provide for receiving portions of information (textual, graphic, video information) in a certain sequence and a method of controlling its assimilation according to the topics of the training course. Intelligent educational systems are characterized by such features as adaptation to the knowledge and characteristics of users, flexibility of the learning process, selection of the optimal educational impact, and determination of the causes of errors. According to the goals, digital educational technologies are divided into the following types:

teaching the skills of using specific methods in practical activities, obtaining and systematizing various factual data; learning information analysis, its systematization, creativity, research methodology. According to the nature of management of cognitive activity when working with pedagogical software products, technologies are divided into linear, branched, and combined programs that contain all the indicated features [11].

Learning technologies in higher education are significantly different from school education. They are aimed not only at the transmission and perception of knowledge recognized by the scientific community and practicing educators, but also at reflecting the modern stage of the development of science, revealing its methodological foundations, and getting acquainted with the searches of research scientists in the field of pedagogy. In the conditions of distance learning, it is important not only to preserve the specified specificity of higher education and not to lose the gains of educational practice, but also to enrich it with findings that are effective in online learning.

Modern institutions of higher education build the student learning process based on a combination of various forms of its organization. The main ones are: lectures, practical, seminar, laboratory classes, special courses, special seminars, pedagogical practice, consultations, colloquiums, control, course and diploma theses. There are no significant differences between the implementation of these forms in distance and classroom learning, although some specifics still exist. For example, the leading among these forms in a higher education institution is a lecture. In the practice of a higher school, lectures are distinguished by didactic tasks – introductory, thematic, review, introductory, final; according to the method of presentation – problem-based, visualization lectures, binary lectures (lectures-discussions), lectures with pre-planned errors, lectures-consultations; lectures-press-conferences, lectures "Round table", lectures-questionnaires, lectures-disputes, lectures-briefings, mini-lectures, lectures-conversations (dialogues with the audience), lectures with the analysis of specific situations, lectures with the use of feedback techniques, multipurpose, etc. All these types of lectures can be held during distance learning. The specificity of their implementation in remote practice consists only in the forms of technical registration. These forms are: the lecture can be made in the form of a presentation, during which the teacher reads the lecture from the monitor, and the students write down the main points at this

time; the lecture can be presented on the monitor with text theses, which the teacher supplements with his comments; lecture theses can be illustrated on the monitor with pictures, tables, diagrams, etc.; the lecture can be given traditionally orally and accompanied by illustrative material on the monitor, for example, a series of tables; the teacher can send the text of the lecture to students by e-mail in advance, and only explain difficult questions during the class; individual lectures can be forwarded to students for independent study, and the analysis of their content and the verification of what they have learned can be carried out during a practical session. In all cases, the electronic version of the lecture, which is shown on the monitor or forwarded to students by e-mail, must begin with a clearly formulated topic and plan, the text of the lecture must be divided into fragments according to the specified plan, and the lecture must end with short meaningful conclusions.

Among the seminar classes, the following are the most common: message, extended conversation, report, discussion of essays and creative works, commented reading, problem solving, debate, conference, etc. During distance learning, students' answers can be illustrated with drawings, pictures, tables, video recordings, etc. During the seminar-dispute, seminar-press conference, it is advisable to display the topic of the class and separate theses for discussion on the monitor.

Practical classes may offer verification of theoretical material in the form of oral answers, exercises, tests on the topic covered, non-game methods (analysis of specific situations, solving pedagogical tasks, analysis of documentation, actions according to instructions), simulation methods (business, role-playing games, game design) etc. During practical classes, students can present the abstracts of their pre-prepared reports or presentations on the studied topic.

An important role belongs to consultations, the function of which becomes especially relevant during remote interaction, since in this type of education it is important for teachers not only to advise students before completing certain tasks, but also to help organize their independent work. With distance learning, the content of consultations also changes somewhat. In particular, the teacher must be ready to provide the necessary consultation on the design of the electronic version of the task, the specifics of the operation of certain digital platforms, inform about the sequence of operations when working with electronic media, etc. Consultation, just like

during classroom training, can be an independent form of a lesson or be part of other forms, for example, a lecture, a practical lesson, a colloquium.

With the use of digital technologies, the possibilities of organizing students' independent work are expanding. Independent work with scientific and teaching-methodical literature on paper media is preserved as an important link of independent work of students in general, but its basis is now work with educational digital programs, testing systems, information databases, etc.

A colloquium is one of the forms of education, which involves a conversation between the teacher and students with the aim of clarifying the level of knowledge and improving it. In most cases, the colloquium is held at the end of the academic semester, or after studying certain theoretical topics. To organize a colloquium, it is appropriate to send a list of topics or questions to students by e-mail for preparation for this type of work, and during the colloquium to demonstrate it on the monitor.

A lot of digital technologies have been developed, however, in our opinion, in order to improve the quality of education, we should search for new approaches in the organization of distance learning, in particular, in the direction of finding innovative forms of work. One of these forms is proposed by P. Moore, who believes that it is expedient for distance education to use a non-classical scheme: lectures (when the teacher "voices" the educational material) and practical classes, where its assimilation is checked. In his opinion, it is much more useful to work according to the following scheme: an electronic version of the lecture is sent to the students in advance, and during the lesson the teacher comments on the most difficult questions, the study of which is planned to be examined in detail later; the next lesson is devoted to the discussion of problems that arose during the study of the topic, consideration of examples [13]. With this approach, lectures in their classical sense are not held.

Of course, in addition to the advantages of using digital technologies, the teacher should consider their downside. The use of these technologies during distance learning can lead to a number of negative consequences, including: deterioration of the physiological state and health of the student; a number of psychological and pedagogical problems (unfiltered information can cause psychological damage); a decrease in the student's speech activity, as a result of which she does not have sufficient practice of expressing her own thoughts

in speech. Long-term absence of active practice of the specified type has a negative effect on thinking processes. Disadvantages of the use of digital technologies are also more significant requirements for the teacher (many students of education have more modern equipment at home than teachers; in addition, some teachers do not have even minimal knowledge in the field of digitalization); the research activities of students are complicated by the following reasons: difficulties in choosing high-quality research material from the Internet, the possibility of obtaining a ready-made product; insufficiently developed self-education technology for education seekers; low information culture of these persons and teachers. Information culture involves checking the reliability and quality of information sources and preventing plagiarism. Indeed, when using digital technologies, the "principle of energy savings" can work: why spend your own energy and time preparing for a practical lesson or laboratory work, if the Internet provides such a rich choice, and you can, without spending too much effort, get a ready-made solution to the problem .

The use of various digital applications contributes to the personalization of the educational process. The teacher cannot devote half an hour to each learner in each class, but can see progress by analyzing the data collected by programs and applications. Traditional education with digital technologies is not a trend, but a requirement of the time. All changes taking place in society are reflected in education. Teachers should encourage the use of digital technologies in education, as this is an area in which today's learners are well versed. Their awareness of technology can be an impetus for greater engagement and deeper learning.

It should be noted that the use of digital tools and technologies, which have acquired the characteristics of mobility, affect the environment where the education of students takes place and which is a mechanism for realizing personal flexibility and adapting the modern personality to changing methods of educational interaction. Such an environment is characterized by dynamism, mobility and adaptability, and the implementation of educational interaction in it takes place without territorial restrictions (at home, on the road, at work), geographical (from any location), time (at a convenient time and at a convenient pace). We consider it promising in its development to use the possibilities of modern digital technologies.

At the same time, the use of the term "digital technologies" in normative legal documents of education was not found. In national legislation, it is

identified with the concepts of "electronic resources", "digital information". Thus, the Regulation on the National Educational Electronic Platform [21], which is the technological support of the secondary education reform "New Ukrainian School", defines the main tasks, functions, structure, principles of its functioning and basic concepts: electronic office, electronic textbooks, electronic educational resources etc. The Law of Ukraine "On Copyright and Related Rights" [20] defines that electronic (digital) information is audiovisual, musical works (with or without text), phonograms, computer programs, programs (broadcasts) of public broadcasting companies, that is presented in an electronic (digital) format suitable for reproduction and may exist or be stored as one or more files (parts of files) in a computer database, servers on the Internet, etc.

O.O. Bernaziuk defines the concept of "digital technologies" as technologies in which digital signals are used to transmit information [17]. M. A. Zhurba characterizes them as "coded into discrete signal pulses" [18].

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It was found that there is no single approach to defining the concept of "digital technologies" in scientific circles and national legislative documents. In the classical sense, we interpret it as an electronic way of processing and transmitting information using coding symbols used in computer equipment and computer technologies.

Along with this, the analysis of international legal acts revealed the active use of the term "digital technologies" [23; 26; 27]. In the scientific

works of foreign researchers, it is emphasized that professional associations, publishing and technological companies should support and strengthen the efforts of teachers of higher education institutions in the implementation of digital technologies for the purpose of continuous improvement of the learning process [24; 25]. This ensures the success of the individual's educational trajectory, demand in the labor market and in society as a whole.

According to the results of the monitoring of online resources, digital tools were found that allow the teacher to create conditions for an active educational trajectory of students in the electronic educational environment (e-environment).

We classify them by directions:

– tools for setting educational problems, summarizing the studied material, summarizing (Google Drive, Google Site); – tools for checking and consolidating knowledge, forming critical thinking (Learningapps, Educaplay, Flippity);

– tools for organizing group work, reflection (MindMeister, Cacoo, Bubblus, Mindomo);

– tools for organizing independent work (Glogster, ThingLink, Google Drive).

Also, the use of modern digital technologies and tools for organizing the learning process in the internal Intranet network has become especially important. The tool for formulating the context of educational tasks by the teacher is the taxonomy (level classification of verbs) proposed by B. Bloom for the specification of educational goals (results). When designing "digital activity", the teacher focuses on the formation and development of students' skills necessary for a successful career, namely: complex problem solving, critical thinking, creativity, the ability to cooperate, emotional intelligence, negotiation, cognitive flexibility [19].

The use of digital technologies in the educational environment creates opportunities for managing the learning process, methodical support, optimal organization of the joint interaction of the teacher and students, updating forms of interpersonal communication [22; 24; 25].

We will briefly describe the digital tools that can be used to create educational tasks for students of higher education.

**Google Drive** (*Google Drive*) is an online environment where files (pictures, recordings, videos, documents, tables, etc.) are systematized,

stored, changed, deleted, and added. Files are accessible from any device with an Internet connection, and the changes made are saved automatically. Note that this tool can be used in the educational process by a teacher of any discipline (in lectures, laboratory, practical classes). The ability to work through comments allows students to work on assignments synchronously or asynchronously with the teacher, accept or reject the proposed decision, etc. This forces students to study the educational material more consciously. Google Drive is one of the tools for setting a learning problem, organizing independent work, summarizing the learned material and summarizing, which allows users to store information on servers in the cloud and share it with other users on the Internet. Files are accessible from any device with an Internet connection, and changes are saved automatically. Google Drive includes Google Docs, Sheets, and Slides, an office suite that lets you collaboratively edit documents, spreadsheets, presentations, drawings, and more. Note that this tool can be used in various disciplines (in lectures, practical classes). Students of higher education have the opportunity to process educational material synchronously and asynchronously, analyze it and assimilate it.

The main advantages of the Google Drive service:

– The service is free, has a Ukrainian-language interface.

– Access files from anywhere. Put your files on Google Drive and you can access them from your desktop, mobile phone, or tablet, as well as from drive.google.com.

– Constant update. You make changes to a file in one place and it automatically updates everywhere.

– 15 GB of free space. You get 15GB of Google Drive storage for free to start with, so you can store all kinds of files here – images, stories, layouts, drawings, recordings, videos, and more.

Google Drive lets you instantly create new documents, spreadsheets, and presentations. You can collaborate on the same documents at the same time and see changes as they appear. Google Drive is a single space for storing files and working with them. It allows you to work on documents simultaneously with other users, for example, prepare a joint project with a colleague, plan any events or keep records with partners. With this service, you can upload to the cloud and have constant access to any files, including videos, photos, PDFs, text documents and many others – a total of 30 types.

**LearningApps.org** is a tool for checking and consolidating knowledge, forming critical thinking. It is easy to use and allows you to create interactive exercises. It is a designer for the development of various tasks (quizzes, crossword puzzles, puzzles) of different levels of complexity and different subject areas. Students can independently create tasks, or they can perform tasks prepared by the teacher. The main advantage of the service is that applications are created exclusively in Ukrainian.

**Cacoo** is a tool that allows you to collectively create diagrams and schemes online, simultaneously make changes and discuss work in a special chat. Cacoo is free to use.

Cacoo makes collaboration a reality! Charts created in Cacoo can be edited by multiple people at the same time. Changes made by users are displayed in real time. Working at Cacoo feels like everyone is working together in the same room and gives new meaning to the word Collaboration.

Various stencils are available in Cacoo, so you can easily draw the diagrams you need:
- Site map
- Framework schemes
- Frame diagrams by hand
- Web services
- Block diagrams – UML
- ER charts
- Basic stencils
- Clouds with text
- People
- Smiles
- Greeting cards
- Dimensional lines
- Office equipment
- Network
- Planning of premises
- Simple icons
- Files
- iPhone
- iPad

– Android

– Electric circuits

Cacoo is currently available in many languages.

**Google Forms** is a tool for reflection, creating the simplest surveys on any topic. It is possible to analyze the results of the survey with the help of spreadsheet tools from Google. The form can be connected to a Google spreadsheet, and then the respondents' answers will be automatically saved in it. If this feature is not enabled, you can open the Answers menu and view a summary.

To create forms, you need to have a Gmail mailbox, if you don't have one, follow the link and register at http://mail.google.com.

Upon registration, your personal Google account is created and this gives you many additional opportunities (one of them is 15 GB for free storage of your files on the cloud).

If you already have Gmail, you can go directly from it to Google Drive. Or enter from the browser by clicking on the square in the upper right corner. In the window that opens, select Disk. At the top left, click the CREATE button. Not all options are visible in the window, so click on "More" and select Google Forms. Instead of "New form" write your name (survey, questionnaire, test, etc.).

Below, in the line Description, you can explain the essence of the online form in more detail. For example, make a description of the test or ask to fill out a survey form and explain why you need it. You can also change the "New Form" to your name in the top left of the form's cap, so you can easily find the form you want in your Google Drive later. Then you can start filling out the form. It is better to prepare a list of questions in advance.

Additional features of Google Forms include the ability to add a title and description, image, video or a new section to the question.

The finished form can be shared in any way:

– include it in an e-mail message;

– copy the link (create a short URL) and share via social networks or insert into advertising;

– copy the HTML code and put it on the site.

**AnswerGarden** is a concise tool for organizing instant evaluation of answers, simplifying the process of obtaining statistical data. The advantages of using AnswerGarden are:

– no need to create an account. To start working in it, you just need to go to the main page and click the "Create AnswerGarden" button ("Create AnswerGarden").

– provides an opportunity to build a shared cloud of words in real time, unlike such resources as Word It Out, Word Art, Word Cloud Generation, which allow you to create only author's projects for educational purposes with "word clouds".

– the teacher formulates a clear task for the applicants, and the applicants, having joined using the link sent by the teacher, leave their answers. The number of applicants' answers is unlimited, unless it is determined by the conditions of the teacher's assignment. In addition, the teacher has the opportunity to set the time limit for providing an answer (for example, within an hour), the number of characters (the length of the answer is 20 or 40 characters), modes of providing answers (for example, "Brainstorm"), etc.

– the teacher and students can immediately see how the answers appear in the virtual cloud from the sent words and which of the answers occurs most often. The number of identical answers is displayed when hovering over the enlarged word. Important: the teacher needs to systematically update his page so that new answers appear on the screen.

– an interesting feature of AnswerGarden – if the answer you wanted to write is already on the screen, you can add it by simply clicking on the word in the cloud. Then this word will increase in size.

Word clouds in lessons can be used for various educational purposes: for an anonymous survey, collecting comments from students, brainstorming, or reflection, where students complete sentences from word combinations on the word cloud: "I learned in class," "I understood/- la", "I learned", "I did the best in the lesson", "I didn't understand", "I had difficulties", etc.

AnswerGarden can become a good assistant for both distance learning and offline learning. In addition, access to the tool is convenient both from a computer and from a mobile phone.

**MindMeister** is a tool for creating mind maps. You can systematize the created maps. New elements (ideas) of the scheme can be highlighted in several ways: font, background color, icon, attaching an explanation to them.

Effective in the professional training of future teachers is the use of online tools with the help of gadgets. For example, Nearpod is an online

tool that allows teachers to create individual assignments and track them using mobile devices. A feature of this service is that users have the opportunity to connect to Nearpod 3D and Nearpod VR.

**Kahoot** is an interesting learning game platform that allows you to create, play, open and share interesting didactic games in minutes. To start working in the service, you need to register. Kahoot is a free online service that allows you to create interactive learning games consisting of a series of multiple-choice questions.

Such game forms of work can be used in education – to test the knowledge of students. Also, the service can be useful to the head and teaching staff of the educational institution for various forms of scientific, methodical and organizational work.

Participation in games created with the help of the service promotes communication and cooperation in the team, increases the level of awareness in information and communication technologies, and stimulates critical thinking.

To start working in the service, you need to register: follow the link and select the "Sign up for free" option in the upper right corner. Then on the page you will be able to choose one of four roles: teacher (Teacher), student (Student), home (Home) and business (Business). In the first window, you need to click on the arrow and select the role "I'm a teacher". Therefore, you need to enter your email address and create a password. After that, the site will offer one of four registration options: basic (Basic), which is free; plus (Plus) – worth $5 per teacher per month; professional (Pro) – $10 per month; premium (Premium) – $15 per month. We choose: get the basic version for free (Get Basic for free). Another cell will appear below, where you need to enter the name of the educational institution. Then fill in the registration data: choose a username, enter your email and confirm it, choose a password. To complete the registration, you need to select the "Create account" option.

Basic access to the platform gives the teacher quite a lot of opportunities:
– allows up to 50 students to be involved in testing;
– you can create questions yourself (Create button in the upper left corner of the screen) or use ready-made questions from the bank (to view the entire question bank, click the Discover button in the upper left part of the screen);

– you can turn on the function for automatically shuffling the answers in the question;

– to visualize the question, you can use the bank of images, add them to the questions or use them as answers;

– it is possible to limit the time given to the student to answer the question;

– you can determine the number of points for each correct answer;

– allows you to find out how each student answered the question, or to build diagrams of the success of the academic group.

Paid access to the platform gives much wider opportunities. They are manifested, in particular, in the number of students who can be involved in the survey ("plus" – 100, "professional" – 200, "premium" – 2000), the ability to receive an extended report on the results of the survey, create a team virtual space for the educational institution, use the image library in its entirety, receive priority online support ("professional" and "premium" tariffs), use the logo and colors of the educational institution ("premium"), etc.

The service offers three forms of play. The goal with which you intend to create a game will help determine the form:

– to determine the level of familiarity of the participants with this or that topic or the level of its understanding – a quiz;

– arrange a discussion on a certain issue, present an idea and receive "feedback" on it – discussion (Discussion);

– to collect opinions, views of participants on this or that problem – survey (Survey).

The platform allows testing in two ways:

– virtual classroom – testing can be done together with students in the classroom. In this case, questions and answer options appear on the screen of the teacher's projector or computer, and students answer from their mobile phones or computers;

– self-paced learning (for self-placed learning) – students take the test on their own, questions and answer options appear on the screen of their computers or smartphones. Having chosen this method, the teacher has the opportunity to set the date and time period during which the testing will be open.

To join the test, students need to go to the kahoot.it link from their computer or smartphone, enter the test code, and then their name. The code

is generated automatically after creating the test and the teacher must inform the students in advance.

The platform is a convenient tool for creating tests that can be used to:
– current and modular control of students' knowledge;
– independent learning and self-control;
– preparation for modules and exams;
– survey of the opinion of students, etc.

The "virtual class" survey method can be used not only for classroom classes or distance learning. It can also be used during student conferences, scientific circles or other events when there is a need to involve students in the discussion of scientific or educational problems.

Virtual whiteboards are used to quickly obtain data from students. For example, **Padlet** is one of the services that allows all participants of the educational process to work together on a web wall, on which you can attach files, photos, calls to sites, etc. The wall can be moderated by several participants, reading and editing access can be open to anyone.

**Padlet** is a virtual whiteboard on which you can place text notes, images, photos (including from your device's webcam), files and links to external resources. You can move element cards around the board, add comments under individual cards, and work with the board together with others. When the board is ready, you can share it on social networks, embed it on your site, export it in various formats, print it, and even create a QR code for it.

Main features of the service:
– 3 virtual boards in the free version;
– unlimited number of participants;
– automatic saving of changes;
– the possibility of commenting;
– possibility of moderation and setting of access modes (only viewing, editing, administrative access);
– support for a large number of formats (images, video, audio, tables, documents, etc.).

Especially valuable in working with online boards is the ability to choose and change the displayed content display formats. Padlet offers seven information display formats, each of which can be used in an e-course for specific purposes: the most popular formats are "Wall" or "Shelf", however, discovering the various possibilities of Padlet, teachers start to experiment.

In the Padlet "Wall" format, the information placed on the stickers is structured in blocks, so you can move them on the surface of the online board only within certain limits, like a puzzle constructor. Instead, in the Padlet "Canvas" format, the contents of the stickers can be arranged, grouped and combined in any way.

You can not only choose content display formats before creating a new Padlet, but also change the format of an existing online board. For example, at the beginning of the lesson, you can ask participants to write answers to some question in the Padlet Backchannel format, in which new messages appear on the board in a form similar to correspondence in a chat or messenger. When all class participants have expressed their opinion, the teacher can change the display of the content generated in the class to the Padlet "Shelf" format. As a result of such a maneuver, students' answers will automatically be placed in one column, which can be called "Answers in the classroom session", and next to it create other columns with the names of the next tasks, to which students will add their new entries. The Padlet "Shelf" format is often used to organize the results of work in groups (for example, group essays) or to present all the references from an educational session or training in a structured way. The same algorithm for transitioning to the "Shelf" format can be used starting from the "Broadcast" Padlet format, in which the content is easy to read from top to bottom and which is often used to host blogs, stories, discussions, forums, instructions or, for example, module summaries. On Padlet online boards, you can not only post information, but also interact with the content by rating, liking or leaving comments.

Teachers most often offer students to submit such works on the online board, which should be shared not only with the teacher who checks and grades them, but also with other students of the course. For example, it can be an online board with infographics or visual summaries of a scientific article, student selections of flash cards on a specific topic, results of group work or brainstorming results are often published on Padlet, etc. In e-courses, you can often find Padlets with chronologies of historical events and visualizations of the plots of literary works, summary materials for the study of a topic or module, a treasure trove of resources or tools necessary for working on the course, and sometimes online boards become a space for posting additional tasks with the opportunity to receive extra points for them.

Padlet has several ways you can share your online whiteboard with users: copy the link, generate a QR code, insert a script for a website, share directly on social media, save Padlet as a photo (JPG, PNG) or download a PDF file with all posted information. You can also provide access to Padlet by sending email invitations to users. For teachers who work in the UCU CMS based on Moodle, the question of how to integrate Padlet into their e-course is especially relevant. This can be done in at least three ways, but each time you should start by adding the "Page" resource to the course.

**Canva** is a relatively new Ukrainian-language service that is already used by many teachers across the country. With it, you can easily create lesson plans, timetables, posters, collages, presentations, infographics, various charts and much more. All functions can be used online and absolutely free. This is a very popular site (and smartphone app). Here you can create a design for anything: posters, videos, posts, flyers, CVs, business cards and other graphic products. The Canva site has a huge number of creative templates of various styles and for every taste. This service is fun just to browse for inspiration. Of course, you will have to pay for some features, but even without it, you can create something very creative and unusual.

At the same time, the teacher's use of digital tools in the educational process provides feedback, in particular, through summative and formative assessment, which provide various data on the level of students' understanding of key concepts of the educational material and the formation of certain skills in them. Formative assessment is constructive feedback from the teacher to the student. Also, it is an opportunity for the student to track his own development process, error analysis, development of critical thinking, etc. In other words, reflection of educational achievements with a clear idea of what needs to be done next [19].

From the point of view of ensuring the implementation of planned learning outcomes and the implementation of formative assessment in the educational environment of a higher education institution, we highlight three criteria for the selection of digital technologies:

– provision of interactive information interaction in the learning process;
– adaptation to the individual characteristics of students;
– the possibility of synchronous or asynchronous interaction of subjects of educational activity.

The use of digital tools for formative assessment is multivariate. The teacher chooses a specific technology based on the educational needs of the students.

Thus, in the professional activity of a teacher, the determining indicator of competitiveness in the labor market is the systematic use of digital technologies in the educational environment, readiness and ability for technological, organizational, social innovations, cooperation and mutual responsibility. In the conditions of global processes of digital transformation of all spheres of social life, the need for teacher interaction with students in the educational environment of a higher education institution is increasing, both in the traditional format and with the use of digital technologies. At the same time, the question of the level characteristics of the digital competence of a modern teacher of a higher education institution, which are being investigated by domestic scientists N.V. Morse, O.G. Kuzminskaya, M.A. Gladun, V.P. Vember, and I.P. Vorotnikova, remains open [28].

From today's perspective, competent, responsible, competitive specialists who possess critical thinking, are proactive, creative, socially active and professionally mobile, competently and consciously use the means of information and communication technologies in their professional activities are in demand on the labor market.

Today, digital technologies are a tool that is actively used in education and contributes to the improvement of its quality. The need for transformations in pedagogical education is defined in regulatory and legal documents, namely: laws of Ukraine "On Education", "On Higher Education"; decrees of the President of Ukraine "On measures to improve the higher education system of Ukraine", "On measures to develop the national component of the global Internet information network and ensure wide access to this network in Ukraine"; in the Strategy for the Development of Higher Education in Ukraine for 2022–2032; in the Concept for the Development of Pedagogical Education, the Concept for the Development of the Digital Economy and Society of Ukraine for 2018–2020; provision on electronic educational resources. As stated in the Concept "New Ukrainian School", "the end-to-end application of information and communication technologies in the educational process and management of educational institutions and the education system should become a tool for ensuring the success of the New Ukrainian School", because a modern

teacher cannot carry out educational activities without the use of modern technologies, and such services as e-mail, Internet search, mobile phones, video calls are becoming indispensable and universal. It is clear that the informatization of education involves improving the professional training of future teachers in the conditions of the informational educational environment of higher education institutions

Special attention should be paid to the digital training of a modern teacher, since, in addition to basic digital competencies (preparation of text documents, presentations, tests, etc.), a modern teacher must possess innovative practices for implementing adaptive, mixed, distance, cloud, and mobile learning, etc.

According to "Education. Strategy of Ukraine 2030" universities should move not only to digital tools in the traditional educational process, but also to completely new digital learning models; develop digital transformation programs to ensure the competitiveness of educational, research and economic activities at the national and global levels [4]. Why does it need to be done immediately?

First, "digital" literacy ("digital" competence) was recognized by the EU as one of the 8 key competencies for a fulfilling life and activity. However, as shown by the results of the first all-Ukrainian study of digital literacy of Ukrainians (December 2019), 53% of the population of Ukraine is below the "basic level" mark.

At the same time, 37.9% of Ukrainians aged 18-70 have digital skills at a level below basic, and 15.1% do not have them at all.

However, only 47% of Ukrainians aged 18-70 believe that learning digital skills is relevant for them. Mostly, these are young people [5].

Secondly, universities are pushing new forms of university integration to digitization. Among them: a) virtual universities (consortia, associations), which mean the pooling of resources of HEIs located in different regions (countries) for the purpose of joint implementation of individual educational programs, primarily in new technological environments; b) network universities. Organizations of various sectors of science, education, business, etc. participate in the formation of the latter: universities, state scientific organizations, small knowledge-intensive firms, large businesses, local authorities. The network organization of the university makes it possible to build a "school-university-consumer" chain.

Thirdly, thanks to digitalization, the creation of innovative networks with the participation of HEIs, scientific cooperation between HEIs of different countries is accelerated, especially in the field of research and development [6].

Developing:

– research and production networks created in accordance with the scientific and technological policy of transnational corporations. TNCs try to control the creation of new technologies, experimental development and provision of engineering services, production and sale of science-intensive products;

– scientific and educational networks based on universities that interact with other educational institutions within the framework of regional or international relations and have a state or private status. Reforming higher education institutions based on the principles of a network research organization leads to the emergence of "virtual universities" or "invisible colleges";

– educational and business networks on the basis of leading universities and innovative companies within promising areas of research. Possible discrepancies between scientific, educational and industrial activities are corrected by the state.

Fourth, the digitalization of universities strengthens their competitive advantages in the markets of educational services. For example, in Ukraine, lawyers are trained not only by law schools, but also by classical and technical universities, which have wide opportunities for digitalization and thus become much more attractive to applicants. Moreover, the educational process is becoming globalized, and we already have to compete with universities in Poland, the Czech Republic, Germany and other countries with educational systems of a new generation, including the achievements of the digital economy.

The generalization of world experience indicates that digitalization of higher education should include [2]:

1. Digitization of internal processes/services of the university:

– creation of basic information services used in the educational process (video screens for educational sessions, cloud technologies for data storage and exchange, etc.);

– creation of a digital library (ensures student or teacher access to scientific literature from any device, regardless of location and time of day)

with tools for scientometric evaluation of indicators of scientific work and publication activity of university teachers and employees;

– digitization of the processes of management of research projects, purchases, interaction with applicants and students, etc.; – creation of digital campuses (experience of the USA, European countries).

2. Creation of a digital marketing system that would ensure: organization of the University's interaction with applicants and their parents, graduates and employers; constant monitoring of the university's reputation and formation of a positive image of the university; stimulating the creation of new digital communities and innovations at all stages of the educational cycle, etc.

3. Creation of a system of digital interaction with applicants and students:

– the use of digital technologies to inform applicants about various issues of the educational process, which is important both for domestic applicants and for potential foreign applicants;

– use of analytics to identify student learning outcomes and their rating;

– creating a feedback system with students, studying their opinions and suggestions, evaluating teachers, the quality of the curriculum, the need for certain educational and professional programs, etc.

To implement such tasks, digital technology departments are opened in foreign universities and the position of Chief Digital Officer (CDO) is introduced. The experience is very important, it deserves to be studied and spread in Ukraine [3].

The pandemic affected and continues to affect the field of education, as the sudden transition to distance learning caused by an emergency situation put teachers in new, previously unknown conditions. The only thing they can do in this situation is to use a digital learning model. It is worth noting that such a transition took place in an incredibly short time, but with partial availability of resources, and this made it possible. Digital technologies during the pandemic enable remote interaction between educators and learners. In the conditions of digitization of the educational process, a type of modern teacher is being formed, who must not only possess knowledge in the field of these technologies, but also be able to apply them in professional activities.

Summarizing the results of using the possibilities of digital technologies, it was found that they enrich traditional teaching methods with new forms

of presentation of educational information and methods of interaction characterized by dynamism and mobility. Their use by the teacher in the educational process for educational tasks and formative assessment ensures the inclusion of the student in the process of information exchange, maintaining an individual approach to everyone, taking into account the needs of the learner, creating conditions for self-realization, cooperation, reflection, etc. The assessment provides students with information about how well the learning material has been developed and what aspects need improvement. Also, assessment is not only a recording by the teacher of the results of the completed educational tasks, but also a means of managing the student's development.

The selection of digital technologies for creating educational tasks depends on the educational goals. The process of educational interaction using digital technologies becomes more flexible, accessible and personalized, which meets the challenges of modern society – education for self-realization in life and one's own career. Their active implementation in education is an important factor in the modernization of the education system and meets the requirements of reforming the education system.

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