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# DIGITAL TOOLS FOR EFFECTIVE STUDENT LEARNING AND TRAINING ONLINE IN CONDITIONS OF UNCERTAINTY

## ABSTRACT

The purpose of this work is to intensify the implementation in the educational process of digital tools to provide quality education during online classes. Underlined the importance of high-quality training of education seekers under the condition of using modern digital tools for conducting classes in conditions of uncertainty (such as quarantine, martial law) for the training of a specialist at a high level, that is, in the conditions of the classroom, was noted. To achieve the goal, the following tasks were solved:

- the role and importance of online learning in today's uncertainty is substantiated;
- it was emphasized the importance of properly selected teaching methods for educational components in an online format, taking into account the requirements of the National Agency for Higher Education Quality Assurance to educational program (EP) by the 4 criteria, and, therefore, identified the most acceptable digital tools in the educational process to ensure high-quality educational services online.

The article also substantiates the social importance of online classes in the context of obtaining quality education for people with disabilities, which is possible with this form of teaching using a wide range of digital tools.

**Keywords:** distance learning, online learning, learning methods, learning technologies, digital technologies

**JEL Classification:** J24

## INTRODUCTION

Today, there is an acute problem in solving the issues of the formation of high-quality education in Ukraine, which will take into account the trends and directions of educational development in the European space. Education, research, innovation forms the basis for a successful and effective future of society since it contributes both to its social development – through the formation of soft skills in a student, and economic – through hard skills as a result of mastering educational components that form programmatic learning outcomes in the professional direction. In both cases, in order for the student to receive knowledge at a sufficient level, it is necessary to organize properly the educational process, guided by internal documents on quality assurance of higher education, to use effective methods, methods and tools of teaching.

It is right to say that it is currently impossible to imagine a society without the use of digital technologies, the Internet. Currently, the digitalization of processes in the field of education and marketing is actively taking place, especially during the last five years. Uncertain conditions, such as quarantine introduced as a result of the spread of the coronavirus disease, martial law, as well as the limited capabilities of individuals (such as the results of diseases or physiological features), acutely raise questions about the possibility of conducting online classes at a high level, which will correspond to the auditorium. Achieving such a result is possible only by using digital tools with an understanding of which of them is appropriate in certain conditions and with an understanding of the goal to be achieved as a result of teaching the material. That is why the issue of digitalization of the educational process and the maximum use of the possibilities of digital tools is relevant and requires detailed disclosure.

## LITERATURE REVIEW

These Ukrainian scientists devoted their works to the issue of the formation of high-quality education in the conditions of informatization and digitalization of society: N. Boliubash [6], I. Bloschinsky [5], V. Dyvak [7], M. Ivashchenko and O. Samoilenko [14], M. Kyrychenko [10; 11], S. Kas'yan [9], and T. Makhyni [13], V. Kukhareno [12], as well as foreign scientists – Patricia McGee, Abby Reiss [3], Samnana Ali [4].

Scientists O. Samoilenko and M. Ivashchenko pay attention to the development of distance learning in the work of the international educational society with the problem of the prerequisites and stages of the development of distance learning. Myhnya T. in scientific fractions pays attention to the use of new information and communication technologies in teaching, Kyrychenko M. pays attention to the factors of the influence of technology, technologies, innovations on the development of society, social capital, and especially in the conditions of digitalization and sustainable development. Scientists Samnan Ali, M. Amaad Uppal, Stephen R. Gulliver in their works consider the conceptual foundations and reasons for the inhibition of the implementation of e-learning.

Researchers in their works highlight the current problems of the formation of quality education in online learning, but it is advisable to consider and resolve their issues regarding the use of digital tools – the basis for the formation of quality educational services for online classes of all educational institutions due to the quarantine restrictions, uncertain conditions.

## AIMS AND OBJECTIVES

The purpose of the article is to justify the expediency of using advanced digital tools to ensure high-quality online training and obtain programmatic training results for education applicants in the current uncertain conditions.

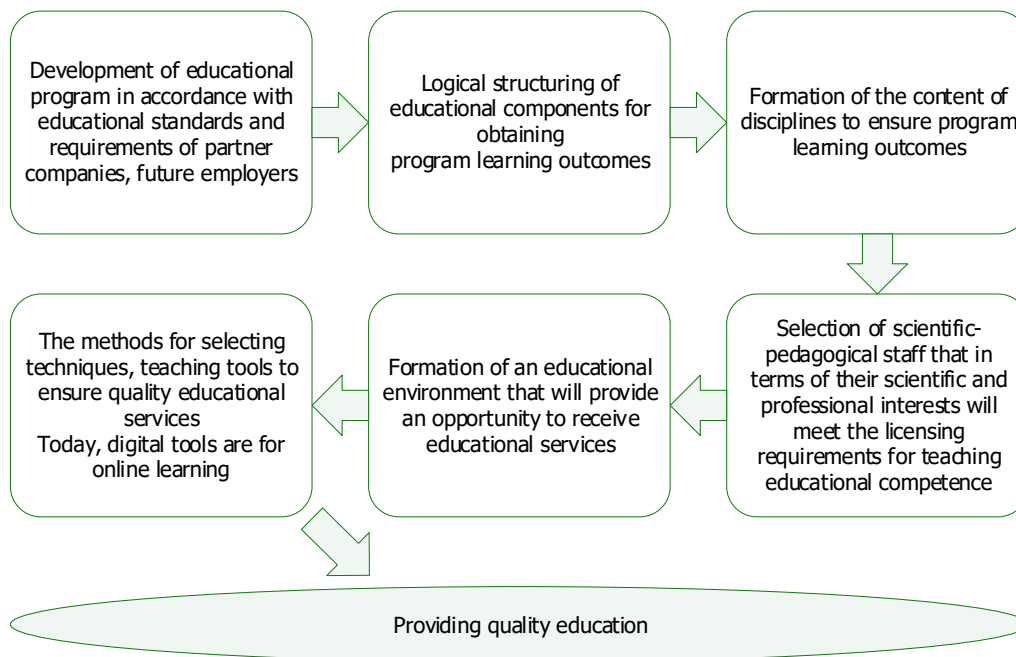
## METHODS

Analysis of constructive ideas in education issues in an online format, as well as digitization of the educational process. Synthesis of the resulting elements with their further generalization.

## RESULTS

The document «The Standards and guidelines for quality assurance in the European Higher Education Area» (ESG) is noteworthy, which states: Increasing access to higher education is an opportunity for higher education institutions to absorb a diverse range of individual experiences. Higher education needs to be fundamentally transformed to respond to this diversity and growing expectations; it needs a more student-centered approach to teaching and learning, which would provide flexible learning trajectories and recognize competencies acquired outside the formal education and qualification program [15]. Higher education institutions must become more diverse in their goals, ways of providing education and models of cooperation: in particular, the level of internationalization is growing, and digital teaching methods and new ways of teaching are being developed [17].

It is advisable to determine the importance of learning tools in the system of ensuring a quality educational process, therefore its role is significant because it is the tool to achieve information to the applicant. Today, digital tools play an important role, their place and importance in the process of ensuring the educational quality in classroom-online learning under uncertain conditions are shown in Figure 1.



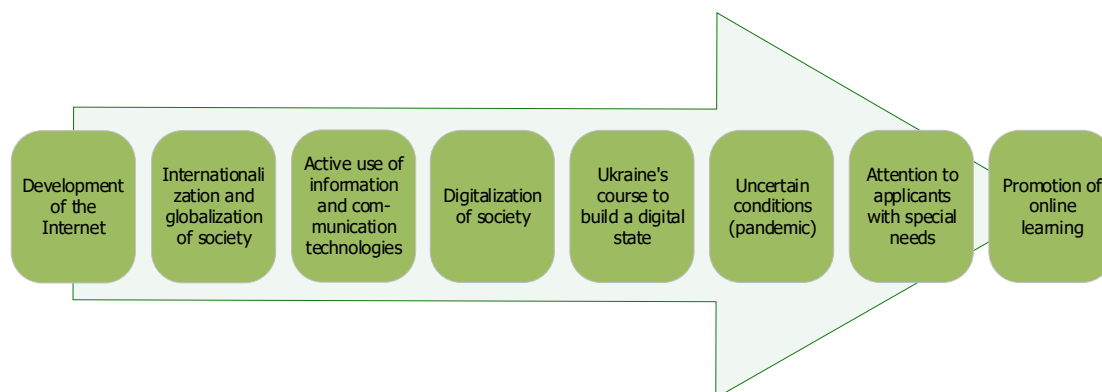
**Figure 1. The place of digital tools in the process of ensuring the educational quality in classroom-online learning under uncertain conditions.** (Source: summarized by the authors of [1; 15; 16; 17])

In the present circumstances, for the second year in a row, society is adapting to the uncertain conditions caused by the spread of coronavirus, it is necessary to pay attention to providing higher education services at the same level as before the pandemic. In order to do this, the educational process must be organized in a way that students do not feel the difference, i.e. they continue gaining theoretical and practical knowledge and skills in the learning process. In addition, they must understand that this frees up time for mastering courses in non-formal education, which means that students are more thoroughly engaged in self-education.

Thus, the question arises of how to provide conditions for students' distance learning at the required level (i.e., full-time). Therefore, this study focuses on the use of scientific and pedagogical tools for teaching students online. This issue has been actively considered since the spread of the practice of providing distance learning services but has not gained much interest until the world has conditions that, so to speak, required immediate resolution (quarantine restrictions). The pandemic has led educational institutions to convert full-time education to online learning.

It is an interesting fact, that in Ukraine the experiment of implementing distance learning began almost 20 years ago, it was launched by The Ministry of Education and Science of Ukraine in 2002, a number of higher education institutions joined the project, but it did not gain popularity and was not credible, despite the fact, that the precondition for the perception of this form of education was the Law «On the Concept of the National Informatization Program», signed in the early 2000s [2].

Today, distance learning is considered a common practice and is based on the following factors (Figure 2):



**Figure 2. Prerequisites for intensifying online learning.** (Sources: [1; 12; 16; 19])

The above-mentioned factors have intensified and accelerated the use of e-learning in higher education. As we can see, in the last two years, teachers and research-teaching staff have been mastering new opportunities to use digital tools to conduct high-level classes. It is worth considering the interests of people with special needs.

According to the «Regulations on Distance Education», distance learning means an individualized process of acquiring knowledge, skills, abilities, and ways of human cognitive activity, which occurs mainly through indirect interaction of distant participants in the learning process in a specialized environment based on modern psychological-pedagogical and information-communication technologies [1].

It is worth mentioning the project of the world's first university of distance education – Open University, which was launched in the UK in 1960 [19]. Today, the number of students who have successfully completed their studies at the university is more than 2 million from around the world, and the university itself is the largest educational institution in terms of distance learning. In summary, it can be unequivocally stated that distance education is and should be adjusted and organized training of applicants with the possibility of teaching them online.

## DISCUSSION

After studying a number of scientific works looking for the definition of the term «distance learning», in our opinion, it is worth noting the definition given by V. Kukharenko [12], who understands distance learning as «complex pedagogical technology that combines the achievements of pedagogy and psychology with the didactic capabilities of information and telecommunications technologies that allow the use of computers as a carrier of information and a means of organizing communication».

The scientist S. Kas'yan [9] in his work emphasizes the importance of finding the most effective methods of digitalization in learning using distance technologies; modernization of preparation and submission methods of educational materials; timely updating of their content; providing opportunities for quality access to educational content for participants in the educational process, notwithstanding of their place of residence, and forms of learning using quality educational materials created using digital technologies.

Scientists Samnan Ali, M. Amaad Uppal, Stephen R. Gulliver [4] have been studying e-learning issues since the active use of the Internet by the general public. However, they consider the educational process before the onset of quarantine restrictions, but since the emergence of Covid-19, traditional training has needed to be transferred to a new format - online learning. It is clear that there is a need to revise approaches to training and the means of its implementation. Scientists have focused on the fact that e-learning often fails - the result and success of students are reduced, as e-learning requires self-organization and the ability to plan their time, as opposed to online learning, which is trying to adapt to traditional learning as much as possible.

In their research, Patricia Mc Gee and Abby Reis [3] reviewed publicly available guides, documents, and books that support best or effective practices in blended course development to identify commonalities among such practices. The research paper also conducted a qualitative meta-analysis that identifies common principles regarding the design process, pedagogical strategies, use of technology in the classroom and online, assessment strategies, and course implementation and student readiness. However, the digital tools that could be used to communicate effectively with the audience, revive their attention and interest, and be part of the online learning process were not taken into account.

Bloshchinskiy I. G. [5] characterized the essence and content of the concept of "distance learning" in foreign and domestic scientific literature. The definition of the concept of "distance learning", which is an innovative form of learning, has characteristic features and can be used in all types of educational practice, providing the development of creative and personal components of the educational process. The author pays special attention to the disclosure of the essence and content of the concept of "distance learning", but does not indicate how to ensure the effectiveness of learning, and does not disclose the features of learning in an online format.

The research N. Boliubash [6] identified the factors and psychological and pedagogical conditions formation of professional competence of future specialists in the case of the introduction of network technologies in the system of traditional vocational education, but the study is based on the use of the information environment Moodle, not taken into account the tools that are currently available to enhance the student's work, attention is paid only to network technologies (hardware and software educational purpose)

V. Divak [7] formulated and substantiated the principles, forms and methods of applying blended learning technologies in the system of open postgraduate education, that is, for applicants who have already completed the learning process and

perceive information well and for whom online and traditional learning is offered, but again it is not emphasized what effective tools and measures should be used now

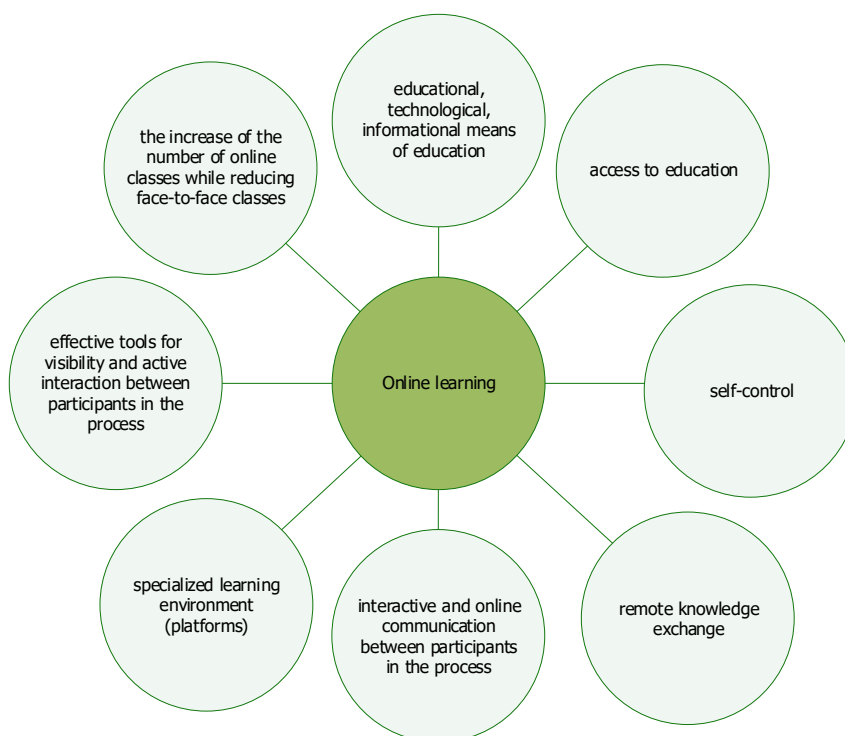
The results of M. Kyrychenko's [10;11] research are important in the spread of digital technologies, which act as a megatrend of the digital economy and management, as well as learning. The scientist proved that the impact of digital technologies on the development of human and social capital acts as a catalyst for increasing the intellectual and digital capabilities of a person capable of living in the digital era.

T. Makhynya [13] believes that innovative forms of ICT implementation in the professional and pedagogical activities of teachers are carried out through the use of standard and specialized programs, pedagogical software, educational e-mail projects, social services Web 2.0, the use of an interactive whiteboard, telecommunication forms: video bridges, videoconferences, webinars on the use of audiovisual learning tools and multimedia technologies, the use of social services. Again, except for the interactive whiteboard, the use of modern digital tools for interactive interaction between the lecturer and the student is not covered.

Distance and online learning are considered by O. Samoilenko and M. Ivashchenko [14] a relatively new phenomenon in modern pedagogy, which is at the stage of development and implementation, and the main stages of formation and development of distance learning are directly related to the reached level of technology and were unable to develop until technological capabilities did not become available to them.

Taking into account the results of the research of the above-mentioned scientists, we identify a gap in the construction of online education in the area of using new technologies, applied solutions and digital tools in order to activate their work, increase interest in mastering the disciplines and keep attention at the necessary level for mastering the material.

After researching the works of scientists on online learning, we can summarize the factors that characterize it, which are shown in Figure 3:

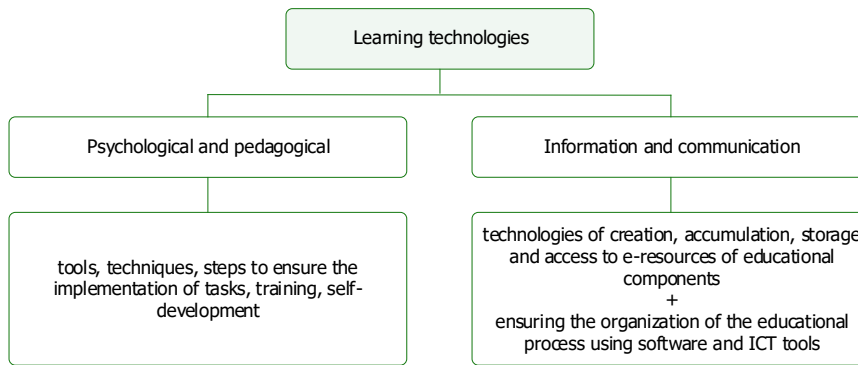


**Figure 3. Factors that characterize online learning.** (Sources: [3; 4; 9; 10; 11; 12])

The main factors include the availability of educational, technological, and informational learning tools; accessibility of education for people with disabilities, i.e. ensuring social equality from the standpoint of education, notwithstanding the location and residence, financial status, and health; use of educational, technological and informational teaching aids; self-organization of training and self-control; exchange of information at a distance, i.e. remotely; interactive and online communication between participants in the process using effective tools for training applicants to ensure active interaction

between participants in the process using a specialized learning environment; changing the ratio between face-to-face classes in relation to the online format (conducting classes to increase the latter).

When planning work online, it is advisable to start with choosing the approach to the organization of distance learning, because the process of organizing learning involves these lessons of communication technology with students, which is most acceptable when studying a particular educational component. Technologies of communication with students are divided into information and technological. Distance learning technologies are a set of educational technologies, such as psychological-pedagogical and information-communication, which enable the realization of the process of distance learning in educational and scientific spheres (Figure 4).



**Figure 4. Online learning technologies.** (Sources: [17; 18; 19])

Some progressive Universities in Ukraine provide the opportunity to perform remotely necessary tasks with the help of educational technologies (distance learning system MOODLE), and the rights and responsibilities of participants in the educational process in the university are regulated by «Regulations on Distance Learning».

Digital tools are actively used in the process of teaching students (below, except Jam board) in specialty 076 «Entrepreneurship, trade and exchange activities» in the disciplines «Taxes and tax systems», «Investment and business lending», «Business organization» and «Organization of commercial activity»), which allows you to effectively work and communicate with students while studying in online (Figure 5).

Jamboard	Smart board for teamwork, the ability to edit information in real time (paid version)
Pinup	Electronic note board (online data editing)
Mindmaster	Creation of intelligence maps, joint performance of work, visualization of thoughts
Kahoot!	Designing educational games using templates
Wheelofnames	For random selection of a speaker or selection of a ticket number in online mode
Quizlet	Create your own cards to visualize and simplify memorizing information
Mentimeter	Express polls in the classroom during online classes
Padlet	"Organizer" during distance learning
Wordle	Creating a word cloud
Livebinder	A tool for collecting and organizing resources for connecting and processing them on an interactive whiteboard

**Figure 5. Digital tools for effective communication and work of teachers with students in online learning.**

Let's take a closer look at each of the proposed tools, the first is Jamboard. Today, it is progressing (60-inch screen) with a wide range of capabilities, which is a smart board for the team to more easily convey their thoughts and ideas, develop new ones, and create with the group in real time.

Among the advantages of its use are:

- which facilitates and makes available connections and work for all participants;
- portability, because the device could be easily connected only with one cable;
- simple and easy to use, unnecessary information is removed by touch, in addition, there is the ability to recognize the manuscript, which is especially convenient for transmitting information by image;
- independence from the location, which is an extraordinary advantage due to today's working format (remotely, online, distantly);
- saving ideas and answers with their automatic mailing to students;
- feature updates (monthly) for functions;
- Ability to integrate with G-Suite, making it possible to use a variety of Google slides, presentations, PDF documents, and more.

A significant disadvantage that slows down the use of this device is that the board is purchased from Google and installed by them, i.e. Jamboard is not a free and widely available tool.

The next tool is Pinup – an electronic board for notes, the use of which allows you to work in real-time with information while editing it by the participants. It is convenient to work with students in case of discussion of a certain idea, everyone can express their opinions, write on the board (electronic analog of the usual board for notes), then discuss the vision and organize the material with the ability to edit and make the adjustments. It is convenient that all participants see each other's statements and have the opportunity to summarize the posted information, comment, and come up with it.

An interesting and useful tool is MindMaster, which serves as a basis for nurturing ideological and creative ideas. Creating smart maps, collaboration, sharing, team management, and mapping capabilities on mobile devices. It is extremely useful in mindmaps (intelligence maps) the ability to visualize your own visions and opinions, and their step-by-step building, and structuring.

It is advisable for students to use this service when writing essays, and creative assignments, since writing down individual visions and elements allows them not to miss the most important thing, and then systematize and generalize the material, and highlight the most important thing.

Simplifies the work with MindMaster a list of templates that allow you not to waste time creating them, but immediately write down the idea.

The construction platform Kahoot! allows you to create an educational game using ready-made templates and send it to students. Using the tool, you can create both a quiz (there are 4 answer options for each of the questions, and only one of them is correct) and a test (there are only two answer options for each question, one of which is correct) (True or False)).

It is useful to use the Quizlet service in the educational process, which allows you to memorize information that can be provided in the form of educational cards. To work, you need to either find materials in the database or create new interactive material – your own cards, which may contain pictures, and audio files. The map mode allows the student to perform exercises on memorizing the material in the game mode: see all the cards, turn them over to learn, and repeat concepts and definitions to them.

In the memorization mode, an individual training plan will be created based on mastering the material of the module. To complete this step, you must answer each question correctly twice. After completing each stage, all terms will be grouped according to the level of mastery: familiar means that the student answered correctly once, and learned twice. It is advisable to set a deadline for mastering, it is possible to track progress in the study of the material by a student, as well as reminders on topics and deadlines for them.

In the card mode, you can set a deadline for memorizing all cards, track progress and receive reminders from the program.

In the modes: writing – displays the term and grade, how well the student has mastered the material; testing – test variants are automatically created (matching, multiple choice, true/false, fill the gap); the game of selection – applicants



as soon as possible select the correct terms for the determination; gravity in the game – students must give correct answers to questions in order to save the planet from asteroid without actually hitting it.

The online service Mentimeter is designed to create and conduct instant polls in the classroom and during webinars.

The features and limitations of the service version are the following:

- one access code provides students with access to two surveys (no more than), as well as five questions in the Quiz mode;
- the teacher can create an unlimited number of polls of different types (for different access codes), as well as organize them in his profile in folders;
- you can create online presentations with an unlimited number of text slides, to which you can add images or links, as well as embed videos and add polls;
- to create polls and slides in Mentimeter you need to have access to the global network;
- to take part in surveys, participants must log in from their device (mobile phone, tablet, computer) to the menti.com website or enter the survey code into a pre-downloaded application;
- there are no restrictions on the number of participants participating in the surveys, which allows using the tool with a large number of students in groups.

The Pad lets an online virtual whiteboard be used as an «organizer» during distance learning.

Wheel of names is an extremely useful tool for conducting surveys, distributing questions, and student ticket selection while studying online. Allows for reducing the time for organizational questions to establish the sequence of speeches, and answers, which simplifies the survey procedure.

Wordle is a tool for creating a word map. The usage is appropriate when providing a definition, whereby students must provide concepts, associations, or visions regarding a problematic issue, and ways for their solution.

Livebinder is a tool for collecting and organizing resources for connecting and processing on an interactive whiteboard.

It should be noted that quite rarely, but now the practice of organizing the educational process in a mixed form, that is, Blended Learning, is used. This form of education involves a combination of online learning and face-to-face training, since digital and social networks are spreading daily among the population in the daily life of applicants, it is obvious that blended learning is the result of a combination of the action of informatization of society and digitalization in all areas, including education.

In addition, when teaching the above courses ("Taxes and Tax Systems", "Investments and Business Lending", "Organization of Entrepreneurship" "Organization of Commercial Activities", "Merchandising in the Market of Goods and Services"), the distance learning platform Moodle is actively used, which contains teaching materials on disciplines.

Also, when conducting practical exercises on the educational components "Organization of commercial activity" and "Organization of entrepreneurial activity" software is used "BAS ERP", access to which was provided to the educational institution and applicants through the server of the partner company of the department "Prokom" LLC, which allowed students to freely acquire practical skills when conducting online classes [8].

So, online learning allows you to transfer the educational process to a qualitatively new space, where new learning opportunities arise: being even at home (if you have the Internet) have access to platforms, programs, receive a high-quality educational service online for using well-chosen digital tools for learning. Thus, there is an opportunity for academic mobility of the applicant, since it is not necessary to cross the border and go to another country or go directly to an educational institution to obtain programmatic learning outcomes for the educational component that the student chooses, but it is enough to register for the course and master the discipline online.

Uncertain conditions caused by the spread of coronavirus diseases, as well as the state of war in Ukraine, especially emphasize the importance of improving teaching methods and identifying the most effective digital tools for effective learning. The question of the deterioration of the quality of education of those seeking education in difficult conditions disappears, because appropriately and aptly selected digital tools to allow providing an educational service, ensuring the quality and continuity of its provision. That is, the improvement of conducting classes online equates it to the level of classes held offline, which resolves the two-sided attitude to online education.



## CONCLUSIONS

Digital tools are the basis for effective online learning, which, in today's uncertainty caused by the pandemic, are an integral part of traditional education. Correctly selected digital tools, during training in the online format, will allow the student to acquire knowledge and skills that will form a highly qualified specialist, the student also will be interested in completing assignments. Therefore, it is important to use all the possibilities of e-learning in order to provide a high-quality educational service, since online learning is being integrated into traditional education every day and is gaining popularity among applicants for education.

A significant advantage of online learning is the maximum visualization of materials during classes since in this way the communication between the applicant and the teacher is most effectively set up, and most importantly, the material is mastered, since it is video information that is best perceived and remembered (text educational materials. Information should be presented in tables, graphs, figures, illustrations, diagrams).

In addition, at the institutional level, distance learning plays an important role, because the online format provides access to open education for persons with special needs and allows the development of a digital state with e-learning. Also, this training format makes academic mobility available to the applicant, since there is an opportunity to gain knowledge on the educational component regardless of the place of residence, material condition, i.e.

Thus, we can conclude that taking into account the fact that for a long time, namely over the past three years, society has been adapting to uncertain conditions and has completely revised its attitude to "online" learning as normal, equal to offline. That is why it is necessary to expand the list of popular online learning tools, as the understanding of the form of learning has been formed - at a distance using new methods, techniques, and tools. Analysis of digital tools and evaluation of their implementation in the online educational process indicates the most appropriate and effective advanced tools that should be used in online learning. Such tools are Pinup, Mindmaster, Kahoot, Wheelofnames, Quizlet, Mentimeter, Padlet, Jamboard, Wordle, Livebinder, but only with their layout, and successful combination, it is possible to fully recreate the traditional format of online learning.

Therefore, the results of the study clearly identified digital tools that should be used to ensure quality online learning in conditions of uncertainty. It was possible to prove the feasibility of their use due to the fact that learning outcomes are improved, students' work is intensified, interest in studying the discipline is increased, and their interest is enhanced, as the combination of digital learning tools allows you to keep students' attention and focus on key learning issues. The introduction of digital tools in online learning brings the audience as close as possible to traditional learning, as it stimulates communication between the participants of the educational process and to work in groups, to perform tasks together.

Unresolved but actual problems and prospects for their further research. Student programs provide for a free choice of subjects that can be taught in any educational institution, but the issue of the possibility of physical presence at it is not taken into account. The schedule of classes may be such that it is impossible to attend a class offline due to the territorial location of the educational institution (distance), as well as insufficient time to return to the next classes at the main place of study. Therefore, this issue remains open for research taking into account its solution thanks to the online format of attending classes and using digital tools.

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## DIGITAL ІНСТРУМЕНТИ ДЛЯ ЕФЕКТИВНОГО НАВЧАННЯ СТУДЕНТІВ ТА ПРОВЕДЕННЯ ТРЕНІНГІВ У РЕЖИМІ ONLINE В УМОВАХ НЕВИЗНАЧЕНОСТІ

Метою цієї роботи є активізація впровадження в освітній процес цифрових інструментів забезпечення якісної освіти під час онлайн-занять. У статті наголошено на важливості якісної підготовки здобувачів освіти за умови використання сучасних цифрових інструментів проведення занять в умовах невизначеності (таких як карантин, військовий стан) для підготовки фахівця на високому рівні, тобто в умовах аудиторної діяльності. Для досягнення мети вирішено такі завдання:

- обґрунтовано роль і значення онлайн-навчання в умовах сучасної невизначеності;
- наголошено на важливості правильно відібраних методів навчання освітніх компонентів в онлайн-форматі з урахуванням вимог Національного агентства із забезпечення якості вищої освіти до освітньої програми (ЕП) за 4-м критерієм, а отже, визначено найбільш прийнятні цифрові інструменти в освітньому процесі для забезпечення якісних освітніх послуг онлайн.

У статті також обґрунтовано соціальну важливість онлайн-занять у контексті отримання якісної освіти для людей з обмеженими можливостями, що можливо при такій формі навчання з використанням широкого спектра цифрових інструментів.

**Ключові слова:** дистанційне навчання, онлайн-навчання, методи навчання, технології навчання, цифрові технології

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