MODERN TOOLS FOR INCREASING THE EFFICIENCY OF DISTANCE EDUCATION IN THE CONDITIONS OF DIGITALIZATION

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Abstract: The article considers digitalization tools as a means of improving the quality of education. An analysis of the didactic possibilities of innovative digital technologies and tools is presented. It is shown that this form of education requires the use of fundamentally new tools and mechanisms of the educational process, which, in their application, can significantly change the form, process and end results of education.

Keywords: distance education; information technologies; remote classes; self-education.

1 Introduction

In the 21st century, intensive scientific and technical transformations are being carried out in all spheres of human activity on the basis of informatization and digitalization of society. The constant development of the digital space is changing society, as a result of which it is moving from a society of knowledge to a society of competent citizens. Thus, ensuring the effectiveness and efficiency of the use of digital technologies in the educational process is possible under the condition of increasing the level of computer literacy, which is closely related to the information and digital competence of future teachers of vocational training [2; 13].

The European Union has started active work in the context of implementing its own developed system of forming digital competence of citizens. “European system of digital competence of citizens” (DigComp) is a tool for increasing the level of competence of citizens of the EU countries in the field of digital technologies. In the field of education and training of quality personnel, there was a need for a common reference framework that would allow understanding what “digital literacy” means in the world, the degree of globalization and computerization. DigComp was developed by the Joint Research Center of the European Commission as a scientific project based on consultations and active cooperation with a wide range of stakeholders and policymakers from such areas as industry, education and training, employment, as well as social partners, etc. [2].

Globality, as one of the most important features of modern education, characterizes current interstate integration processes. Thanks to the existence of an international system of distance education, which is constantly improving, it provides open access to the best global educational resources. Traditional education is changing, forming an informational and educational space, where a student can explore a field of interest independently or under the guidance of a teacher; it significantly expands the circle of people with access to educational resources; contributes to the acquisition of independent work skills; by providing services, educational institutions increase the possibilities of fully meeting the educational needs of the population [16].

Distance learning is recognized as one of the priority areas of the higher education modernization program in today's environment. In modern conditions, there is a need to obtain higher education remotely, which is caused by the need to study without being separated from production, the need of receiving education by people with disabilities, persons living in occupied territories and those who are abroad or in places of deprivation of liberty. This opportunity is provided by distance learning, which is carried out thanks to information and educational technologies and communication systems [26; 28].

However, the level of development of distance education in Ukraine does not meet the requirements of the information society and does not ensure Ukraine's full entry into the international educational space. In order for the distance learning system to take a worthy place in the education system of Ukraine, it is necessary, first of all, to create a global computer network of education based on the use of modern digital technologies, which are advanced on the way to the implementation of the program of continuous education in Ukraine.

2 Method

Distance learning has become widespread in many countries of the world and its popularity is growing rapidly every year. For example, in the USA and Canada, as an alternative to traditional education, virtual universities have been created, where every student can get education on basic distance courses on the basis of any university. In Europe, open universities of distance education have been created, that is, a group of educational institutions that implement distance programs. The methods of such training involve the use of new information technologies, which include satellite television, computer networks, multimedia, etc.

Among the world's leading educational institutions, for example, the National University of Technology (USA), Shanghai University (PRC), such relatively new institutions of distance education and self-education as teleuniversities, tutoring centers (multimedia training), information centers (Internet teaching) were created and gained popularity.

In recent years, interactive learning has become widespread in Ukraine, in particular, leading positions in this regard are occupied by the Kyiv National University of Trade and Economics (KNTEU) and the Interregional Academy of Personnel Management (IAUP), where the introduction of new educational technologies and their entering into the organizational channel in the form of the latest social institutes, such as teleuniversities, tutoring and information centers, centers for remote professional development and retraining, etc., allows everyone who wants to, even in conditions of a systemic crisis and a sharp limitation of financial resources, to receive a proper education and acquire the necessary specialty. These forms of distance learning open up new perspectives for the development of students' self-education [6; 11].

The work of many scientists is devoted to the trends and regularities of development, as well as to the peculiarities of the organization of distance education. In particular, the transformation of the educational space under the influence of the development of distance learning is studied by F. Naskimbeni and U.-D. Ehlers; researchers analyze the effectiveness of using modern information and digital technologies as the main tools for ensuring communication between teachers and students. A. Kukulska-Gulme, E. Beirne, G. Konole, E. Costello, T. Kaflan carried out a study of informal and non-formal methods of providing distance education in the context of a high level of digitalization of society. The specific relationship between the effectiveness of distance learning methods and changes in the cultural sphere was determined by R. R. Wright, J. Burdick, K. Jubas, and J. A. Sandlin. Scientists have proven that distance education is not only a systematized structure of information exchange between a teacher and a

student, but also knowledge obtained as a result of students' interaction with the modern cultural environment; researchers define this kind of interaction as a specific form of informal distance learning. Prospects for the use of the latest information and communication technologies (ICT) in the structure of distance learning of students were studied by D. Anderson, S. Willer, T. Edward, R. Kling, D. Parrish, R. Phillips, D. Muller, D. Keegan, A. Clark, M. Thompson. Among Ukrainian researchers, V. Bykov, Yu. Bogachkov, O. Pinchuk, O. Spirin, L. Luparenko made an important contribution to the organization of distance learning in Ukraine. M. Vovk and S. Khodakivska summarized the experience of Ukrainian scientists in the direction of theoretical substantiation and implementation of modern technologies for students' distance learning in the conditions of the development of formal and informal education. Therefore, informal methods of providing distance learning, which remain understudied and unadapted to the Ukrainian domestic practice of obtaining higher education, are becoming more relevant. Education is changing its format, the gradual introduction of electronic information and the digitization of society affect the results of student learning, as well as the everyday life of individual subjects of the national education system. Therefore, the task of achieving an ideal balance between the organization of a modern student's education, the level of use of digital technologies in the higher education system, and the personal lifestyle of the subjects of the educational process remains unresolved, which is a rather complex, ontological challenge for modern scientists.

Current research and scientific achievements of scientists claim that digital technologies represent a tool for educational activities that involve changes in cognitive abilities and even the emergence of new forms of thinking, without which the student will not be able to fully realize himself in life. Thus, it becomes obvious that forming such a personality is possible only under the condition of creating the latest educational environment, which will be innovative, informational, and digital.

With the above in mind, the methodological basis of the study was:

- At the philosophical level: the categorical apparatus of dialectics as applied to social philosophy and philosophy of education; the presence of dialectical laws in the ratio of such categories as "General-Particular", "System-Element", "Cause-Effect", which allow describing the ratio of real and virtual, subjective and objective, subjective and subjective
- At the general scientific level - the main provisions of the systematic approach
- At the specific scientific level, the main provisions were based on the competence-based paradigm of education, the axiological approach, the technological approach, the informational approach.

3 Results and Discussion

The implementation of digital technologies in the educational process of higher education institutions is one of the most important trends in the development of pedagogical education. They contribute to education intensification, increase the speed and quality of perception, understanding and assimilation of knowledge by students. The learning process becomes more mobile, differentiated and individualized [20].

On today's terrain, digital technologies have incorporated elements of various methods - personal-oriented, project-based, developmental training - and are the method of knowledge transfer that corresponds to the qualitatively innovative content of training and development of the student; they create comfortable conditions for self-determination of the individual in the information society [12].

An important component of the effective use of modern digital technologies for the organization of distance learning in classes is the ability to select appropriate tools and create content.

The following types of remote technologies are most common:

- Chat classes that are held synchronously, when all participants have simultaneous access to the chat;
- Web classes, or remote lectures, conferences, seminars, business games, laboratory work, workshops, and other forms of educational classes conducted using telecommunications and other Internet capabilities (in particular, Zoom, etc.);
- Teleconferences held on the basis of mailing lists using e-mail. Educational teleconferences are characterized by the achievement of educational goals [4; 5].

Let us give examples of the use of individual online tools for organizing the educational process. The Skype program helps to communicate with a group, team, and student group. The teacher can use it in classes and provide educational information to a wider range of students, having a computer connected to the Internet, so that students who are not in class can use Skype to learn remotely in real time. In Skype, one can install the WhiteBoardMeeting module, which will allow working with a virtual whiteboard. It resembles a graphic editor that allows several users to work on the same drawing at the same time. On it, one can edit, insert text on the image, create drawings, set the thickness of the lines, print the drawing, etc. For the convenience of the user, a separate tab opens on the virtual board when creating several drawings at the same time. The application allows selecting users from the contact list who will have access to this document. Drawing in the WhiteBoardMeeting window takes place in real time. Users see each other's current work status [9; 18].

The online tool Trello is also a virtual whiteboard that allows high-quality work on joint online projects together with students. The teacher has the opportunity to divide the tasks by types, and the students, during the work, see its results (what was done, what needs to be done). Such a technique ensures effective organization of the educational process in the virtual mode, allows participating in teamwork. This is a useful visual tool in the teacher's work.

The Padlet online tool is designed to create and fill a virtual whiteboard (space) with content, providing the possibility of joint editing. There are various ways of using Padlet boards, in particular, as a platform for organizing group work of students during "brainstorming", generalization and systematization of knowledge, reflection, posting educational information or tasks for its search; also, it can be used as a place to host ideas for projects and discuss them, as a tool for organizing students' joint activities during and outside of class. The use of this online tool allows students and teachers to see the results of the work of all groups, immediately analyze them and reach an agreement on controversial issues online [19; 24].

Today, various web-services are used to organize the joint activities of teachers and students in the educational process.

- Powtoon.com (https://www.powtoon.com), SparkolVideoScribe (https://www.sparkol.com/) – web services for creating animated videos, interactive infographics, presentations and video scribing. The finished video can be published on YouTube or Vimeo, as well as downloaded as Ppt, Pdf formats or embedded on the site/blog using HTML code. With the help of scribing, one can quickly attract the attention of listeners, provide them with additional information and highlight the main points of the report [28].
- Wordart.com (https://wordart.com/), Worditout (https://worditout.com) – web services for visualization, word cloud creation. With the help of word clouds, one can visualize the terminology of a certain topic in a more visual way. This helps to remember information quickly.
- PearDeck (https://www.peardeck.com), Nearpod (https://nearpod.com) are web platforms that allow teachers to create interactive presentations for their classes and share them with students right during class.

- Canva (https://www.canva.com/) – graphic design service. The graphic editor gives access to a built-in library of templates, photos, illustrations, and fonts. The service can be used by both inexperienced users and design professionals. On the platform, one can create both images for publication on the Internet and layouts for printed products.
- Kahoot (https://kahoot.com), Plickers (https://get.plickers.com), Cosrative (https://www.socrative.com), ClassMarker (https://www.classmarker.com/) – web services that allow creating interactive educational games, including quizzes, discussions, surveys. This type of work contributes to the formation of students' cognitive interest, and the results are automatically evaluated and displayed in real time [14; 19].

The Kahoot online service is quite popular today. It allows creating various interactive games consisting of a series of questions with multiple answers. It can be used not only in working with students, to check their knowledge, but also in working with teachers, for various forms of scientific, scientific-methodical and organizational work. Participation in such games helps to establish communication and cooperation in the team, increases the level of awareness of teachers in digital technologies, stimulates critical thinking [17; 22].

The use of the web services listed above in the practical activities of a pedagogical worker provides an opportunity to intensify the learning process, increase the level of professional training of the teacher, and contributes to the development of cross-cutting skills of students.

The implementation of remote technologies in the educational process of higher education institutions is aimed at a deeper understanding of the educational material, formation of such competencies as: communicative (direct communication using network tools), informational (search for information from various sources and the possibility of its critical understanding), self-education (ability to study independently). As practice shows, if a student does not learn to make decisions on his own, determine the content of his educational activity and find means of its implementation, he will not be able to master particular discipline. In addition, distance learning also performs an upbringing function - it contributes to the formation of leading personality qualities: activity, independence, self-improvement, creativity [6; 7; 25].

Distance learning is considered by scientists as a form of educational organization, when students are distant from the teacher in space and time, but can maintain a dialogue using means of communication. Provision of access to educational materials, recommendations for working with them takes place in a convenient place and at a convenient time. This allows reducing the number of classroom classes in the student's overall workload and freeing up time for more active independent work, ensuring individualization of learning.

This organization of the learning process implies a slightly different approach to learning, in particular: independent search, analysis, systematization and generalization of information, self-organization and self-control.

The difference between distance learning and traditional learning is clear if to consider them from the point of view of the forms of interaction between the teacher and the student. The traditional model of education is based on lectures, conducting seminars, laboratory and various types of games, organizing students' independent work, etc. The basis of traditional learning is a book and a teacher as an interpreter of knowledge. But distance learning is focused on the implementation of fundamentally different learning models in the educational process, which include holding conferences, project work, trainings and other types of activities with computer and non-traditional technologies [6; 11; 21].

The experience of using the distance form of education revealed another feature, namely, the heavy strain on the eyes due to the need to be at the computer for a long time. Therefore, when using a distance form of education, it is necessary to diversify its types.

Among the important disadvantages of the distance form of education in Ukraine, it is also worth highlighting the insufficient direct contact between the teacher and the distance student due to the extraordinary professional workload of domestic Ukrainian teachers. Students of foreign distance courses can receive answers to their letters in a few hours, since there are far more teachers than students in countries with significant experience in implementing distance education. Unfortunately, the opposite situation has developed in Ukraine - there are many people who want to receive distance education, but there are few experienced teachers who are familiar with the latest digital technologies of distance communication [3; 10; 23].

On the basis of the conducted theoretical study of the peculiarities of the implementation of distance education using digital learning technologies, we conducted an experimental study. One of the most important ways to distinguish modern tools for increasing the effectiveness of distance education in the conditions of digitalization is the implementation of outlined methods in the process of theoretical research.

The results of the theoretical research are the basis for the development of the necessary methodological toolkit, which is used to diagnose the effectiveness of distance education in the conditions of digitalization.

At the ascertainment stage of the experiment, a survey based on questionnaire was conducted among students of the 1st-4th year of the first (bachelor) level of higher education who are studying at the pedagogical specialties of the Oleksandr Dovzhenko Hlukhiv National Pedagogical University. The sample size was 110 students. Among them, 54 respondents were involved in the control group (CG), and 56 people were involved in the experimental group (EG), including 63 women and 47 men. Student responses were graded at the following levels: high, medium, sufficient, and low. The results of the obtained questionnaire data at the ascertainment stage of the experiment are presented in Fig. 1.

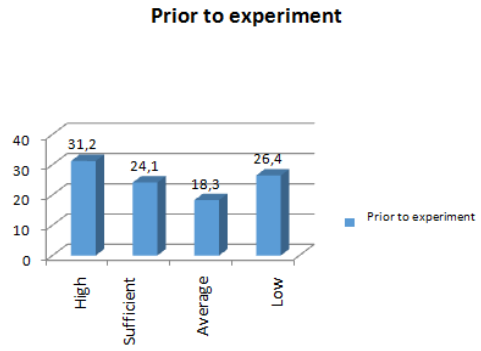

Figure 1. Results of the survey of respondents at the ascertainment stage of the experiment

The survey results show that the majority of students have a positive attitude towards new digital technologies. They believe that distance learning provides an opportunity to work more efficiently, save time, and combine learning with work. However, many students lack the psychological readiness to study in new conditions, the skills and abilities of independent work are not formed. A significant part of the students believe that the available educational and methodological support is not always effective for independent study of the material, therefore, a constant exchange of information with the teacher is necessary. That is, the activity of a teacher (tutor) in the process of distance learning, although it undergoes certain changes, but remains the same important.

The tasks of the teacher in the distance form of education are:

1) Preparation of remote classes on the basis of already existing or original author's developments;
2) Management of students' educational and cognitive activities (directly in “online” and “offline” mode using e-mail and indirectly, which is embedded in the logical structure of the construction of the course's educational material);
3) Control of students' knowledge, abilities, and skills (using test tasks);
4) Establishment of positive cooperation with students (effective and constant communication) [1; 8; 27].

At the formative stage of the experiment, a distance course was developed on the topic: “Distance technologies in professional education institutions” for full-time students of the first (bachelor's) level of higher education. The developed course included the following topics for study: the main types of electronic educational resources, computer tools for checking the level of educational achievements, distance education and distance learning, cloud technologies for informatization of education, use of WEB 3.0 to create educational resources, design and development of electronic educational resources, tools for creating electronic educational resources, use of online services for creating electronic educational resources, communication technologies. The results (obtained data) are presented in Figure 2.

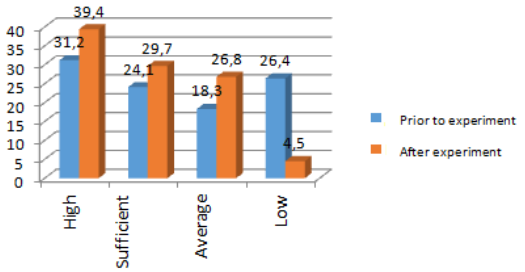

Figure 2. Results of the survey of respondents at the formative stage of the experiment

Thus, to optimize the educational process, we used traditional forms of classes in combination with remote technology, since both have their advantages. Typical teaching aids in both traditional and distance learning are: textbooks, methodical guides, lecture notes, which provide direct (for distance learning – indirect) contact with the carrier of knowledge. There is only a change in the form of presentation of educational material: from verbal and logical in traditional education to figurative in distance education. Convenient, affordable and fast means of learning in distance learning are: e-mail (through which one can send letters both to individual recipients and to a group of people) and CD-ROM (or flash-drive) (for delivery and creation of audio and video files).

Therefore, the option of distance learning, which is carried out at the Oleksandr Dovzhenko Glukhiv National Pedagogical University in the process of studying various disciplines, is based on the use of not only modern technologies and electronic media, but also on the use of traditional teaching aids and paper media: study guides, methodical recommendations, other available program and methodical resources. In our opinion, this option fully takes into account the needs and capabilities of students. Distance learning in universities should be comprehensive, i.e., cover all levels of higher and additional education, be a complex set of information technologies that will allow the student to use the entire volume of educational material, with the simultaneous possibility of teacher' consultations and control of work results.

4 Conclusion

The study of the formation and development of distance learning in the context of the use of modern digital technologies allows singling out a list of its advantages in modern conditions, which include: ensuring access to education for those who do not have other opportunities to obtain it; flexibility of the educational process due to the use of online services; additional involvement of experts from different countries and higher education institutions in the educational process; clarity and visualization of educational materials for acquiring practical skills. Further research into the effectiveness of the use of modern distance learning technologies is an important direction of future scientific research, which will facilitate the informatization and intellectualization of society in order to ensure the innovative development of education.

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Primary Paper Section: A

Secondary Paper Section: AM