РОЗДІЛ 9. ІНФОРМАЦІЙНО-КОМУНІКАЦІЙНІ ТЕХНОЛОГІЇ В ОСВІТІ

THE USE OF INNOVATIVE COMMUNICATION TECHNOLOGIES IN THE FORM OF DISTANCE LEARNING IN HIGHER EDUCATIONAL ESTABLISHMENTS DURING A PANDEMIC

ЗАСТОСУВАННЯ ІННОВАЦІЙНО-КОМУНІКАЦІЙНИХ ТЕХНОЛОГІЙ У ДИСТАНЦІЙНІЙ ФОРМІ НАВЧАННЯ В УМОВАХ КАРАНТИНУ У ВИЩІЙ ШКОЛІ

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Our article is devoted to the introduction of innovative communication technologies in the form of distance learning in higher educational establishments during a pandemic. The definition of the term "Distance Learning" is given in the article. The tasks facing the lecturer during the distance learning are considered and the characteristic features (flexibility, modularity, parallelism, coverage, new role of the tutor, cost-effectiveness, manufacturability, social equality, internationality) that distinguish distance education from traditional forms of learning are highlighted. Types of distance learning (correspondence learning, e-learning, online learning) are identified and analyzed.

According to the research topic, information is provided on the use of services (forums, chats, Wikipedia, blogs, e-mail, Zoom, Skype, Google Classroom, Moodle, etc.), which are recommended for implementation during distance learning.

The author of the article has considered the advantages (continuity of education, social equality, accessibility, cost-effectiveness, individualization and differentiation of training, the opportunity to pay more attention to what is the most difficult to understand and systematic control of knowledge, innovation, mobility, creative development, unconventional thinking) and disadvantages (difficulties in access to remote resources, incompetence of tutors in the organization of distance education using innovative communication technologies, a problem of identifying students, the complexity of motivation and control of the timeliness of tasks) of using distance learning in comparison with full-time and part-time education and has concluded that the use of distance learning forms and methods helps to individualize the process of professional development, which encourages students to work independently, forms information culture, sets up to master innovative means of obtaining and applying information, which is extremely important during a pandemic.
Key words: *innovative communication technologies, distance learning, information society, independent work, Internet services.*

У нашій статті розглядається впровадження інноваційно-комунікаційних технологій у дистанційну форму навчання у вищій школі в умовах пандемії.

Схарактеризовано визначення поняття «Дистанційне навчання». Розглянуто завдання, які стоять перед викладачем під час дистанційної форми навчання та висвітлено характерні риси (гнучкість, модульність, паралельність, охоплення, економічність, технологічність, соціальна рівноправність, інтернаціональність, нова роль викладача), які вирізняють дистанційну освіту від традиційних форм навчання. Визначено й проаналізовано типи дистанційного навчання (кореспондентське навчання, електронне навчання, онлайн-навчання).

Відповідно до теми наукового дослідження було подано інформацію про використання сервісів (форуми, чати, Wikipedia, блоги, електронна пошта, Zoom, Skype, Google Classroom, Moodle та інші), які рекомендуються для застосування під час дистанційного навчання.

Автори статті розглянули переваги (безперервність освіти, соціальна рівність, доступність, економічність, індивідуалізація та диференціація навчання, можливість приділяти більше уваги тому, що найскладніше зрозуміти, систематичний контроль знань, інноваційність, мобільність, творчий розвиток, нетрадиційне мислення) та недоліки (труднощі доступу до віддалених ресурсів, некомпетентність викладачів в організації дистанційного навчання з використанням інноваційно-комунікаційних технологій, проблема ідентифікації студентів, складність мотивації та контролю своєчасності виконання завдань) застосування дистанційної форми навчання в порівнянні з очною та заочною та дійшли висновків, що використання дистанційних форм і методів навчання сприяє індивідуалізації процесу професійного становлення, що спонукає студентів до самостійної роботи, формує в них інформаційну культуру, налаштовує на опанування інноваційними засобами здобуття та застосування інформації, що вкрай актуально в умовах пандемії.
Ключові слова: *інноваційно-комунікаційні технології, дистанційна форма навчання, інформаційне суспільство, самостійна робота, Інтернет сервіси.*

Problem statement. Nowadays, the rapid growth of the flow of scientific information, the volume of which is increasing every year, encourages the search for new, more effective methods, ways and means of learning that would provide students with more information during distance learning and present it brighter and more accessible to make it easier to perceive and better to remember. The emergence and development of the information society involves the widespread use of innovative communication technologies (ICT) in education, which is determined by many factors. The introduction of innovative

communication technologies in modern education will significantly accelerate the provision of knowledge and accumulation of technological and social experience of mankind not only from generation to generation, but also from one person to another [1]. Currently, distance learning has become the only possible means of acquiring knowledge during a pandemic. Previously, that form of education was embodied only in full-time and part-time types of education. And recently, distance learning is widely used in all areas of the educational process. According to the resolution of the Cabinet of Ministers (March 11, 2020 № 211) [2] and a letter from the Ministry of Education and Science of Ukraine on the introduction of quarantine in educational institutions of all forms of ownership (March 11, 2020 №1 / 9-154) according to paragraph 4 [3] distance learning was introduced in all educational institutions of Ukraine.

Analysis of recent studies and publications. Analysis of research and publications has shown that the introduction and use of innovative communication technologies in higher educational establishments has been studied by many scholars. In particular, A. Andreev [4], G. Andrianova [6], E. Polat [5], A. Khutorsky [6] studied the principles of distance learning; B. Bykov [7], V. Kukharenko [7], N. Syrotenko [7], S. Schennikov [8] paid attention to the work of a teacher in the system of distance learning; I. Kozubovska [9], V. Kukharenko [10], E. Polat [11] analyzed psychological and pedagogical principles of distance learning; E. Dolynskyi [12], O. Karelina [13], N. Syrotenko [7], G. Yatsenko [14] dealt with the problem of methods, forms and means of creating distance learning courses; M. Zagirnyak [15] considered the features of innovative communication technologies for the training of specialists in technical specialties, etc.

Scientific novelty. ICT provide an opportunity to use completely new methods of teaching and studying in the form of distance learning in higher educational establishments during a pandemic.

The purpose of the article. The article aims to clarify and systematize the peculiarities of the process of distance learning during a pandemic by means of innovative communication technologies.

The results and discussion. Modern innovative communication technologies, especially in distance education, improving the quality of learning, allow people to adapt more successfully and faster to the environment and social change. This gives everyone the opportunity to gain the necessary knowledge. The use of innovative communication technologies is one of the factors that contribute to increase the intensity and quality of the learning process. The emergence and active spread of innovative communication technologies in learning is an adequate response to the educational systems of many countries, it is a movement towards the information society, which meets the requirements of modernization of the

traditional education system. The importance and necessity of ICT implementation in education is substantiated by international experts and scientists. ICT affects all the areas of human activity, but perhaps the strongest positive impact they have on education (distance), as they open up opportunities for the introduction of completely new methods of teaching and learning. Theoretical and applied aspects of the organization of the learning process in higher educational establishments are considered by taking into account the achievements of modern science [1].

Distance learning is a technology based on the principles of open learning, which widely uses intellectualized educational programs for various purposes and creates an informational educational environment with the help of modern telecommunications for the presentation of educational material and communication [16].

Distance learning is a form of organization of the educational process and pedagogical technology, the basis of which is the managed independent work of students and the wide application in teaching of modern innovative communication technologies. Distance learning differs from other forms of learning by high interactivity and management system of students' cognitive activity, it provides the differentiation and individualization of learning. In the process of distance learning there is a combination of lecturer competence, information technology and mobility with the desire and determination of the student. Therefore, the main purpose of distance learning of students is to educate a person who has the desire and ability to communicate, learn and is ready for self-education [17].

The lecturer faces the following tasks during the distance learning:

1) preparation of distance classes on the basis of existing or original author's developments;

2) management of educational and cognitive activities of students (direct in the "online" and "offline" regimes using e-mail;

3) control of knowledge, skills and abilities of students (using test tasks);

4) establishing of positive cooperation with students (effective and constant communication) [17].

Distance learning technology, which has a high degree of mobility, covers all subject areas of knowledge and a huge contingent of students, and is one of the most effective and promising training systems. It is characterized by a special educational and cognitive motivation created by the Internet [16]. Purposeful and controlled intensive independent work of students is the basis of the educational process during distance learning. Students can study in a convenient place, according to an individual schedule, having a set of special teaching aids and an agreed opportunity to contact the tutor [16]. Distance learning differs from traditional forms of learning in certain characteristics (see fig. 1) [18].
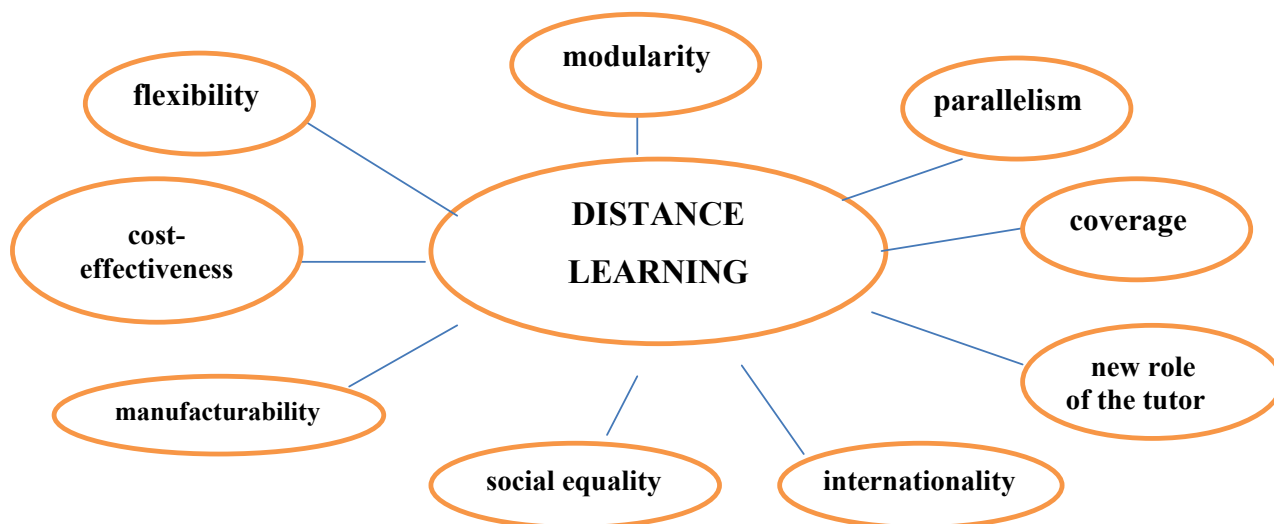
Fig. 1. Distance learning characteristic features

Scientists distinguish 3 types of distance learning:

− *Correspondence training*: students use textbooks, manuals, assignments and other materials that can be obtained by mail or taken from the library. Materials are processed at a time convenient for the student according to their own schedule. The instructor or tutor provides assistance by e-mail or telephone;

− *E-learning* allows you to access the course materials via a personal computer, get information on CDs, DVDs. Various computer programs are widely used in the e-learning process;

− *Online learning* is a form of e-learning with access to the Internet. Online learning allows you to communicate with tutors and other students in real time. Through online learning, the student can download learning materials from the Internet, and the tutor can send own assignments via online portal for students, conduct online surveys, attend webinars and participate in virtual classes [19].

The Internet is filled with a large number of services that are convenient to combine in the learning process: forums, chats, Wikipedia, blogs, e-mail, Zoom, Skype, Google Classroom, Moodle and others. All these services can be used as a supplement to traditional forms of learning, effectively increasing the teacher's communication with students.

These services are present in the distance learning system Moodle (stands for Modular Object-Oriented Dynamic Learning Environment) – a free e-learning system. This is an open web application on the basis of which you can create a specialized platform for students' learning. Using the e-learning system Moodle you can teach and test students from around the world at a distance. Plugins play an important role in the platform – modules that help to change the design and expand the functionality of the system. Today, Moodle is one of the most popular e-learning platforms. It has been translated into more than 100 languages and is used by major universities around the world [20].

Moodle can be used to organize distance education: using e-learning tools, students can get assignments and send them to check up. The system allows you to study at any time for students, learn subjects at their own pace and in a convenient place, provides students with round-the-clock access to educational materials, which include a full course of methodological support: practical, control, test tasks, lectures, electronic library. Each tutor according to the subject, structures the educational material and provides it in any form convenient for study and control. There are 3 types of course formats in Moodle: forum, structure (calendar-free learning modules), calendar (calendar-bound learning modules). The course can contain any number of resources (web-pages, books, links to files, directories) and any number of interactive elements of the course [20].

Distance learning also uses "virtual classes" technology. Virtual classes are interactive learning sessions that are conducted over the Internet. Such online classes can be conducted in the form of web conferencing, live broadcasts, or teleconferencing using such programs as Zoom, Skype, Google Hangouts and others. One of the advantages of virtual classrooms is that a large number of users have the opportunity to participate in learning activities at the same time. Therefore, virtual classes eliminate one of the disadvantages of distance learning – the lack of social interaction during studies [21].

Zoom service, which appeared in 2011 was very popular during a pandemic. Zoom is a service for conducting online conferences, a product of the American company of the same name. Due to the coronavirus pandemic, the number of people who use Zoom has grown from 10 million in December

2019 to 200 million in March 2020. If necessary, you can organize a lesson from 15 minutes to 2 hours with video calling for a small group of people (5–10), and for a team of 50+ people. The service has a free version. Prior to quarantine, it allowed organizing short 40-minute video conferences. For the pandemic period, that restriction was removed and made it possible to do online events lasting up to 5 hours for 2–50 people for free [21].

Any tutor can organize an online conference. To do this, just log in to your account, using the application. Then click on the "Schedule" button and enter all the necessary parameters (date and time, your settings as an organizer and settings of participants). After that, a letter template with an invitation that can be copied will appear on the screen [21].

Zoom service has the following advantages:

– Stable and high-quality communication. At the same time, hundreds of thousands of Zoom Meetings can take place on the platform;

– The ability to turn off sound or video for individual users, to enable a demonstration or screen recording, to rename individual chats;

– No restrictions on the number of conferences;

– The presence of the function "Feedback". It can be connected in your account in the "Settings" (if you are logging in from a PC or laptop) [21].

The service makes it possible to conduct not only online classes, but also scientific conferences, department meetings, exams, etc.

Among the disadvantages of Zoom service are the following ones:

– The program is not sufficiently protected from the actions of hackers who can interfere with the course of the lesson and put its video in the public domain, which is called Zoom-bombing;

– There are other vulnerabilities in Zoom. For example, a user can be connected to an online conference with the camera turned on even when he is unaware of this;

– The need to create unique identifiers and passwords for classes [21].

In May 2013, Google Hangouts appeared. It combined the functionality of the messenger and the ability to organize video conferences for up to 10 people. Up to 100 users could interact in a text chat. In 2017, Google divided the service into two categories: Hangouts Chat (text messaging) and Hangouts Meet (audio and video conferencing). In April 2020, in response to COVID-19, Google Meet became free for all users. Use of Meet has grown 30 times between early 2020 and April. 100 million users a day get access to Meet. For comparison: the number of daily Zoom users is 200 million (data for the last week of April) [22].

Advantages of Google Meet:

– Synchronization with contacts in Google account;

– Snap to Google calendar. Ability to create a conference with the participation of users from the contact list;

– The ability to participate in video conferences both through a browser and through an application for Android or iOS;

– Screen sharing to provide documents, spreadsheets or presentations;

– Encrypted calls between all users;

– The screen can display 16 participants in the "Mosaic" mode.

Disadvantages of Google Meet:

– The need to have a Google account;

– Restriction for free use (no more than 60 minutes) [22].

Skype is a system of free Internet telephony, text and video communication. Skype-conference can be of three types: 1) chat, where communication takes place through correspondence; 2) voice conference; 3) video conference. If necessary, it is possible to send files at high speed. Skype is a safe and secure program: there is no advertising, effective spam protection is provided and external intrusion of other subscribers into the communication process is excluded. The program allows you to communicate with several interlocutors (up to 10 subscribers) anywhere in the world, using group video. Skype is very effective for distance learning meetings with students anywhere in the world. It is necessary to keep in mind that group video calls are subject to abuse restrictions: no more than 100 hours of group video calls per month, no more than 10 hours per day, and no more than 4 hours per group video call. Once these limits are reached, the video call is turned off and the current video call becomes a regular voice call [23].

This program expands the boundaries and allows you to work with students from other countries. Online classes allow you to plan your class schedule as efficiently as possible. Another indisputable advantage of learning via Skype is the ability to move freely without being separated from the learning process. The use of modern technical capabilities should also be attributed to the benefits of learning with a tutor online. Lecturer can send a text document, spreadsheet, an audio file, give a link to a video or presentation on the topic being studied to a student at any time. Of course, distance learning using Skype largely depends on the serviceability of the equipment and the quality of the Internet connection, as well as significant training on the part of the tutor [23].

The prior principles of distance learning are reliance on individual study; the principle of focusing on life (domestic, social, professional) experience of students. Individual study on mastering various activities, the formation of the necessary skills and abilities is the specifics of this field of knowledge. Individual study is a form of learning, due to which the

student acquires the necessary knowledge, obtain skills and abilities, learns to work systematically, forms his style of mental activity. The difference between individual study and other forms of learning is that it involves the students' ability to organize their own activities according to the task [24].

Distance education has a number of features and advantages in comparison with traditional forms (full-time and part-time):

− continuity of education – the ability to study at any time on an individual schedule and an opportunity to get an education in foreign educational institutions without leaving the country;

− social equality: the possibility of getting education regardless of place of residence or state of health;

− accessibility – openness of educational resources for mass involvement of all segments of the population in the educational process;

− cost-effectiveness – providing qualitative training with minimal financial and energy costs;

− individualization and differentiation of training – creation and adjustment of distance courses, which take into account age and physiological features of the user;

− taking into account the student's abilities, the opportunity to pay more attention to what is the most difficult to understand and systematic control of knowledge;

− innovation – the use of innovative communication tools to create a qualitative educational environment in order to form and develop skills not only in professional fields, but also the acquisition of computer literacy;

− mobility – the opportunity to study in another field in parallel, combining professional activity with studies;

− creative development, unconventional thinking [25].

However, the use of distance learning has some disadvantages, from which we can highlight the following ones:

− difficulties in access to remote resources, which can lead to loss or damage of data;

− incompetence of tutors in the organization of distance education using innovative communication technologies;

− the complexity of controlling the individual way of performing the tasks, a problem of identifying students (due to the inability to verify the performer of the task);

− the complexity of motivation and control of the timeliness of tasks, because most of the training material should be self-studied;

− the complexity of organizing joint activities for communication and sharing the experience [25].

Conclusions and prospects for further research. Thus, taking into account the current situation in the modern educational process, the problem of innovative learning remains one of the most relevant in the world research, which requires careful study and scientific, and practical justification: better experience of innovative educational activities; characteristics of the content of interactive forms of education, the specifics of their use in higher educational establishments during a pandemic. The use of distance forms and methods of learning contributes to the individualization of the process of professional development, which encourages students to work independently, forms their information culture, sets them up to master innovative means of obtaining and applying information. Opportunities for distance learning contribute to the development of a qualified, intelligent and highly professional specialist. Taking into account the above mentioned research, we have come to the conclusion that it is necessary to create and disseminate distance learning technologies. The purpose of introducing distance learning at higher educational establishments is to organize a qualitative educational process using the latest information and communication tools and open access to educational resources. This form of training can be quickly adapted to the requirements of the information society and can help to prepare a future specialist. Distance education in higher school can provide a wide range of educational services for both applicants and students to acquire the necessary skills and abilities for future professional activities, and also can help tutors to improve their skills. At the moment, the main prospects of the study are the process of developing a qualitative free educational system and training of highly qualified tutors of all the spheres, as well as in the field of innovative communication technologies. It is possible to implement effective distance learning, which will fully reveal the potential of the student, taking into account both individual and universal needs in case of solving above mentioned problems.

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