Chapter 26

IMPLEMENTATION OF INNOVATIVE DISTANCE LEARNING TECHNOLOGIES IN THE EDUCATIONAL PROCESS OF HIGHER EDUCATION INSTITUTIONS

Chernyakova Zh. Yu.
DOI https://doi.org/10.30525/978-9934-26-557-0-26

INTRODUCTION

At contemporary stage the development of the national education system is characterized by educational innovations aimed at preserving past achievements while simultaneously modernizing the education system in line with the demands of the time, the latest scientific advancements, culture and social practices. The modern advancement of digitalization and information technology on a global scale impacts every aspect of human life. This is particularly true in the realm of education, as educational processes are crucial to the functioning of contemporary society.

The integration of educational technology into teaching and learning practices has transformed the landscape of education, offering new opportunities to enhance the learning experience and prepare students for the demands of the 21-st century. The educational sphere has undergone a significant transformation in recent years, accelerated by technological advancements. Traditional methods of teaching and learning are being increasingly supplemented and replaced by digital tools, platforms, and online resources. This shift reflects a growing recognition that educational systems need to adapt to the demands of a highly digital, interconnected and technology-driven world. The study makes it possible to define the following key drivers of this transformation: the shift to online and blended or hybrid learning and the rise of digital consumers.

Firstly, the COVID-19 pandemic forced educational institutions to adopt online and blended learning models quickly, making technology integration essential for continuity in education. This rapid adoption has revealed the immense potential of digital tools to support learning, as well as the gaps in infrastructure, for instance, teacher's readiness and digital literacy. Secondly, today's students are digital consumers who are accustomed to using technology in almost every aspect of their lives. These learners demand more

interactive, personalized and flexible educational experiences that can be facilitated by innovative technologies.

The relevance of integrating innovative educational technologies becomes clear as educational systems aim to meet the diverse learning needs of these new generations, while also addressing gaps in equity, engagement and access to quality education.

The main challenges that the higher education sector faces across the globe and that are also driving innovation have been identified, in particular pressures from globalization; changing supply of and demand for higher education; changes in higher education funding. Thus, these various challenges determine the development and implementation of numerous innovative practices to address them. At the same time they may activate the introduction of innovative practices in different institutional contexts, while the same innovative practice may be simultaneously driven by more than one challenge.

It is necessary to state that effective innovative practices build on an interplay between national/regional and institutional factors. The significance of different factors can vary including on several elements, such as the scope of the initiative and the level of autonomy within an institution. In terms of scope, the broader the initiative, the greater the impact of national or regional factors; conversely, the narrower the scope, the stronger the influence of institutional factors. Regarding autonomy higher education institutions with greater independence, possessing more control over their financial resources and their allocation, tend to develop more bottom-up practices.

The immediate impact of these types of innovations may be more noticeable, but often more limited, typically staying within the innovating institution. On the other hand, less autonomous higher education institutions tend to follow a more top-down, state-driven approach to innovation. Although this doesn't reduce their capacity for innovation, it encourages broader connections and processes across the higher education system, with longer timelines for implementation, ultimately leading to a more enduring and far-reaching impact beyond the institution itself.

1. Determination of factors and challenges for innovations in the higher education system

The conducted analysis of this issue has confirmed that the development and implementation of innovations in higher education systems have a great impact on all elements of the systems: components, relationships and functions. At the component level these innovations influence a diverse range of direct and indirect actors, both individual and institutional who contribute to generating, diffusing and using innovations in the system. They can act both

within and outside the higher education sector, but have a direct interest in the higher education sector.

Therefore, the direct individual actors include: students, who can variously be defined as «consumers» and, of course, «learners»; academic staff (faculty, teaching and research assistants, coaches and mentors and others), differentiated in terms of seniority and authority levels; other staff (for instance, academic administrators and an increasing numbers of new «professionals» who bridge the traditional divide between academic and administrative roles[1] such as technology transfer managers, IP experts, patent attorneys; universities with their departments, schools and labs, associated research institutes (often interdisciplinary), technology transfer offices and industrial liaison offices, business support institutions (science parks, business and technology incubators, start-up accelerators), financial support institutions (public and private venture capital firms, networks, etc.).

Speaking about the indirect actors who are a part of a higher education system we should refer individuals, organizations or institutions from the social, economic, and political spheres at national, regional and local governments, «users» of the knowledge created or of the trained manpower produced, such as businesses and employers' organizations, as well as society as a whole and networks of academics, graduates and others. Although they do not have a direct involvement in the higher education sector, they are still indirectly impacted and should therefore be considered.

At the relationship level the most important effects are due to cooperation, networking and increased mobility, which may alter traditional relationships among actors or introduce new ones. So, the relationships among system components mainly focus on how innovation affects the way actors of higher education systems interact and perceive each other. Commonly three broad types of relationships are identified, namely: collaboration and collaborative leadership entail several processes (bottom-up and top-down) carried out in a collaborative manner by different stakeholders (individual and institutional actors) drawn from different spheres; substitution arises when one institutional actor takes the lead on a function traditionally belonging to a different actor; networking as a manifestation specific to the increasingly collective nature of science, technology and innovation, is also relevant in higher education systems. The connection may be stronger or weaker, depending on the network's age, scope, membership, activities and visibility in the public domain.

At the function level the most significant impact is observed on the education function while the research and engagement functions are also

[1] Whitchurch C. Some Implications of Public/Private Space for Professional Identities in Higher Education, *Higher Education*, 2010, 60(6), 627-640.

impacted, though to a lesser extent, with their influence growing over time. This may be seen just as a manifestation of the early stage at which many of the innovative practices find themselves, rather than an effect of a minor importance of the innovation. Therefore, the impact of some innovation practices on other system functions, such as research and engagement, is likely to intensify and become more visible over time, as the innovation matures and diffuses more broadly into the higher education innovation system.

Consequently, we can conclude that higher education is an essential sector that serves as a foundational pillar for the creation, dissemination and transfer of knowledge, innovation and technology in the modern knowledge economy. In this way, higher education institutions have become key drivers in the development of technological advancements and innovations. In this context we would like to focus on three dynamics which appear to be most significant within an innovative higher education system, in particular:

– as innovation diffuses within the higher education system and traces every element of a higher education institution, the innovation process needs to be better managed. While management methodologies are taught in many universities, university managers are not trained enough for this;

– there is a reciprocal nature of change within an innovative higher education system: the system elements (components, relationships and functions) have an impact on the success of the innovation, while the success of the innovation induces further changes in the system elements. Thus, a spiral of change is created within the higher education system to make it more responsive to environmental changes;

– the change induced in a higher education innovation system is rather slow. Numerous innovation practices do not radically modify the traditional higher education institutions' functions; slightly, they provide new ways of doing traditional things that respond more efficiently to changing requirements in higher education[2].

Based on the analysis of the scientific literature, it is possible to identify four main innovations in higher education: the vision behind and the use of new technologies represent enablers of innovative practices, rather than innovations per se; the use of new technologies appears to be a facilitator of the transition from a department-centered vision to a student-centered vision of education; innovation often stimulates an accelerated development of partnerships between higher education institutions and other organizations, especially businesses; innovations in higher education illustrate two general

[2] Brennan John, Broek Simon, Durazzi Niccolo, Kamphuis, Bregtje, Ranga Marina and Ryan Steve *Study on innovation in higher education: final report.* European Commission Directorate for Education and Training Study on Innovation in Higher Education, Publications Office of the European Union, Luxembourg. 2014.

key aspects of the innovation process: «doing new things» and «doing existing things better».

The study of the problem makes it possible to distinguish the barriers to innovation which exist at both the institutional and national or regional levels. At the institutional level, this may include a lack of support for innovative practices. On the national or regional level, various degrees of autonomy for higher education institutions can significantly influence the way they operate and their effectiveness. Additionally, regulatory frameworks can also act as important obstacles to implementing certain innovative practices. Despite these obstacles, innovative practices have the potential to achieve high-quality and equitable outcomes. This includes expanding access to higher education, placing students in the center of the system, and offering possible solutions to address the financial challenges impacting the system.

It should be stressed that in the final report «Study on innovation in higher education: final report» presented by European Commission Directorate for Education and Training Study on Innovation in Higher Education the policy recommendations have been organized around three key themes identified in the study, with a focus on two main target groups: higher education institutions and policymakers[3].

In this context it is important to highlight the key actions for implementing the innovations for both groups. Hence, higher education institutions should consider the following actions:

– foster an institutional culture of innovation that promotes creativity, raises awareness of the benefits of innovation, encourages openness to new ideas, and reduces resistance to change;

– introduce incentives and rewards for staff members who are engaged in innovative practices;

– encourage faculty members to explore and leverage the potential of new learning technologies;

– promote cross-institutional collaboration to enhance student's choice and quality and potentially reduce costs;

– implement measures for the professional development of teaching staff as well as encourage greater collaboration of their teaching roles;

– reevaluate existing organizational boundaries and connections to improve overall efficiency and effectiveness.

Accordingly, policymakers should examine the need to:

[3] Brennan John, Broek Simon, Durazzi Niccolo, Kamphuis, Bregtje, Ranga Marina and Ryan Steve Study on innovation in higher education: final report. European Commission Directorate for Education and Training Study on Innovation in Higher Education, Publications Office of the European Union, Luxembourg. 2014.

– develop a comprehensive regulatory framework that tackles the barriers hindering online learning advancements, including inappropriate quality assurance measures, lack of credit recognition systems, and unclear intellectual property rights regulations;

– encourage policies that support equitable access to education, ensuring all students benefit from innovative practices;

– foster collaboration between higher education institutions and industry stakeholders to ensure education is aligned with evolving workforce demands;

– provide funding and resources to support the adoption of new learning technologies and practices;

– promote continuous professional development for educators to enhance their ability to use innovative teaching methods effectively;

– create flexible policies that allow institutions to experiment with new approaches while maintaining academic standards and quality.

To conclude, we can define a set of constituents, in particular, a network of institutions, organizations and individuals that collectively contribute to the development and diffusion of innovations in education. In the context of higher education, this system focuses specifically on higher education institutions, which are closely interconnected with other institutional spheres such as industry, government, non-governmental agencies and society as a whole. These interactions promote the flow of knowledge, resources and ideas, driving innovation not only within the educational sector but also extending to other areas of society and industry.

2. The essential characteristics of the main research categories: «innovation», «technology», «innovative technologies»

In the context of Ukraine's European integration, the priority areas of state policy include the problem of constantly improving the quality of education, modernizing its content and forms of organizing the educational process, introducing educational innovations and information technologies. The educational process should be transformed in the direction of individualizing educational interaction, learning, forming creative thinking and increasing independent work of students. The use of multimedia information technologies in education is due to the presence of a set of analytical procedures: an open structure that allows you to make quickly any changes to the content of the program depending on the results of its testing; the ability to save and process a large amount of diverse information and arrange it in a convenient form. It contributes to revealing, preserving and developing students' individual abilities, a unique combination of personal qualities appropriate to each person; forming cognitive abilities of students, the desire

for self-improvement; ensuring the comprehensiveness of the study of phenomena of reality, the continuity of the relationship between the humanities, technical sciences and art; constant dynamic updating of the content, forms and methods of educational processes[4].

The transition to an innovative nature of education involves serious work on creating a scientifically sound pedagogical system, requires special research, coordination of the efforts of didactics, methodologists, pedagogues, psychologists, as well as the hard work of practicing teachers. Until recently, the terms «innovation», «innovation process» haven't almost been used in domestic pedagogical literature. Understanding the impact of technological innovations on learners, educators and educational institutions is crucial for developing strategies and methods for managing and using technology in education. Foreign and domestic researches in this sphere provides an opportunity to understand how technological innovations are used and how effective they are in improving the learning outcomes of the students.

It is emphasized that the primary aim of educational innovations is to address the challenges posed by globalization, environmental problems and multicultural trends. It is highlighted that the defining feature of our era is the prioritization of innovative development in education through the modernization of all aspects of the system, such as curriculum, teacher training, management and funding[5].

In the «National Strategy for the Development of Education in Ukraine for the Period 2020-2021» it is highlighted that the country's integration into the global educational space requires constant improvement of the national education system, finding effective ways to improve its quality, testing and implementing innovative pedagogical systems, modernizing the content of education and organizing it in accordance with global trends and labor market requirements[6].

In 2016 the next step taken by the Ministry of Education and Science was the development of the «Concept of a New Ukrainian School»[7] aimed at ensuring a fundamental and systemic reform of general secondary education. One of the key ideas of the concept is to reform education in a way that focuses on its innovative nature, emphasizing not so much the transfer of knowledge,

---

[4] Палига О. В., Притула І. А. Інноваційні технології навчання при підготовці кваліфікованих робітників в системі професійно-технічної освіти. м. Василівка, 2015. URL: http://vpl57.zp.ua/file/IYPNoweV

[5] Енциклопедія освіти / за ред. *В*. І. Кременя. Київ: Юрінком Інтер, 2008. С. 339

[6] Національна стратегія розвитку освіти в Україні на 2020-2021 роки. URL: www.mon.gov.ua/images/files/news/12/05/4455.pdf

[7] Концепція Нової української школи. 2016. URL: https://mon.gov.ua/storage/app/media/zagalna%20serednya/nova-ukrainska-shkola-compressed.pdf

but the development of basic competencies that enable individuals to acquire knowledge independently in the future.

Besides the initial conceptual provisions of innovation processes in the education system are set out in the laws of Ukraine «On Education» (2017), «On Complete Secondary Education» (2020), «On Innovation Activity» (2002) and others.

Active cooperation with European countries in the field of fundamental sciences, scientific education and innovation is a trend in the modern educational policy of our state, which is confirmed by a number of legislative documents, in particular, by the order of the Ministry of Education and Science of Ukraine «On Approval of the Roadmap for the Integration of the Scientific and Innovation System of Ukraine into the European Research Area» (2021)[8]. Therefore, this motivates the enhancement of teaching and learning processes, fostering the development and integration of innovative educational approaches into both national and global educational practices for the sustainable progress of the country and the world.

In domestic scientific literature the problem of innovation in the context of culture, education and society have been studied in the collective monograph «The Phenomenon of Innovation: Education, Society, Culture»[9].

Nowadays, scientific searches for new directions of holistic research in the field of education, identification of value foundations of its modernization, determination of the conditions for the effectiveness of innovative processes in education, ensuring its continuity are being updated (V. Andrushchenko, L. Vashchenko, L. Danylenko, N. Demyanenko, I. Dychkivska, O. Dubaseniuk, I. Zyazyun, V. Kremen, V. Palamarchuk, I. Pidlasy and others). Scientists have identified the main definitions and classified educational innovations; analyzed the trends in the growth of the role of innovative activity in the education system as a process of introducing new elements into the traditional system, creating and using an intellectual product.

In the context of the study we will compare different scientific approaches to the definition of the essence of the main categories, in particular «innovation», «technology», «innovative technologies». The concept «innovation» was first used more than a century ago in cultural studies and linguistics to denote the process of transfer (Latin «transfero» – «transfer, move»), in other words the penetration of elements of one culture into another

[8] Про затвердження Дорожньої карти з інтеграції науково-інноваційної системи України до європейського дослідницького простору: наказ МОН України від 10 лют. 2021 р. № 167. URL: https://mon.gov.ua/storage/app/media/rizne/2021/02/12/edp-nakaz.pdf.

[9] Кремень В. Г. Феномен інновацій: освіта, суспільство, культура: монографія. Київ: Педагогічна думка, 2008. 472 с.

and the acquisition of new, previously not inherent qualities. Such penetration was considered a decisive factor in the development of cultures. In the modern world it is actively used in various fields of knowledge, including education.

The historical sources of educational innovations are associated with the period of the emergence of experimental pedagogy in the second half of the 19-th century. Since the 1960-s the phenomenon of «innovation» has become key in the characteristics of the postindustrial formation – its formation and development. The question of innovative educational activity has as its starting point the definition of the meaning of the terms «innovation», «innovation project», «innovation culture», «educational innovations», «innovative educational activity», which allows us to establish the essential features of the course of innovative processes in the education system.

In reference sources the definition of the term «innovation» is regarded as the process of creating, introducing and disseminating in educational practice new ideas, means of pedagogical and managerial technologies, the result of which is an increase in the indicators of achievements of the structural components of education[10].

According to the Law of Ukraine «On Innovative Activity» «innovations are newly created (applied) and (or) improved competitive technologies, products or services, as well as organizational and technical solutions of a production, administrative, commercial or other nature that significantly improve the structure and quality of production and (or) the social sphere» (Law of Ukraine «On Innovative Activity», 2002)[11].

Referring to a concept introduced by I. Zaichenko, «innovations» in pedagogy are understood as changes or improvements in the educational system. According to I. Zaichenko, innovations can relate to the pedagogical process itself, the course structure and the outcomes of education. In other words, it's about enhancing teaching methods, learning environments and the overall effectiveness of the educational process[12].

According to N. Dychek «if we interpret pedagogical innovation as the process of introducing an innovation into educational practice, then pedagogical innovation is the process of emergence, development, and most importantly, widespread introduction of pedagogical innovations and innovations into the educational field»[13]. As interpreted by N. Dychek,

---

[10] Енциклопедія освіти / за ред. В. Г. Кременя. Київ: Юрінком Інтер, 2008. 1040, С. 388.

[11] Про інноваційну діяльність: Закон України від 04 лип. 2002 р. № 40-IV. URL: https://zakon.rada. gov.ua/laws/show/40-15#Text.

[12] Зайченко І. В. Педагогіка: навч. посіб. для студентів вищих педагогічних навчальних закладів. Київ: «Освіта України», 2006. 528, с.77.

[13] Дічек Н. П. Понятєво-термінологічні особливості вивчення педагогічного новаторства. *Освітологія: Польсько-український / українсько-польський журнал*, 2012. №1. С. 62–68.

«teacher-innovator is the author of new pedagogical systems, the developer and implementer of educational innovations and innovations in general»[14].

At the same time scientists from the International Institute for Systems Research in the dictionary «Innovation Glossary» have defined the essence of the phenomenon «innovation» through the categories of novelty and progressiveness. According to their interpretation «innovation is a type or result of the development process»[15]. As claimed by the authors true innovation in comparison with innovation and renovation means something more than simply replacing old elements with new ones in a certain system. Only such an element or system is new that is more progressive than the old one, which means its compliance with the positive trend of the development process as a whole. The fact of innovation can be established only when using the criteria of novelty and progressiveness of a new element or system.

Therefore, the creation, establishment and implementation of a new as a progressive element or system reflects the essence of innovation as a process of changing the pedagogical system and its development. The innovation process is associated with the transformation of scientific knowledge into an innovation that satisfies new social needs and includes a sequential chain of actions that covers all stages of creating a new product and implementing it in practice[16].

It is important to highlight that innovations are changes aimed at improving the various elements of the educational space (educational process – in terms of the development of content or technological components, management mechanisms, changes directly related to the methods of educational activities; these innovations can be systemic, modular or private), is the process of introducing innovations, and innovation activity in this context is seen as a set of project-active procedures from the creation of an idea to its replication in the educational practice of other educational institutions[17].

Scientist T. Demydenko believes that pedagogical innovations are innovations in pedagogical systems and the processes that accompany them, aimed at obtaining sustainable positive results that significantly improve the

---

[14] Дічек Н. П. Понятєво-термінологічні особливості вивчення педагогічного новаторства. *Освітологія: Польсько-український / українсько-польський журнал*, 2012. №1. С. 62–68.

[15] Haustein H. D. Innovation Glossary. Oxford; New-York; Toronto Sydnei; Frankfurt, 1986. 224.

[16] Стадник В. В. Інноваційний менеджмент : навч. посіб. Київ: Академвидав, 2006. 464, С. 64.

[17] Shelever O., Bazulevska O., Lopatina H., Cherniakova Z., Lisovyi V., & Polishchuk V. Computer technologies as a method of forming students' information skills in the process of learning. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 2024. 15(1), 398-413. URL https://doi.org/10.18662/brain/15.1/559

state of both individual components and systems as a whole and determine the progressive direction of their development[18].

It is worth mentioning the fact that in a number of scientific studies the term «innovation» is defined through the category of result as a consequence of the implementation of new ideas, approaches, technologies. Any process is carried out to obtain a specific result, which is predicted as the goal of the activity that ensures this process.

In the process of summarizing the results of the content analysis, the main categories characterizing the concept «innovation» have been identified: system, process, innovation, activity, change, implementation, result, technology, development (improvement) and stable categorical features of the essential side of innovation: novelty; practical implementation; emergence of a new quality not previously inherent in the object of innovation; the activity of innovation subjects, the transition or transfer of the system from one state to another as a result of changes introduced into it by innovation; a specially organized process, directed and managed; the achievement of qualitatively new, stable results; complexity, social conditioning, manageability, progressiveness, self-organization.

The analysis of the category «technology» gives us an opportunity to stress that the term «technology» comes from the Greek «techne» – art, skill and «logos» –science, law, so «technology» is the science or teaching of skill. In the «Explanatory Dictionary of the Modern Ukrainian Language» «technology» is interpreted as a set of knowledge, information about the sequence of individual production operations in the process production of something; an educational subject that teaches this knowledge, information; a set of methods for processing or processing materials, manufacturing products, conducting various operations[19].

At the same time the concept of «educational technologies» is also used in a combination with «pedagogical technologies», «learning technologies», «educational technologies», «social and educational technologies», «management technologies». Scientists generally consider the term «educational technologies» is broader than «pedagogical technologies»[20].

Scientists, in particular, claim that educational technologies reflect the general strategy for the development of education, a single educational space, while pedagogical technologies embody the tactics of its implementation. Examples of educational technologies are the Concept of Education Development, the Law on Higher Education of Ukraine, etc. Educational

---

[18] Демиденко Т. М. Підготовка майбутніх учителів трудового навчання до інноваційної педагогічної діяльності: автореф. дис... канд. пед. наук: 13.00.04. Луганськ, 2004. 20 с.

[19]. Тлумачний словник української мови. Київ: Довіра, 2012. 488.

[20] Буркова Л. Технології в освіті, *Рідна школа*. 2001, № 2. С. 18–19.

technologies include pedagogical, socio-educational and information and communication technologies. Pedagogical technologies include training technologies, educational technologies and management technologies. Beyond pedagogical boundaries are socio-educational technologies as their subjects are not only school teachers but also workers of social services and extracurricular activities educational establishments, public organizations and others.

In the pedagogical science several approaches to the interpretation of these terms are distinguished:

1) educational technology as a new means of learning;

2) educational technology as an open pedagogical system;

3) educational technology as a set of actions (system of actions) or activity;

4) educational technology as a project (model) of the educational process;

5) educational technology as a branch of science or pedagogical knowledge or science[21].

Although in scientific sources there exist numerous approaches to defining the term, they do not fully capture the essence of educational technologies. According to the conclusions of the well-known scientists, the key characteristics of educational technologies have been distinguished:

1. Conceptuality. Each technology should be based on a certain scientific concept.

2. Systematicity. The technology should have such features of a system as the logic of the process, the interconnection of all its elements, and integrity.

3. Manageability which provides for the possibility of goal setting, planning, designing the learning process, phased diagnostics, and varying means and methods in order to adjust results.

4. Efficiency. The technology must be effective in terms of results and cost-effective and must guarantee the full achievement of the learning outcome.

5. Reproducibility. We mean the possibility of using (repeating, reproducing) the technology by other teachers in other educational institutions.

6. Adjustability which involves not only correcting errors, but also a creative search for optimal ways to solve the tasks set and preparing for further use of the technology[22].

In the framework of scientific research, we consider it necessary to highlight the main stages of the development of educational technologies

---

[21] Янкович О. І. Освітні технології в історії вищої педагогічної освіти України (1957–2008): монографія. Тернопіль: Підручники та посібники, 2008. С. 12.

[22] Жигірь В. І., Чернега О. А. Професійна педагогіка: Навч. посіб. / за ред. М. В. Вачевського. К.: ТОВ «Кондор», 2012. 336.

depending on the dominance of the type of learning. Researcher T. Turcot has identified and characterized four stages of the development of learning technologies, namely:

1-st period (1940-1950), which is called the traditional type of education, is determined by the use of various technical means of obtaining information, united by the concept of «audiovisual means» (tape recorders, televisions, radio receivers, players, film projectors, etc.) in the educational process.

2-nd period (1950-1960) known as a programmed type of learning is characterized by the use of the idea of programmed learning, which involved the development and introduction of special programs for managing the process of knowledge acquisition. Accordingly, audiovisual feedback tools were developed, programmed learning classes, language labs, training machines, simulators and program systematization tools were created in institutions: programmable textbooks, didactic machines for knowledge control and others.

3-rd period (1970-s-mid-1990-s) identified as a problem-based type of learning is distinguished by the expansion of the pedagogical technology based on the achievements of psychological and pedagogical sciences: the results of new research in the psychology of learning, the theory of managing the cognitive activity of pupils and students and the scientific organization of the work of teachers and students are being introduced. Since the 1970-s in connection with the introduction of programmed learning, the concept of «pedagogical technology» has been actively introduced into scientific circulation and used by practicing teachers. Of particular importance is the definition of learning goals, the sequence of learning steps and rational ways to achieve the goals.

4-th period (mid-1990-s – present) recognized as an interactive type of learning is represented by creating computer classrooms, distance learning centers and so on. The number and quality of programmable learning tools are increasing and interactive systems are widely used. Thus, pedagogical technology acts as a system, the components of which are participants of the pedagogical process, a system of theories, actions, means and methods of organizing educational activities to ensure effectively the solution of problems covering all elements of knowledge acquisition and the formation of practical skills[23].

In the presented study we will characterize foreign pedagogical approaches to defining the essence of the concept of «technology». The foreign scholars consider technology in education is a tool which functioning is maximized by educators adapting it to their teaching purposes. In this context the pedagogue should motivate the students, promote ICT-oriented

[23] Туркот Т. І. Педагогіка вищої школи:навч. посіб. К.: Кондор, 2011. 628.

teaching practices, since the technology can arouse student's interest and attention that can stimulate the desire to learn[24].

On the other hand, technology is seen as a set of techniques, processes, methods, means and instruments from one or more areas of activity, resulting from either scientific knowledge or accumulated experience[25].

In the same sense P. Tigre argues that technology can be defined as a system of knowledge about specific techniques[26]. The techniques involve applications of knowledge in products, processes and organizational methods. The use and access to technologies allowed the information age to be characterized by behaviors, practices, information and knowledge that change with extreme speed, thus characterizing the current stage of knowledge. In this case the development of technologies has led us to a historical level of changes beginning with the wave first took place in agriculture, moving to industry and which currently relates to information and communication. This last wave marks the transition from technological innovation to artificial intelligence and /or Web 5.0[27].

The concept of «innovative technologies» is not new to the European educational system. This term is usually understood as a system or a set of methods for acquiring knowledge and its transfer through the interaction of teachers, students and information and communication technologies, which is generally aimed at achieving a certain result during the educational process, which allows to expand didactic opportunities in the process of further independent work of higher education students[28].

Innovative educational technologies are used to increase interest in education, to teach students to master the material independently, to be competent and mobile, quickly adapt to the requirements of the labour market and modern social development[29].

---

[24] Angotti J., Auth M. Science and technology: social implications and the role of education. *Science & Education*, v.7, 2001, №1, P.15–27.

[25] Carvalho F. C. A. de & Ivanoff G. B. Technologies that educate: teach and learn as information and communication technologies. São Paulo: Pearson Prentice Hall. 2010.

[26] Tigre P. B. Innovation Management: The Economy of Technology in Brazil Paulo (7th Reimpre). São Paulo: Elseiver Editora. 2006. P.479–485.

[27] Dias P. Living in a digital society: digital technologies, new practices and social changes (1st Edition). Cascais: Principia. 2014. 110.

[28] Bondar I., Bachynska N., Novalska T., Kasian V., Kuchnarov V., & Pylypiv V. Analysis of the organization and features of the implementation of information technologies in the educational process of institutions of higher education. *Systematic Reviews in Pharmacy*, 2020, 11(11), 868-872. URL: https://doi.org/10.31838/srp.2020.11.126

[29] Bakhmat N., Kolosiva O., Demchenko O., Ivashchenko I., & Strelchuk V. Application of international scientometric databases in the process of training competitive research and teaching staff: opportunities of Web of Science (WoS), Scopus, Google Scholar. *Journal of Theoretical and Applied Information Technology*, 2022, 100(13), 4914-4924 URL: http://www.jatit.org/volumes/Vol100No13/21Vol100No13.pdf

The use of innovative technologies helps ensuring the flexibility of the educational process, its variability, the evolution of the content, methods and forms of information flow, conducting training sessions, choosing the level of complexity and scope of tasks, the peculiarities of their implementation, activating the educational and cognitive activity of higher education students by productive and interactive learning formats.

In the final analysis, the full potential of innovative technologies hasn't been explored yet, as new paradigms are continuously being introduced into practice. Additionally, the socio-economic conditions of social formations are undergoing significant changes. Therefore, there is a need for further modernization of the educational process, which involves rethinking both the theoretical foundations and the valuable practical experiences of higher education institutions. Higher education institutions are increasingly embracing digital pedagogies to enhance flexibility and individualization in teaching methods. A thorough meta-analysis of research conducted up until December 2021 indicates that the integration of various digital pedagogy technologies such as video tutorials, mobile apps, flipped classrooms and virtual reality, yields positive results, fostering innovative teaching strategies that improve both student and teacher pedagogical performance[30].

3. The peculiarities of implementation of innovative distance learning technologies into educational process in higher education institutions

The dynamic development of the information society and information and communication technologies (ICT) imposes new requirements on the educational training of future teachers, their professional skills and abilities. Future specialists must be able to think freely and actively, independently generate and implement new ideas and educational technologies, model the educational process creatively and continuously develop using ICT. Training future highly qualified teachers of modern Ukrainian schools is one of the key priorities of the state educational policy, defined by the Laws of Ukraine «On Higher Education» (2014) and the Concept «New Ukrainian School» (2016). Obtaining updated knowledge, forms of its acquisition are the basis for the development of the information society, the introduction of concepts for ensuring the quality of higher education; «lifelong learning». However, the issue of organizing the educational process in the form of blended learning in higher education institutions requires additional study.

---

[30] Tsekhmister Y. Effectiveness of Practical Experiences in Using Digital Pedagogies in Higher Education: A Meta-Analysis. *Journal of Higher Education Theory and Practice*, 2022, 22(15). URL: https://doi.org/10.33423/jhetp.v22i15.5567

The issue of the development of information and communication technologies in the context of the information society is a subject of research by both international and domestic scholars. The problems of distance learning are examined in the scientific works of such researchers as: O. Andriyuv, V. Kukharenko, B. Shunevych; K. Osadcha, V. Osadchy (synchronous/asynchronous learning); R. Ellis, I. Elliot, M. Nichols, L. Triaka (e-learning and its differences from distance learning); L. Boremchuk, N. Machynska, M. Nahirnyok (principles of distance learning); V. Bykov, A. Boychenko, Yu. Lynnyk (distance learning tools); S. Tran (massive open online courses) and others.

The theoretical and practical principles of combining various forms of organizing educational activities are highlighted in the scientific works of V. Bykov, I. Voytovych, S. Gorobets, V. Kukharenko, N. Morse, V. Osadchy, K. Osadchya, O. Samoilenko, S. Semerikov, S. Sysoyuva, E. Smirnova-Trybulskaya, Yu. Trius and others. The features of the introduction of mixed forms of learning (traditional and distance learning) into the educational process are reflected in the works of N. Dem'yanenko, K. Kolos, O. Rafalska, N. Rashevska, O. Spirin, Yu. Trius, O. Samoilenko, E. Smirnova-Trybulska and others.

In the current situation distance learning with the use of ICT is gaining popularity and activation in the conditions of higher education informatization. Distance learning is a form of education that involves the use of the Internet and modern technologies for remote study of educational materials by students, testing their knowledge, and communication with pedagogues. Distance learning and online learning are two terms that are often used interchangeably, as they involve the use of the same technologies and also require an internet connection. However, despite the apparent similarity between the terms, there is one significant difference. Online learning implies conducting the educational process in real time. This format is considered a continuation of distance learning and is often called e-learning. Online learning includes Skype lectures, taking exams on Zoom, communicating with a tutor in chat, and so on. The distance learning process involves more independent work by students. They watch lecture videos, read articles, complete assignments, study additional materials, and take tests at any time convenient for them[31].

Distance learning is understood as an individualized process of acquiring knowledge, skills, abilities and cognitive strategies, which occurs mainly

[31] Sheremet M., Leniv Z., Loboda V., Maksymchuk B. The development level of smart information criterion for specialists' readiness for inclusion implementation in education. *Information Technologies and Learning Tools*, 2019, 72, 273-285. URL: https://journal.iitta.gov.ua/index.php/itlt/article/view/2561

through indirect interaction between remote participants in the educational process in a specialized environment based on the latest psychological, pedagogical and information and communication technologies. The implementation of distance learning occurs through use of distance learning as a separate form of implementation of the educational process; use of distance learning technologies to provide training in various formats[32].

As a part of the effective organization of distance learning, it is necessary to ensure the functioning of the following subsystems: delivery and support of online courses, development of online courses, administrative support, academic support for students, support for teachers, curriculum for the program and department, and personal support for students[33].

In the context of the rapid development of distance learning in the information society, it has become necessary to use such innovative learning technologies as distance learning technologies, which involve the use of computer and telecommunication technologies, which ensure interactive interaction between participants in the educational process[34].

Distance learning technologies are electronic or digital learning media, including the Internet, email, television, and other audiovisual communication devices, that are used to deliver instruction when the instructor and students are in different physical settings[35].

The distance and media learning technologies, as outlined in Regulations on Distance Learning (2013), encompass:

– the essential hardware infrastructure. This includes personal computers, network equipment, uninterruptible power supplies, servers and videoconferencing tools. These resources facilitate the creation and use of web-based learning platforms, the management of the educational process, and enable interaction between participants in distance learning, both in synchronous and asynchronous modes;

– the information and communication support with adequate channel bandwidth, ensures that all participants in distance learning at an educational institution have 24-hour access to web resources and web services, enabling the implementation of the educational process in both synchronous and asynchronous modes;

---

[32] Про затвердження Положення про дистанційне навчання. Наказ МОН України від 25.04.2013 № 466. URL: https://zakon.rada.gov.ua/laws/show/z0703-13#Text

[33] Jill E., Stefaniak T., Logan Arrington & Alison L. Moore Systemic considerations to support distance education environments. *Distance Education*, 2022, Vol. 43, №. 2, 171-178.

[34] Ребуха Л. З. Характеристика засобів інноваційних технологій для фундаменталізації професійної підготовки майбутніх соціальних працівників. *Вісник Львівського державного університету безпеки життєдіяльності*: зб. наук. праць. Львів, 2018, 17, 156−161.

[35] Distance Learning Technology definition. 2022. URL: https://www.lawinsider.com/dictionary/distance-learning-technology

– general and specialized software, including programs designed for individuals with special needs, must either be licensed or based on open-source software products[36].

The attention should be focused on the fact that any educational institution determines the list of web resources for distance learning, which includes web resources for academic disciplines depending on their profile. To provide distance learning, the educational institution may create its own web resources or use other web resources that are verified by this institution.

Thus, Web resources of academic disciplines (programs) necessary to provide distance learning may include the following:

– methodological recommendations that contain information on the use of resources, the sequence of tasks and control mechanisms;
– documents related to the planning of the educational process such as curricula, thematic plans and lesson schedules;
– video and audio recordings of lectures, seminars and other educational materials;
– multimedia lecture materials;
– terminological dictionaries;
– practical tasks, including methodological recommendations for their implementation;
– virtual laboratory work, containing methodological recommendations for their implementation;
– virtual simulators and methodological recommendations for their use;
– test tasks for control measures, testing with automated verification of results and testing with verification by the teacher;
– business games and methodological recommendations for their use;
– electronic libraries and links to them;
– bibliographies;
– a distance course that combines web resources of the academic discipline into a single pedagogical scenario;
– other resources with educational purposes.

Thus, there is a transition to interactive electronic textbooks, workshops, presentations, video lectures, electronic tests, libraries, glossaries, interactive posters, telecommunication projects, etc.

The analysis of pedagogical literature allows us to state that many developed countries have established a strong distance education system. The following distance learning models are currently being effectively implemented:

[36] Про затвердження Положення про дистанційне навчання. Наказ МОН України від 25.04.2013 № 466. URL: https://zakon.rada.gov.ua/laws/show/z0703-13#Text

Model I. External-type education. Education is focused on school or university examination requirements, intended for pupils and students who, for some reason, cannot attend institutions in person. This is in fact a correspondence form of external education.

Model II. University education. A system of education for students who are not studying in person, but at a distance, in correspondence or remotely, based on information technologies, including computer telecommunications. In addition to printed manuals, students are offered CD-ROMs developed by leading teachers of specific universities.

Model III. Education based on cooperation between several educational institutions. Cooperation between several educational organizations in the preparation of correspondence/distance learning programs allows them to be made more professionally high-quality and less expensive.

Model IV. Education in specialized educational institutions. Educational institutions are specially created for the purposes of correspondence and distance learning and oriented towards the development of multimedia courses. Their competence also includes the certification of students.

Model V. Autonomous learning systems (remote classroom model). Training within such systems is conducted entirely with the help of television or radio programs, CD-DVDs and additional printed manuals.

Model VI. Informal, integrated learning based on multimedia programs. These are self-education programs aimed at educating an adult audience, those people who could not complete their education. Such projects can be part of the official educational program[37].

Hence, online learning is on the rise, and it is changing the way people learn and develop new skills. Distance learning is a valuable tool that offers several significant advantages, including:

– Learning from anywhere in the world and at any convenient time makes it easier for people with disabilities, from remote areas, and foreigners to access education.

– Reduction of operating costs for business – no need to rent halls, «book» a foreign coach and pay employees who are on business trips.

– Online learning can be planned independently, for example, at home or during lunch, without disrupting your work schedule.

– Hundreds of employees from remote offices or students from different countries can be trained simultaneously without worrying about the number of training places.

[37] Rahman M. Faculty Recruitment strategies for Online Programs, *Online Journal of Distance Learning Administrator*, 2019, Vol. IV, Number IV. URL: http://www.westga.edu/~distance/ojdla/winter44/rahman44.html.

– Training materials are stored in a shared virtual database to which each participant has access.

– Automatic analytics and control of the learning process using various graphs, reports and constant monitoring.

– Individual training according to the scheme of continuous education, which allows to keep the employee in good shape, thereby increasing his demand in the labor market[38].

Distance learning technologies are designed to simplify the educational process and improve its quality. With their help pedagogues deliver the necessary information to students, test their knowledge, collect feedback, answer questions, and exchange photos, videos, and audio materials. The choice of tools often depends on the goals, capabilities, interests and preferences of all participants in the educational process. The following groups of distance learning technologies can be distinguished:

1. LMS (learning management systems). These are server-based and cloud-based platforms that allow you to create and manage training courses. LMS helps not only to teach students, but also to interact with them, track the learning process, and issue certificates. Cloud systems are particularly popular because they do not require installation and are easy to use.

2. Communication tools. These include technologies that help tutors and students interact with each other. For example, asking questions, sharing materials, leaving feedback, submitting completed assignments, etc. Distance learning communication tools include email services, instant messengers, social networks, websites and services like Google Classroom or Zoom.

3. Gamification tools. To make the educational process more interesting and memorable, game elements are often used. These can be quizzes in a chatbot, quizzes, specially designed programs, etc. Gamification tools increase student engagement and also help to diversify learning and knowledge testing.

4. Online platforms for hosting educational materials. These include various services where you can host educational information. For example, a company website, video hosting sites like YouTube, podcast platforms and more[39].

No doubts that freedom to choose the place, time of study and even learning technologies makes distance education increasingly popular. A

---

[38] ЧЕРНЯКОВА Ж., КИРИЧЕНКО Л., ТАЩЯН А. ІННОВАЦІЙНІ ТЕХНОЛОГІЇ ДИСТАНЦІЙНОГО НАВЧАННЯ. *АКТУАЛЬНІ ПИТАННЯ У СУЧАСНІЙ НАУЦІ* №7(25). 2024. С. 856-869. DOI: HTTPS://DOI.ORG/10.52058/2786-6300-2024-7(25)-856-869.

[39] Rahman M. Faculty Recruitment strategies for Online Programs, *Online Journal of Distance Learning Administrator*, 2019, Vol. IV, Number IV. URL: http://www.westga.edu/~distance/ojdla/winter44/rahman44.html.

particular demand for it arose with the spread of Covid-19, when most students around the world lost the opportunity to study in person.

The analysis of scientific sources confirms that there are many various types of distance learning, which can be categorized into three main groups:

1. Synchronous learning. A group of students learn at the same time. Synchronous learning is most often used in online education, where classes take place in real time.
2. Asynchronous learning. Students work independently of each other within set deadlines. However, asynchronous learning can be without time frames. In this case, students work on a maximally flexible schedule.
3. Blended or hybrid learning, which combines synchronous and asynchronous learning[40].

In the domestic higher education system, it is possible to distinguish the organization of the educational process in the form of blended learning, which depends on a number of factors, namely: the teacher's readiness to work in new conditions, the readiness and needs of students, the academic discipline, the ICT competence of participants in the educational process, etc.

In the context of this study we consider it appropriate to provide a definition of the essence of the concept of «blended learning», which will allow us to implement one of the key tasks of informatization of the educational process, in particular «the introduction of modern information and communication technologies that ensure the improvement of the educational process, the accessibility and effectiveness of education, and the preparation of the younger generation for life in the information society»[41].

Thus, in the face of today's challenges, the issue of combining the traditional educational system with modern pedagogical innovations and ICT tools is relevant, namely such a form of organization of learning as blended learning.

In the presented scientific research, we will try to characterize different approaches to interpreting the essence of the concept of «blended learning» (*Table 1*).

Hence, there are different approaches to understanding the essence of the concept of «blended learning», namely, as a learning process, an educational concept, a purposeful learning process, a combination of traditional and distance learning, a combination of learning methods, a hybrid of traditional and online learning.

---

[40] Online vs Offline Studies: The Better Deal for Your Finances. URL: http://www.college-connecting.com/blog/online-vs-offline-studies-the-better-deal-for-your-finances/.

[41] *Про Національну стратегія розвитку освіти в Україні на 2012-2021 роки*. URL: http://zakon2.rada.gov.ua/laws/show/344/2013

In addition within the concept presented by the Christensen Institute, the phenomenon of «blended learning» is interpreted as «a formal curriculum in which a student learns in the following way: part of the educational process falls on online learning, which provides an element of self-control by the student in choosing the time, place, methods and/or pace of learning; a small proportion of the educational process is learning away from home in specialized institutions under the supervision/guidance of someone; the educational process involves mutual coordination and modality between the learning activities of each student during the study of a course or subject, with the aim of ensuring an integrated learning experience»[42].

Table 1

Interpretation of the essence of the concept of «blended learning»

Author	The essence of the concept of «blended learning»
N. V. Rashevska	a learning process in which traditional learning technologies are combined with innovative technologies of electronic, distance and mobile learning with the aim of harmoniously combining the theoretical and practical components of the learning process[43].
A. M. Stryuk	a purposeful process of acquiring knowledge, skills and abilities in the context of integration of classroom and extracurricular educational activities of subjects of the educational process based on the mutual complementarity of traditional, electronic, distance and mobile learning technologies[44].
I. S. Stolyarenko	the combination of traditional learning with elements of synchronous and asynchronous electronic distance learning[45].
Shivam Ruchi	a combination of traditional teaching methods and online learning[46].
Y. V. Trius	a purposeful process of acquiring knowledge, acquiring skills and abilities, mastering methods of cognitive activity by the subject of education and developing his creative abilities based on the comprehensive and systematic use of traditional, innovative pedagogical technologies and ICT, training on the

[42] Staker, H. Classifying K–12 Blended Learning. Innosight Institute. 2012. URL: https://www.christenseninstitute.org/wp-content/uploads/2013/04/Classifying-K-12-blended-learning.pdf.

[43] Рашевська Н. В. (2011). Мобільні інформаційно-комунікаційні технології навчання вищої математики студентів вищих технічних навчальних закладів: (автореф. дис. … канд. пед. наук: 13.00.10. Київ, 2011. С.8.

[44] Стрюк А. М. Система «Агапа» як засіб навчання системного програмування бакалаврів програмної інженерії*:* дис.... канд. пед. наук: 13.00.10. Київ, 2012. 29 с.

[45] Столяренко І. С. Особливості організації змішаного навчання у підготовці майбутніх учителів інформатики. *Інформаційні технології в освіті,* 2015, 24, 38–147.

[46] Shivam R. Implementation of Blended Learning in Classroom: A review paper. *International Journal of Scientific and Rsearch Publications,* 2015, 5 (11), 369-372.

	principles of mutual complementarity with the aim of improving the quality of education[47].
Betty Collis	a hybrid of traditional face-to-face and online learning, in which learning takes place both in and outside the classroom, with the online component becoming a natural extension of traditional classroom learning[48].

In the context of this study we define the essence of the concept of «blended learning» as a purposeful process of forming ICT competence of future teachers in the context of combining classroom and extracurricular educational work of students on the basis of the use and mutual complementarity of traditional and electronic (distance and mobile) learning technologies.

Consequently, we consider traditional learning as a process of forming a system of knowledge, skills and abilities, which takes place through direct interaction between the teacher and students within the classroom and using traditional methods, means, and forms of organizing the educational process. At the same time e-learning is characterized as «learning in the process of which the main carriers of educational information are electronic educational resources, and communication between teachers and students takes place using ICT»[49].

According to the «Regulation on Distance Learning» (Order of the Ministry of Education and Science of Ukraine dated 25.04.2013 No. 466), distance learning is defined as «an individualized process of acquiring knowledge, skills, abilities and methods of cognitive activity of a person, which takes place mainly through the mediated interaction of remote participants of the educational process in a specialized environment, which operates on the basis of modern psychological, pedagogical and information and communication technologies»[50].

In scientific pedagogical literature we encounter the term «mobile learning» (m-learning), which is aimed at «creating an educational environment using mobile electronic devices that students can use as a means

[47] Триус Ю. В. Комбіноване навчання як інноваційна освітня технологія у вищій школі. *Теорія та методика електронного навчання: збірник наукових праць*, 2012, III, 299–308.

[48] Collis B. Flexible learning in a digital world: experiences and expectations. London: Kogan Page Limited, 2001. 231.

[49] Максак І. В. «Blended learning» як інноваційний підхід у формуванні професійної компетентності вчителя англійської мови початкової школи. *Вісник Чернігівського національного педагогічного університету ім. Т. Г. Шевченка,* 2013, *110*, 247–249. URL: http://visnyk.chnpu.edu.ua/?wpfb_dl=1334

[50] *Про затвердження Положення про дистанційне навчання: МОН України*. URL: http://zakon3.rada.gov.ua/laws/show/z0703-13.

of accessing educational materials contained on the Internet, anywhere and anytime»[51].

Modern challenges facing society around the world are prompting the emergence of new teaching methods, namely mobile-oriented teaching. However, the analysis of scientific and methodological literature proves that this issue requires thorough study, clarification of the conceptual apparatus, clarification of mobile-oriented learning methods, positive and negative aspects of the use of mobile devices.

At the current stage mobile-oriented learning is considered a new stage in the development of e-learning and is aimed at using mobile devices as a learning tool. It is an undeniable fact that the pedagogical potential of the latest mobile devices has led educational researchers to rethink mobile technologies and their implementation in the educational process.

Thus, mobile-oriented learning is being implemented in parallel with traditional, distance, computer-oriented learning and allows for the implementation of new blended forms of learning. However, the use of a mobile device is the main means of learning and access to information and educational resources. Such learning takes place regardless of the location of the subjects of the educational process.

We strongly believe that the implementation of mobile-oriented learning has prospects for further development, as mobile devices are rapidly improving along with mobile applications that students can use.

Theoretical analysis of scientific and pedagogical literature provides an opportunity to identify several models of blended learning.

1. The Rotation model involves the organization of training within one discipline/course, alternating classroom training between a teacher and a student or group of students and mediated interaction between participants in the educational process using ICT. We note that the change in the types of educational activity can be fixed (according to schedule) or flexible.

During training, the teacher uses interactive teaching methods, the project method (individual or group), individual consultations, written assignments, etc. This model consists of a number of submodels: Station Rotation; Laboratory Rotation; Flipped Classroom; Individual Rotation.

2. The Flexible model is designed to accommodate the majority of the curriculum in e-learning environments, with the bulk of the curriculum initially presented online (within the higher education institution). So, the teacher acts as a coordinator, organizing consultations (individual or group) to work on topics that are difficult to understand.

3. The Self-Blend or A La Carte model allows students to choose independently additional courses to their core education. Educational service

---

[51] Семеріков С. О. Теоретико-методичні основи фундаменталізації навчання інформатичних дисциплін у вищих навчальних закладах: дис. … доктора пед. наук: 13.00.02. Київ, 2009. 536 с.

providers may include various educational institutions. The effectiveness of this blended learning model is due to the high degree of student motivation to learn.

4. The Online Driver or Enriched Virtual model involves learning most of the curriculum using electronic resources, as well as additional face-to-face or online consultations with a teacher[52].

The presented foreign models are useful for studying and implementing in the educational process with the aim of modernizing the national education system. However, the most optimal models for use are Station Rotation (alternation of different types of activities), Laboratory Rotation (alternate change of laboratories) and Flipped Classroom, which combine traditional and distance learning technologies.

In our opinion blended learning provides an opportunity to use the advantages of traditional and distance learning precisely with the use of ICT, primarily creating a comfortable educational environment for learning, in which teachers and students can effectively carry out the teaching and learning process.

The organization of blended learning requires defining the goals, objectives of the course, needs and scope of material and intellectual tasks. Every educator should master online teaching strategies, ensure effective learning and establish a clear schedule for attending in-person and online classes for students.

Within the framework of scientific research, it is possible to identify a number of advantages of organizing blended learning, in particular:

– students can independently acquire new knowledge using electronic resources at a convenient time for them and practice new skills during classes with the pedagogue and groupmates;

– students choose a convenient time and place for themselves (flexibility and accessibility);

– the teacher manages the process of organizing students' independent cognitive activity in obtaining theoretical material;

– organization of group learning activities (group work on projects, holding discussions, seminars, organized in the form of electronic teleconferences, forums) provides for the formation of online communication skills;

– motivate students to self-education (form a responsible attitude towards learning, rational time planning, choosing the pace of learning material);

– the student improves skills in using modern software and technical means; using new tools and teaching methods, building new learning models;

---

[52] iNACOL Blended Learning Teacher Competency Framework. 2014. *iNACOL, The International Association for K-12 Online Learning.* URL: https://www.inacol.org/wp-content/uploads/2015/02/iNACOL-BlendedLearning-Teacher-Competency-Framework.pdf

– accountability and transparency of the results of students' educational activities; reduction of costs for organizing the educational process (economy).

Despite the advantages of blended learning, there are certain problems with its implementation. A foreign researcher J. Hoffmann identifies not only problems, but also ways how to solve them, in particular:

1. Technology challenges: providing participants in the educational process with technology, i.e. the gradual introduction of technologies into the educational process (from simple to complex).

2. Organizational challenges: recognizing the effectiveness of blended learning; managing and monitoring student academic performance.

3. Instructional/design challenges: careful planning of each stage of the lesson, use of different forms of work, creation of a learning environment to achieve the goal (definition of goals using Bloom's taxonomy); implementation of online interactive exercises; requirements for assessing students' learning activities; ensuring coordination of all course elements[53].

Therefore, the educational process, organized in the form of blended learning, is aimed at developing personally-oriented learning and forming a comprehensively developed personality. The specific features of blended learning are: interactivity and adaptability of educational material; flexibility, informativeness of educational material; clear structure and novelty of educational material; techno-logicality; independent and individual work of students; availability of materials for visual support of the educational process; mobility; modularity; combination of digital content with material received in the classroom.

In the context of the study the components of blended learning are identified: face-to-face learning – traditional classroom classes under the guidance of a teacher; online learning – work of students and teachers in the mode of synchronous interaction online (holding webinars, conferences, forums, etc.); self-place learning – independent work of students: performing practical and laboratory work, searching for educational materials; work in cloud environments and with online services[54].

When organizing blended learning, special attention deserves the study of the role of the teacher, who becomes a researcher/developer (planning and developing blended learning systems; testing new approaches and means of personalizing learning; developing and improving curricula; record the effectiveness, shortcomings, limitations and suitability of technical means); an integrator (creating optimal conditions for learning through the use of technologies – virtual and visual; systematize the approach to planning

[53] Hofmann, J. Top 10 Challenges of Blended Learning (And Their Solutions!). 2014. URL: http://blog.insynctraining.com/top-10-challenges-ofblended-learning

[54] Shivam R. Implementation of Blended Learning in Classroom: A review paper. *International Journal of Scientific and Research Publications,* 2015, 5 (11), 369-372.

content and educational approaches (methodology and teaching techniques); a leader, a teacher, a facilitator at the same time. In other words, the teacher plays the role of a facilitator in blended learning. The term «facilitator» was first introduced into scientific circulation by psychologist C. Rogers, who emphasized that the facilitator should help the student learn, express himself as a person, interest him and support him in the search for knowledge[55].

Therefore, the new role of the facilitator is to implement educational technology or methodology, adapt in real time; select or regulate the direction of student learning;

establish partnerships with students to select the direction of learning.

Valuable for our research is the identification of twelve core competencies that a future teacher must possess to carry out effective activities in a blended environment. These competencies are grouped into four blocks, namely:

1. Mindsets: include priority values and beliefs that govern the processes of thinking, behavior and actions of an individual and are related to the goals of educational change and tasks in blended learning activities. The following competencies are included: a new vision of teaching and learning, orientation towards change and improvement.

2. Personal qualities: personal character traits and behavioral patterns that help a teacher make the transition to new teaching and learning methods. Such competencies include flexibility, mobility, purposefulness, foresight, determination, desire for further self-improvement, etc.

3. Adaptive skills: comprehensive skills that help teachers collaborate, solve new problems and find constructive solutions, and implement innovations in the educational process. The following competencies are identified: continuous self-improvement and innovation, communication.

4. Technical skills: assessing learning, managing learning not only of the whole group, but also of each individual, organizing individual forms of learning with the support of work in small and large groups, the ability to use various teaching aids, methodologies, online and offline resources, the ability to dynamically combine teaching aids and administration. The following competencies are highlighted: information experience, teaching strategies, experience with blended learning activities, teaching tools or equipment[56].

Therefore, the combination of traditional and online learning technologies helps teachers create a new information and educational environment to achieve the goals of the educational process and puts forward new requirements for the professional and pedagogical training of future teachers.

In the scientific works of the scholars the most effective and promising technologies used in online education have been distinguished and

---

[55] Rogers C. The necessary and sufficient conditions of therapeutic personality change. *Psychotherapy: Theory, Research, Practice, Training*. 2007. Vol. 44 (3). P. 240–248.

[56] Allison Powell, Ed.D., iNACOL Blended Learning Teacher Competency Framework. 2014. URL: https://www.inacol.org/wp-content/uploads/2015/02/iNACOL-lendedLearning-Teacher-Competency-Framework.pdf.

characterized. The following technologies of distance learning are highlighted[57]:

1. Learning games. More often they are suitable for solving everyday business tasks simulation of a real working situation effectively. Modern virtual tools allow to implement educational game easily into online personnel training system in any company.
2. Dialogue simulators. It is a virtual character with whom you need to have a proper conversation. Such a text case is good for developing communication skills during negotiations, product presentations, concluding a deal and communicating with colleagues or partners in a foreign language.
3. Scribing. The essence of scribing is to accompany textual information with visual images. Our brain remembers much better what it sees than what it hears. Graphic and dynamic presentations are well perceived and remembered.
4. Chatbot. A chatbot is a special program for messengers and social networks that «knows» how to ask and answer questions, search for information, take orders and perform simple tasks automatically. Modern chatbots have artificial intelligence and mimic live communication well. This is the educational technology of the future, which combines an individual approach and involvement in the learning process.
5. Virtual reality. Virtual reality technology is familiar to many people thanks to games. But it is expanding its horizons and is already actively used for educational purposes.
6. Electronic courses. An online course can combine several of the aforementioned methods at once, as well as contain familiar formats and types of content – video, text, webinar, podcast, animated infographics, educational chat and practical exercises. And training organizers can conduct exams and online testing, monitor the speed and learning results of all participants.

To sum up, the skillful application of innovative technologies will bring about positive transformations in both the structure and content of the educational process. This, in turn, will enhance the quality of education and elevate the qualifications of teachers, fostering a more effective and dynamic learning environment.

CONCLUSIONS

In the study on the basis of scientific literature analysis the research of factors and challenges for innovations in the higher education system has been carried out. The main elements of the system, in particular, components, relationships and functions have been determined and characterized in details. The attention has been focused on the dynamics in the development of

[57] Чернякова Ж., Кириченко Л., Тащян, А. Інноваційні технології дистанційного навчання. *Актуальні питання у сучасній науці.* 2024, №7(25). С. 856-869. DOI: https://doi.org/10.52058/2786-6300-2024-7(25)-856-869.

technological advancements and innovation in a higher education system. Besides the key actions for implementing the innovations for

two main target groups, namely higher education institutions and policymakers have been highlighted.

As part of Ukraine's European integration, state policy of our country prioritizes the continuous enhancement of education quality, the modernization of its content and organizational methods and the implementation of educational innovations and information technologies into the learning process. In the study different scientific approaches to the definition of the essence of the main categories of the research, in particular «innovation», «technology», «innovative technologies» have been considered.

Based on the analysis of scientific sources the key characteristics of educational technologies have been distinguished: conceptuality, systematicity, manageability, efficiency, reproducibility, adjustability. The main stages of the development of educational technologies depending on the dominance of the type of learning have been identified and characterized.

The rapid development of the information society and information and communication technologies imposes new requirements on the educational training of future teachers, their professional skills and abilities. Nowadays distance learning with the use of ICT is gaining popularity and activation in the conditions of higher education informatization. Distance learning technologies are actively implemented in the educational process of the higher education institutions.

The conducted research allows us to assert that the introduction of such a form of organization of learning as blended learning allows teachers to build a flexible personalized learning process, on the one hand, taking into account the individual characteristics of students, and on the other, using the capabilities of ICT. Blended learning involves expanding the educational opportunities of each student, promoting interactive interaction between teachers and students not only remotely, but also in person with the use of various methods and teaching aids. In conditions of blended learning, the proportion of independent work of students increases, new opportunities open up for mastering educational material at a time convenient for students, for choosing their own pace of learning, for communicating with the teacher.

We are convinced that in the future the development of blended learning can become one of the priority areas for the transformation of the modern higher education system, as it contributes to increasing the efficiency of learning by combining traditional and distance learning and provides for the formation of future specialists with the necessary set of core competencies, capable of solving various professional tasks.

SUMMARY

The emergence of information technologies related to the development of computer tools and telecommunications networks made it possible to create a qualitatively new information and educational environment as a basis for the development and improvement of the education system. At present various innovative technologies are used to organize the educational process. Active and effective implementation of innovative technologies in education is an important factor in creating an innovative education system that will meet the requirements of the information society and the process of changing the traditional education system in the realities of modern society. These technologies help teachers improve their teaching beyond traditional textual learning and involve applicants in practical methods of learning. Education is increasingly becoming high-tech. Everything that happens in the world of technology directly affects the education and training systems.

Therefore, the use of innovative technologies in the educational process involves not only obtaining knowledge, but also contributing to the formation of an educated, creative, professionally capable qualified specialist capable of solving certain tasks in practical activities. The introduction of modern innovative distance learning technologies should be implemented through the transformation of the education system, the development of new didactic and methodological conceptual foundations of education.

Bibliography

1. Whitchurch C. Some Implications of Public/Private Space for Professional Identities in Higher Education, *Higher Education*, 2010, 60(6), 627-640.

2. Brennan John, Broek Simon, Durazzi Niccolo, Kamphuis, Bregtje, Ranga Marina and Ryan Steve Study on innovation in higher education: final report. European Commission Directorate for Education and Training Study on Innovation in Higher Education, Publications Office of the European Union, Luxembourg. 2014.

3. Brennan John, Broek Simon, Durazzi Niccolo, Kamphuis, Bregtje, Ranga Marina and Ryan Steve Study on innovation in higher education: final report. European Commission Directorate for Education and Training Study on Innovation in Higher Education, Publications Office of the European Union, Luxembourg. 2014.

4. Палига О. В., Притула І. А. Інноваційні технології навчання при підготовці кваліфікованих робітників в системі професійно-технічної освіти. м. Василівка, 2015. URL: http://vpl57.zp.ua/file/IYPNoweV

5. Енциклопедія освіти / за ред. В. І. Кременя. Київ: Юрінком Інтер, 2008, с. 339

6. Національна стратегія розвитку освіти в Україні на 2020-2021 роки. URL: www.mon.gov.ua/images/files/news/12/05/4455.pdf

7. Концепція Нової української школи. 2016. URL: https://mon.gov.ua/storage/app/media/zagalna%20serednya/nova-ukrainska-shkola-compressed.pdf

8. Про затвердження Дорожньої карти з інтеграції науково-інноваційної системи України до європейського дослідницького простору: наказ МОН України від 10 лют. 2021 р. № 167. URL: https://mon.gov.ua/storage/app/media/rizne/2021/02/12/edp-nakaz.pdf.

9. Кремень В. Г. Феномен інновацій: освіта, суспільство, культура: монографія. Київ: Педагогічна думка, 2008. 472 с.

10. Енциклопедія освіти / за ред. В. Г. Креміня. Київ: Юрінком Інтер, 2008. 1040, С. 388.

11. Про інноваційну діяльність: Закон України від 04 лип. 2002 р. № 40-IV. URL: https://zakon.rada. gov.ua/laws/show/40-15#Text.

12. Зайченко І. В. Педагогіка: навч. посіб. для студентів вищих педагогічних навчальних закладів. Київ: «Освіта України», 2006. 528, с. 77.

13. Дічек Н. П. Понятєво-термінологічні особливості вивчення педагогічного новаторства. *Освітологія: Польсько-український / українсько-польський журнал*, 2012. №1. С. 62–68.

14. Дічек Н. П. Понятєво-термінологічні особливості вивчення педагогічного новаторства. *Освітологія: Польсько-український / українсько-польський журнал*, 2012. №1. С. 62–68.

15. Haustein H. D. Innovation Glossary. Oxford; New-York; Toronto; Sydnei; Frankfurt. 1986. 224.

16. Стадник В. В. Інноваційний менеджмент: навч. посіб. Київ: Академвидав, 2006. 464, С. 64.

17. Shelever O., Bazulevska O., Lopatina H., Cherniakova Z., Lisovyi V., & Polishchuk V. Computer technologies as a method of forming students' information skills in the process of learning. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 2024, 15(1), 398–413. URL: https://doi.org/10.18662/brain/15.1/559

18. Демиденко Т. М. Підготовка майбутніх учителів трудового навчання до інноваційної педагогічної діяльності: автореф. дис... канд. пед. наук: 13.00.04. Луганськ, 2004. 20 с.

19. Тлумачний словник української мови. Київ: Довіра, 2012. 488.

20. Буркова Л. Технології в освіті, *Рідна школа*. 2001, № 2. С. 18–19.

21. Янкович О. І. Освітні технології в історії вищої педагогічної освіти України (1957–2008): монографія. Тернопіль: Підручники та посібники, 2008. С. 12.

22. Жигірь В. І., Чернега О. А. Професійна педагогіка: Навч. посіб. / за ред. М. В. Вачевського. К.: ТОВ «Кондор», 2012. 336.

23. Туркот Т. І. Педагогіка вищої школи:навч. посіб. К.: Кондор, 2011. 628.

24. Angotti J., Auth M. Science and technology: social implications and the role of education. *Science & Education,* v.7, 2001, №1, P.15-27.

25. Carvalho F. C. A. de, & Ivanoff G. B. Technologies that educate: teach and learn as information and communication technologies. São Paulo: Pearson Prentice Hall. 2010. 184.

26. Tigre P. B. Innovation Management: The Economy of Technology in Brazil Paulo (7th Reimpre). São Paulo: Elseiver Editora. 2006. P. 479–485.

27. Dias P. Living in a digital society: digital technologies, new practices and social changes (1st Edition). Cascais: Principia. 2014. 110.

28. Bondar I., Bachynska N., Novalska T., Kasian, V., Kuchnarov V., & Pylypiv V. Analysis of the organization and features of the implementation of information technologies in the educational process of institutions of higher education. *Systematic Reviews in Pharmacy*, 2020, 11(11), 868-872. URL: https://doi.org/10.31838/srp.2020.11.126

29. Bakhmat N., Kolosiva O., Demchenko O., Ivashchenko I., & Strelchuk V. Application of international scientometric databases in the process of training competitive research and teaching staff: opportunities of Web of Science (WoS), Scopus, Google Scholar. *Journal of Theoretical and Applied Information Technology*, 2022, 100(13), 4914-4924 URL: http://www.jatit.org/volumes/Vol100No13/21Vol100No13.pdf

30. Tsekhmister Y. Effectiveness of Practical Experiences in Using Digital Pedagogies in Higher Education: A Meta-Analysis. *Journal of Higher Education Theory and Practice*, 2022, 22(15). URL: https://doi.org/10.33423/jhetp.v22i15.5567

31. Sheremet M., Leniv Z., Loboda V., Maksymchuk B. The development level of smart information criterion for specialists' readiness for inclusion implementation in education. *Information Technologies and Learning Tools*, 2019, 72, 273-285. URL: https://journal.iitta.gov.ua/index.php/itlt/article/view/2561

32. Про затвердження Положення про дистанційне навчання. Наказ МОН України від 25.04.2013 № 466. URL: https://zakon.rada.gov.ua/laws/show/z0703-13#Text

33. Jill E., Stefaniak T., Logan Arrington & Alison L. Moore Systemic considerations to support distance education environments. *Distance Education*, 2022, Vol. 43, № 2, 171–178.

34. Ребуха,Л. З. Характеристика засобів інноваційних технологій для фундаменталізації професійної підготовки майбутніх соціальних працівників. Вісник Львівського державного університету безпеки життєдіяльності: зб. наук. праць. Львів, 2018, 17, 156−161.

35. Distance Learning Technology definition. 2022. URL: https://www.lawinsider.com/dictionary/distance-learning-technology

36. Про затвердження Положення про дистанційне навчання. Наказ МОН України від 25.04.2013 № 466. URL: https://zakon.rada.gov.ua/laws/show/z0703-13#Text

37. Rahman M. Faculty Recruitment strategies for Online Programs. *Online Journal of Distance Learning Administrator*, 2019, Vol. IV, Number IV. URL: http://www.westga.edu/~distance/ojdla/winter44/rahman44.html.

38. Чернякова Ж., Кириченко Л., Тащян А. Інноваційні технології дистанційного навчання. *Актуальні питання у сучасній науці*. №7(25). 2024. С. 856-869. DOI: https://doi.org/10.52058/2786-6300-2024-7(25)-856-869.

39. Rahman M. Faculty Recruitment strategies for Online Programs. *Online Journal of Distance Learning Administrator*, 2019, Vol. IV, Number IV. URL: http://www.westga.edu/~distance/ojdla/winter44/rahman44.html.

40. Online vs Offline Studies: The Better Deal for Your Finances. URL: http://www.college-connecting.com/blog/online-vs-offline-studies-the-better-deal-for-your-finances/.

41. *Про Національну стратегія розвитку освіти в Україні на 2012-2021 роки*. URL: http://zakon2.rada.gov.ua/laws/show/344/2013

42. Рашевська Н. В. Мобільні інформаційно-комунікаційні технології навчаннѐ вищої математики студентів вищих технічних навчальних закладів*:* автореф. дис. … канд. пед. наук: 13.00.10. Київ, 2011. С.8.

43. Стрюк А. М. Система «Агапа» як засіб навчання системного програмування бакалаврів програмної інженерії: дис.... канд. пед. наук: 13.00.10. Київ, 2012. 29 с.

44. Столяренко І. С. Особливості організації змішаного навчаннѐ у підготовці майбутніх учителів інформатики. *Інформаційні технології в освіті*, 2015, 24, 38–147.

45. Shivam R. Implementation of Blended Learning in Classroom: A review paper. *International Journal of Scientific and Research Publications*, 2015, 5 (11), 369–372.

46. Триус Ю. В. Комбіноване навчання як інноваційна освітня технологія у вищій школі. *Теорія та методика електронного навчання: збірник наукових праць,* 2012, III, 299–308.

47. Collis B. Flexible learning in a digital world: experiences and expectations. London: Kogan Page Limited, 2001. 231.

48. Staker H. Classifying K–12 Blended Learning. Innosight Institute. 2012. URL: https://www.christenseninstitute.org/wp-content/uploads/2013/04/Classifying-K-12-blended-learning.pdf.

49. Максак І. В. «Blended learning» як інноваційний підхід у формуванні професійної компетентності вчителя англійської мови початкової школи. *Вісник Чернігівського національного педагогічного університету ім. Т. Г. Шевченка,* 2013, *110*, 247–249. URL: http://visnyk.chnpu.edu.ua/?wpfb_dl=1334

50. *Про затвердження Положення про дистанційне навчання: МОН України*. URL: http://zakon3.rada.gov.ua/laws/show/z0703-13.

51. Семеріков С. О. Теоретико-методичні основи фундаменталізації навчання інформатичних дисциплін у вищих навчальних закладах*:* дис. … доктора пед. наук: 13.00.02. Київ,2009. 536 с.

52. iNACOL Blended Learning Teacher Competency Framework. 2014. *iNACOL, The International Association for K-12 Online Learning.* URL: https://www.inacol.org/wp-content/uploads/2015/02/iNACOL-BlendedLearning-Teacher-Competency-Framework.pdf

53. Hofmann J. Top 10 Challenges of Blended Learning (And Their Solutions!). 2014. URL: http://blog.insynctraining.com/top-10-challenges-ofblended-learning

54. Shivam R. Implementation of Blended Learning in Classroom: A review paper. *International Journal of Scientific and Research Publications*, 2015, 5 (11), 369-372.

55. Rogers C. The necessary and sufficient conditions of therapeutic personality change. *Psychotherapy: Theory, Research, Practice, Training*. 2007. Vol. 44 (3). P. 240–248.

56. Allison Powell, Ed.D., iNACOL Blended Learning Teacher Competency Framework. 2014. URL: https://www.inacol.org/wp-content/uploads/2015/02/iNACOL-lendedLearning-Teacher-Competency-Framework.pdf.

57. Чернякова Ж., Кириченко Л., Тащян, А. Інноваційні технології дистанційного навчання. *Актуальні питання у сучасній науці.* 2024, № 7(25). С. 856-869. DOI: https://doi.org/10.52058/2786-6300-2024-7(25)-856-869.

Information about the author:
Cherniakova Zhanna Yuriivna,
Candidate of Pedagogical Sciences,
Associate Professor at the Department of Pedagogy
Sumy State Pedagogical University named after A. S. Makarenko
87, Romenska str., Sumy 40002, Ukraine