ICT-oriented Training of Future HEI Teachers: a Forecast of Educational Trends 2022-2024

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Abstract

The article reflects short-term perspectives on the use of information and communication technologies in the training of teachers for higher education. Education is characterized by conservatism, so aspects of systematic development of the industry are relevant to this cluster of social activity. Therefore, forecasting the introduction of innovative elements of ICT training is in demand for the educational environment. Forecasting educational trends are most relevant exactly in the issues of training future teachers of higher education because these specialists are actually the first to implement the acquired professional skills in pedagogical activities. The article aims to consider the existing potential of ICT-based learning, its implementation in the coming years, and promising innovative educational elements that may become relevant for the educational space in the future. The tasks of scientific exploration are to show the optimal formats of synergy between traditional and innovative models of learning. Based on already existing experience, extrapolation of conditions of educational process organization with modeling realities of using information and communication technologies in various learning dimensions should be carried out. Educational trends for the next 3 years are a rather tentative forecast because, as demonstrated by the events associated with the COVID-19 pandemic, the socio-cultural space is very changeable. Consequently, the dynamism of the educational environment dictates the need for a value-based awareness of the information society and the practical use of technological advances. Thus, information and communication technologies are a manifestation of innovative educational strategies of today and become an important component along with traditional aspects of educational process organization. Future higher education teachers should develop a training strategy taking into account the expediency of the ICT component.

Keywords: *higher education, educational strategies, innovative learning technologies, ICT learning, educational perspectives.*

1. Introduction

Educational strategies are an important part of educational planning. It should be noted that each country or international organization forms long-term and short-term plans for the development of the educational environment. These documents, for the most part are about priority directions of development of this sphere of public activity, the attraction of new ideas and principles, formation of stability in the educational space. This is how the long-term prospects of training specialists in the relevant educational sector are formed. At the same time, based on the strategic guidelines, short-term educational and methodological aspects of the use of information and communication technologies are formed. Information and communication technologies have become an integral part of the educational process. If a decade ago this cluster was auxiliary in the organization of the educational process, the current socio-cultural realities form the paradigm of the information society. Under such conditions, fundamental aspects of learning are reoriented along the anthropological dimension to the technological one. The skill and authority of the teacher are no longer the only source of knowledge and skills for future students. Elements of digitalization are becoming more effective means of acquiring hard-skills and soft-skills than traditional teaching and learning materials.

This state of affairs is especially relevant for the training of future teachers, especially teachers of higher education institutions. The reason for this is the direct interrelation of the educational process and professional activity of a higher education teacher. In other words, ICT-based learning is relevant for future teachers both in terms of its target content and in terms of the direct format of the

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learning organization. In other words, two components are relevant for future teachers:

- What knowledge and skills does the applicant acquire as a teacher of higher education?
- How are these knowledge and skills taught to the applicant?

If previously a student could learn from his or her mentor about teaching skills, now there is an opportunity to learn how to use ICT in the learning process. The more skillfully the instructor integrates information and communication technologies, the more the student's interest in their use in teaching grows.

2. Analysis of recent research and publications

In recent years, scientific research on information and communication technologies has undergone a certain reorientation in analyzing the problem of introducing these elements in the coverage of the issue of their full-fledged integration into the educational process. Given the dynamism of the use of information and communication technologies, it is relevant to consider scientific research of recent years. At the same time, we identify a whole cluster of publications related to ICT-based learning during the COVID-19 pandemic, in particular: [15; 9]. Human priorities and socio-professional factors in the development of ICT learning are found in [4; 6; 3; 8], which point out the new role of the higher education teacher in the new information technology paradigm of today. The classification of innovative educational technologies and formats for organizing digital learning is reflected in [2]. The information component in the prospective manifestation of educational strategies was investigated by [10; 11]. The communicative component and the results of research regarding the feasibility of ICT use by students and faculty are outlined in the scientific papers of [12; 7].

3. Research methods

The methodology used in the scientific research is mainly focused on the scientific-philosophical synergistic cluster. When investigating the relationship between traditional and innovative forms of organizing the educational process, scientific and philosophical dialectical methodology is relevant.

The basic general scientific methods that provided awareness of the role and importance of information and communication technologies in the educational process were analysis and comparison. Thanks to observation and analysis, the key sectors of educational and methodological support, in which the use of ICTs is most in-demand, were clarified. The structural method enabled us to find out the relationship between the content and form of ICT-based learning. The modern educational model largely depends on the structural relationship of learning technologies.

The method of expert evaluation is offered to determine the level of proficiency in information and communication technologies. Such methodology is used in the strategic dimension to determine the demand for innovative technologies in the educational environment of the country, region, or professional branch of public activity. At the same time, the expert assessment makes it possible to determine the level of training of a particular teacher of an educational institution in terms of his/her competencies in the cluster of information and communication training. The competency-based approach in pedagogical education implies acquiring certain competencies through the use of separate teaching and learning support. In our case, we are talking about digital-skills as the key competence of future higher education teachers' training.

To predict the specifics of educational trends development, the most acceptable methods are modeling and extrapolation. Such methodology provides an analysis of the current state of educational innovation implementation and develops promising directions for this cluster of educational activity. When forecasting in the short term, the combination of modeling and extrapolation is the most appropriate methodological approach, as it allows taking into account the realities of the present and based on the potential changes that are possible in the short term.

4. Results

Modern socio-cultural space is penetrated by the development of technology, which determines the functioning of all spheres of social activity. Information occupies a defining place in the worldview of modern man. Such precepts in the paradigm of thinking and perception require ordering and interaction. The educational sector is no exception, in which informatization and communicativeness have taken the leading place and determine the content and form of the educational process. “The informatization of society leads to the formation of not only a new information environment in which people live but also a new information structure of their lives and professional activities” [10].

There was an urgent need to provide an informative and communicative component in the educational environment. Traditional models of the educational process had significant limitations in terms of mastering and transmitting information. Under such conditions, the indicator of the quality of education focused on the quality of information involved in the

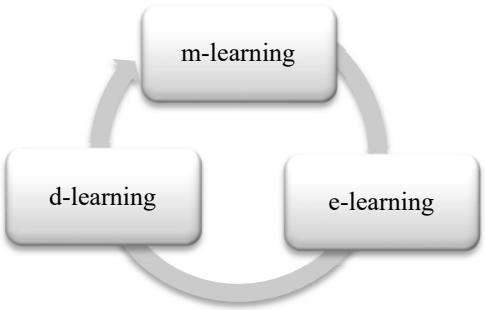
educational process. The main element, due to which the quality indicators were provided, was the human dimension. Indeed, organizational and pedagogical human activities were determinant in the development of education.

It should be noted that the reorientation from the "man-man" format to the "man-machine" model took place at the global level and concerned not only educational realities but also all spheres of social activity [4]. In the worldview paradigm of humanity, there has been a shift of priorities from science-centeredness to human-centeredness. Information and communication technologies were no longer perceived as a solely scientific and progressive achievement. The value of scientific and technological innovations was determined solely by their ability to integrate into spheres of social activity. Since practically all strategic plans of mankind are connected with the active use of achievements of scientific and technological progress, the prospects of further increasing the role of ICTs in the field of education are beyond any doubt. The only question is at what pace and to what extent education will be digitalized.

Information and communication technologies have become not an alternative to traditional elements of the educational process, but part of it, prescribed in the program foundations of educational development and practical work curricula for training specialists in various fields. The training of future teachers of higher education also includes the active use of ICTs as an important and effective method of instruction. In preparing a future teacher for higher education, the role of ICTs also grows in the sense that the teacher, in addition to absorbing information, also broadcasts it. Thus, information and communication technologies fully embrace the professional activity of a teacher.

With the increase in information capabilities that have begun to be implemented in the educational process, the need for innovative elements that can streamline the available information is actualized. Today there are a large number of technologies and electronic devices that are used in the organization of the educational process. Researchers [2] attempt to classify the types of educational process organization depending on the dominance of information and technological support (see Fig. 1).

Fig. 1. Types of organization of ICT-oriented educational process



Along with the forms of organization of the educational process, there is always the question of engaging educational strategies. Of course, when it comes to progressive ICT-oriented learning, it is innovative educational technologies that should be actualized. To prepare a competitive and effective higher education teacher, we consider promising the innovative technologies which proved their relevance in recent years (especially in the years of educational crisis associated with the COVID-19 pandemic).

Virtual Reality in Education is an educational activity involving the use of virtual reality elements. This strategy is a response to today's reality when virtual reality is widely used primarily in the entertainment sphere. Having gained popularity among young people, Virtual Reality got the priority right for further implementation in the educational environment. Note that this technology is relevant to a wide range of sciences, so it can be used by almost all teachers of higher education, regardless of specialization.

Cloud Computing for Education is an educational strategy, the task of which is the ability to operate significant amounts of information. Undoubtedly, educational content constantly needs information support in both quantitative and quantitative terms. Consequently, the use of cloud technology will be an effective solution in the practical activities of a teacher of higher education.

Social Media in Educational Institutions is educational technology, thanks to which there is a possibility to create proper communications between all participants of the educational process. For a teacher of higher education, this technology has several directions of communication: with applicants of educational level, with the administration of higher education, with the educational-scientific community of the country, region, or the world.

So far we can state the active use of these types of the training organization. When it comes to the prospects of ICT-based learning development in the next three years, the question is relevant - which cluster will be dominant in the training of the future higher education teacher. To answer this question, we should analyze the advantages

and disadvantages of the process of education digitalization in the short term (see Table 2).

Fig. 2. Pros and cons of ICT-based learning in the short term

Positive aspects	Negative aspects
Information aspect	
• the ability to operate with large volumes of information • use of the information resource in online mode • openness and accessibility of information	• the need to filter the flow of information • violation of copyright and confidentiality • moral standards of information content
Communicative aspect	
• increasing the level of awareness of the teacher of higher education • the possibility of self-organized forms of training with the coordinating role of the mentor	• the loss of a dominant status in the translation of knowledge and skills • risks associated with the weakening of the controlling role of the teacher and a decrease in the quality of education

Important in determining the prospects for ICT-oriented learning are the views of the students to whom such innovative models are offered. Recent studies show a revival of student interest in new learning formats. However, it may be that these results are related to the pandemic crisis. Nevertheless, studies point to students' active use of innovative technologies in mastering knowledge and mastering skills [9].

Prospects for ICT-based learning are directly related to the demand for specialists with digital-skills. As we can see, market conditions dictate competitiveness in all areas of public activity. Requirements for higher education teachers are also set for the mastery and skillful use of digital and technological competencies.

At the moment, the ICT industry is the most coveted industry in terms of employment [14]. This state of affairs suggests a promising use of ICT-oriented teaching. Consequently, the training of future higher education teachers should focus on creating a competitive environment, which at present is not possible without taking into account the potential of information and communication capabilities.

It should also be realized that there is an urgent need for prerequisites and sites where educational innovations based on ICTs will be implemented. It is clear that economically developed countries have much more opportunities to implement the ICT-based model of education. In particular, the example of South Korea clearly demonstrates the connection between the level of use of information and communication technologies and the indicators of socio-economic well-being of the country. South Korea, with its well-developed ICT infrastructure, has created the necessary social environment for innovative implementations [8].

As defined by a group of scholars, information technology is a "socio-technical ensemble" that requires analysis with a simultaneous focus on both technical and non-technical issues [6]. Consequently, the implementation of innovative models in the training of future higher education teachers should be applied through the prism of socio-technological realities of the sociocultural space.

The introduction of information and communication technologies is of no small importance for all subjects of the educational space. Becoming a teacher, the acquisition of competencies by students, the organization of higher education through ICT administration - all these components, which allow comprehending the practical component of the implementation of innovative strategies [3]. Proceeding from the production necessity, the working curricula and programs are formed, which include appropriate guidelines for the implementation of information and communication support training of a specialist of the relevant industry. In the case of future teachers of higher education, the educational and methodological arsenal that they master is actually duplicated:

- first, information and communication technologies are a fundamental component of the organization of the educational process, and the educational content is determined by the basic for the organization of self-study of the student;
- second, the mentor's use of information and communication technology serves as an example for students, who can analyze all the positive and negative aspects of innovative resources.

It is noted that mobile learning needs methodological support for more organic application in practice. The conceptualization of mobile learning occurs with a constant change of the educational environment and the influence on the organization of the educational process realities of socio-cultural activity. Emphasis is placed on the inadmissibility of static application of mobile learning [1].

Information and communication technologies showed their importance in the first place after the beginning of the pandemic. E-learning became an effective solution to preserve the format of educational continuity. Note that developed countries were quite quick to adjust their technological infrastructure to transition from face-to-face to distance learning. At the same time, developing countries have encountered certain difficulties in the

practical implementation of ICTs in the learning process [15].

Information and communication technologies expand the capabilities of the educational process. The information field, which is actualized in the process of ICT application, along with communicative capabilities become a good platform for the future higher education teacher to acquire the necessary skills and competencies. At the same time, we are forced to state that no technology at present can fully replace the teacher in all his/her professional dimensions. Despite the innovativeness of artificial intelligence, the informative and communicative component is still formed and controlled by a teacher. Therefore, in the short term, it is difficult to imagine the complete transition of the educational process under the control of the information element. An effective educational model is seen in combining information technologies with didactic means of their implementation [11].

An important aspect of the implementation of ICT-based learning in higher education teacher education is the need to achieve synergies in human and scholarly terms. The point is that teacher guidance is a useful tool for building shared responsibility skills and for students, instructional guidance contributes to key transformations in the context of global educational reform [5].

Analyzing research on the reaction of students [12] of pedagogical profile to the use of ICT-oriented learning by their mentors, we note the positive feedback and the need to expand such a model of educational technology. Similar studies have been conducted among teachers [7]. Faculty members show an average level of tolerance towards ICT-based learning. However, it is mostly a matter of aversion of the academic community to ideas related to the total implementation of artificial intelligence. At the same time, trends indicate that the vast majority of teachers have a positive perception of the use of innovative technologies in the educational process.

Another important indicator of further prospects for the development of ICT-based learning is the results of the quality of education of modern students, who were actively offered information and communication technologies as a component of the educational process. As evidenced by the data [3], the quality of educational services has increased significantly, which is a necessary criterion for the continuation of ICT implementation in education.

5. Discussion of results

It should be noted that the prospects for ICT-based learning depend not only on transformations in the sphere of education itself. Modern realities demonstrate the interconnectedness and even interdependence of different spheres of human life and activities. As an example, the COVID-19 pandemic, while having nothing to do with the education cluster, has caused dramatic transformations in its functioning. Accordingly, the conditions of professional activity of a higher school teacher have undergone significant changes. This state of affairs requires a response in the training of future teachers of higher education institutions. Consequently, the prospects of introducing information and communication technologies are proposed to consider in two dimensions:

- as a response to the challenges of time, changing the format of the educational process and requiring changes in the targeting of educational outcomes;
- as a result of transformations in the educational sphere, providing for the correction and improvement of the competencies of the teacher of higher education.

The peculiarity of introducing ICT-based learning in the system of preparing a future higher education teacher is that this process is actualized both by the purely learning process and by the organization of learning. The applicant perceives both the learning content and the work of the tutor, extrapolating the acquired experience in the communication aspect to his/her future professional activity. Based on such guidelines, the higher education teacher should use ICT not only as instructional technology but also to demonstrate a clear example of the effectiveness of such educational technology.

Considering the issues of priority models of ICT-based learning, we should note that the dynamism of modern socio-cultural realities requires a variety of such formats. Higher education teachers should have as many forms of the educational process or educational technologies as possible in their arsenal to apply them promptly when necessary. At the same time, it should be noted that the existing information and communication technologies undergo changes and improvements virtually online. Therefore, an actual teacher of higher education should not only get acquainted and master educational innovations but also keep abreast of their transformation.

Note that the results of the implementation of information and communication technologies for future teachers of higher education cover all participants in the educational process (see Table 3).

Fig. 3. Information and Communication Technologies in Higher Education

Information and Communication Technologies in Higher Education		
Subject - Teacher	Subject - Administration	Subject - Student
Result - ICT literacy	Result - Quality of education	Result - Motivation

6. Conclusions

Information and communication technologies in the preparation of the future teacher of higher education are in demand and relevant. In order for graduates with higher education to have proper professional competencies, it is necessary to acquire three key clusters of skills: hard-skills, soft-skills, and digital skills. If everything is more or less clear with the format of digital skills and they are actually synonymous with information and communication technologies, then a promising direction in the development of education is to increase the role of ICTs in the mastery of hard-skills and soft-skills.

An important feature of the professional work of a higher school teacher is the paradigmatic reorientation of the basis of his/her activity. Nowadays, teachers do not only teach but act as examples of how to teach. Based on such worldview and methodological precepts, we can state the actualization of ICT-based learning in the short term.

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