Digital Competence In Education At The Present Stage Of Development Information Society

Liudmyla Blahodyr[†], Andrii Kononenko[††], Olena Kulynych [†††], Taras Ianytskyi [††††], Valentina Sinelnikova [††††], Tetiana Mykytenko [†††††]

[†] Department of Higher Mathematics and Methods of Teaching Mathematics, Pavlo Tychyna Uman State Pedagogical University, Ukraine
[††] Head of the scientific and organizational department Institute of Vocational Education, National Academy of Pedagogical Sciences of Ukraine, Ukraine
[†††] Postgraduate student of the Institute of Vocational Education, National Academy of Pedagogical Sciences of Ukraine, Ukraine
[††††] Departmen of Musical Arts, Kyiv National Universiti of Culture and Arts, Ukraine
[†††††] Customs Affairs Department, University of State Fiscal Service of Ukraine, Ukraine

Summary

The article defines the hypothesis of the research, it is an assumption that the process of forming ICT competence will be effective if: theoretically substantiated, developed and practically implemented a structural and functional model for the formation of ICT competence, taking into account interdisciplinary integration, the pedagogical conditions that contribute to the formation of ICT competence have been determined: interdisciplinary integration as the basis for building an interdisciplinary course, the content of which is aimed at the formation of ICT competence.

Key words:
information technology, communication technologies, education system, educational process, ICT competence.

1. Introduction

Relevance of the article. The modern period of development of vocational education is characterized by the digitalization process caused by global trends in the transition to the digital economy and digital society. According to the Global Education Futures report, Education for a Complex Society (2018), digitalization of education is a “megatrend shaping our future”.
A new generation of students (generation Z) lives in a digital environment, which is formed by digital technologies, including educationally significant digital technologies: telecommunication technologies, big data, distributed ledger systems, artificial intelligence, robotics components, wireless communication technologies, virtual and augmented reality technologies , cloud technologies, electronic identification and authentication technologies, digital technologies for specialized educational purposes, Internet of things. The digital transformation trends in the field of vocational education require a teacher to have a high level of ICT competence for the successful implementation of professional activities, because it is the teachers who are called upon to further prepare the younger generation for life and work in a modern digital society. The relevance and significance of the ICT competence of modern teachers, including digital literacy, is reflected in the new UNESCO recommendations “Structure of the ICT competence of teachers.
Therefore, today ICT competence is one of the leading competencies in teaching at all levels of education. This is also relevant for the training of specialists of all levels.
The urgency of the problem of formation of ICT competence in their training confirms: analysis of the results of the ascertaining experiment, which showed insufficient knowledge and skills in computer science and ICT, which may be required when using ICT in their future professional activities; high assessment of the importance of ICT competence of a modern teacher and the need to form ICT competence of teachers.

2. Theoretical Consideration

The analysis of dissertation researches, scientific and pedagogical literature, studying of practice of formation of ICT competence at their training, results of the ascertaining experiment allow to formulate the following contradictions:
- between the growing impact of digitalization on the development of education in general, creating the need to improve the quality of the educational process, and the

Manuscript received August 5, 2021
Manuscript revised August 20, 2021
https://doi.org/10.22937/IJCSNS.2021.21.8.2

insufficient formation of ICT competence to work in the context of digitalization of education;
- between the need to form ICT competence of teachers in their training in the context of digitalization of education in accordance with the requirements of modern standards and the inability to properly ensure the formation of ICT competence using existing models and methods;
- between the need of educational organizations for teachers with a high level of ICT competence, ensuring the successful implementation of pedagogical activities, and the existing level of ICT competence, insufficient for the successful implementation of future professional activities.
The need to resolve these contradictions determines the relevance of the problem and the choice of research topic - "Formation of ICT competence, taking into account interdisciplinary integration in the context of digitalization of education."
The highlighted contradictions led to the choice of the research problem, which consists in defining and substantiating the features of the formation of ICT competence of teachers, taking into account interdisciplinary integration in the learning process in the context of digitalization of education.
In modern society, the economy's need for qualified specialists with professional mobility and able to work in changing economic conditions is growing.
Today, many scientists are talking about the completion of the stage of informatization of education [6-9.]. "Educational institutions of all levels are equipped with computer equipment, teachers have been trained and retrained in the use of ICT in the educational process" [9].
The modern world has moved to a new level of technology development. A new stage in the development of society is called "digitalization", which is also called a modern trend and a priority direction of modernization of Ukrainian education, replacing the process of informatization [4, 9, 12]. The digitalization process is a deep convergence of digital technologies with material, social and humanitarian technologies and practices, including educational [12].
The productive use of digital technologies in education, the inclusion of students in independent search, selection of information, participation in project activities forms the competence of the 21st century in future specialists, including ICT competence [1-3].
The construction of a digital educational process in an educational organization today should be based on a new branch of pedagogical science - digital didactics, which is a scientific discipline about the organization of the learning process in a digital educational environment. The subject of digital didactics is human activity, not the functioning of digital educational tools. “Digital didactics can be considered as a trans-integrative area of scientific knowledge”, characterized by “mutual transfer of certain scientific ideas and approaches from one area to another and their integration” [12]. The subject of digital didactics of vocational education and training is “the learning process taken as a whole as a system of organizing the learning process in the digital educational environment ", including: learning objectives (in accordance with the requirements of the digital economy and digital society), the content of education and the requirements for its formation, methods of organizing the learning process (based on the use of digital technologies), organizational forms, technologies and teaching methods (maximum use of the didactic capabilities of digital technologies), teaching aids (including digital - network and software and hardware, combined into a single intellectual complex), the impact of the digital educational process of vocational education and training on the development of society and the economy [5].
Scientists note that the strategy of working with representatives of the digital generation should proceed from the fact that “it is almost impossible to integrate them into the traditional educational process. Its essential transformation is necessary, the result of which is the construction of a new, digital educational process ”[10].
A feature of building a digital educational process is the introduction and use of digital technologies, many of which have the following didactic properties: freedom to search for various information in the global network; personality (unlimited possibilities for personalization according to the needs and characteristics of students); interactivity (ensuring multi-subjectness in the process of educational interaction); multimedia (complex use of various channels of information perception); hypertext content (free movement through the text, use of cross-references, reference nature of information, etc.); subculture (compliance with the usual image of the world for the digital generation) [11].
In addition, digital educational technologies (blended learning, mobile learning, gamification, distance educational technologies, electronic (online) learning, etc.), based on the use of technical means and specialized interactive equipment (PCs, laptops , tablets, robotic kits, interactive whiteboards, electronic flip charts, interactive panel, interactive sandbox, interactive floor, interactive cubes, etc.).
Teachers with a high level of professional competence, including ICT competence, should take into account “fundamentally new educational tasks that the digital age poses for education: the development of readiness for continuous change, which requires a certain transformation of the familiar system of values; education of social responsibility in the system of relations "person - digital means - society"; the formation of an internal border between virtual and real worlds, the development of the ability to differentiate these worlds and the types of responsibility corresponding to them; development of the ability to critically analyze information and filter information noise, advertising, etc. " [2, 7].

To train competent personnel, it is necessary to properly modernize the education system, “bring educational programs in line with the needs of the digital economy, widely introduce digital tools for educational activities and integrate them into the information environment, provide an opportunity for citizens to study according to an individual curriculum throughout their lives - in anytime and anywhere ”[4].

The training of future teachers in the system in the aspect of the problem of the formation of ICT competence largely depends on the psychological and pedagogical, didactic, methodological and substantive possibilities of organizing the educational process, creating a modern information and educational environment in the educational organization.

Trends in the digital transformation of education require a teacher to have a high level of competence in the field of information and communication technologies for the implementation of professional activities and a fairly serious practice-oriented training in the use of ICT and modern educational technologies (distance learning (online learning), "blended learning"), the technology of organizing the project activities of students to solve various professional problems.

Consequently, teacher education involves the training of competent mobile teachers with high professional competencies, capable of

quick adaptation to the changing content and nature of pedagogical work in the context of the digitalization of society[11-13].

Today, competence in the field of ICT is of particular importance, "which will allow a future specialist to be competitive in the labor market, ready for continuous professional growth and professional mobility in accordance with the needs of modern education" [6] of the digitalization era, which is reflected in a new UNESCO document.

Today, ICT competence as a component of professional pedagogical competence is justified in the UNESCO standard “UNESCO ICT Competency Framework for Teachers. VERSION 3” (ICT CFT), developed in 2018. This document provides a comprehensive set of competencies that educators need to integrate into their professional practice in order to help students achieve curriculum goals. In the UNESCO document, the term “competence” describes the functionality of the teacher, and “competence” refers to the ability of teachers to perform the corresponding functions. The structure of the ICT competence of teachers reflects all aspects of the teacher's professional activity (understanding the role of ICT in education, curriculum and assessment, pedagogical practices, the use of digital skills, organization and management of the educational process, professional development).

ICT CFT also recommends using modern education trends in relevant aspects and at all three levels of informatization (Acquiring knowledge, Mastering knowledge, Creating knowledge):

open educational resources (OER) are any educational resources (for example, textbooks, streaming video, multimedia applications, etc.) that are available for use by educators and students, without having to pay for use or licensing fees (free);

Social networks are websites or applications that provide online communication with people on networks that share a common interest or activity (Facebook, Twitter, Instagram, etc.). Social networks can be used to improve pedagogical communication, facilitate the organization of interactive learning, strengthen the community of students and teachers;

mobile technologies (smartphones, tablets, etc.) - devices that offer educators and learners a more flexible approach to learning anytime and anywhere, as well as providing a link between formal and non-formal learning;

The Internet of Things (IoT) is a network of computing devices embedded in everyday objects other than computers and smartphones, allowing them to send and receive data over the Internet.

artificial intelligence (AI). There is no universally accepted definition of AI. Commonly, the term artificial intelligence is used when a machine, especially computers, mimics human thinking or behavior that humans associate with human intelligence, such as learning, speech, and problem solving. Artificial intelligence applications include expert systems, speech recognition and natural language processing, machine vision and imaging technologies. Currently in education, AI is used in the form of: custom content through adaptive learning programs and software, tracking and monitoring diagnostics, automation assessment, AI tutors;

virtual reality (VR) and augmented reality (AR). Virtual reality (VR) is a computer simulation of the environment with which a person can interact. The person is immersed in this simulated environment and is able to manipulate objects or perform a number of actions. Augmented reality (AR) is a representation of a real environment, the elements of which are enhanced with computer images; they overlap the real-time physical environment. AR changes the person's current perception of the real environment, while VR replaces the real environment with a simulated one;

big data As people and devices increasingly connect to the web, society is generating digital data at an extraordinary rate unprecedented in human history.

Social computing, networked devices, electronic business transactions, mobile computing, sensors and environmental scanners generate billions of events per second, many of which are stored for later analysis or can be analyzed as a real-time data stream;

programming (coding) is what allows you to create computer programs, applications and websites. Code is a set of instructions that computers can understand. A computer program is a sequence of instructions that a computer can interpret and execute, and is in fact a means of automating processes. All computer programs are based on algorithms that determine how a task should be performed;
ethics and privacy protection (cybersecurity). For ICT innovation to be developed and used in the service of education and humanity, a value-based approach to the use of ICTs in education is required. There is a need to educate educators and learners on data protection, as well as skills to enable them to better control their personal data.

Conclusions

Thus, the digitalization of education is changing the teaching profession, and the requirements for the digital qualifications of a teacher are increasing. Today, ICT competence, including digital literacy, must be part of all forms of teacher education and training throughout the life cycle. Digital literacy is the ability of an individual to use digital technologies, communications or networks to find, evaluate, use and create information. Digital literacy also includes the ability of an individual to: understand and use information in several formats from a wide range of sources; perform tasks efficiently in a digital environment.
The foregoing allows us to conclude that, in the aspect of the conducted research, it is necessary to clarify the concept of "ICT competence". By ICT competence we will understand its integral personality and activity quality, manifested: in the ability, based on the knowledge, skills and experience of activities acquired in the process of training in a teacher training college, to solve professional problems with the help of ICT and on the basis of possession of digital literacy; in the readiness of the motivated use of ICT, taking into account the specifics of the field of professional activity.

References

[1] Corrall, S. (1998). Key skills for students in higher education. SCONUL Newsletter, 15, 25-29.

[2] Frolov, D., Radziewicz, W., Saienko, V., Kuchuk, N., Mozhaiev, M., Gnusov, Y., & Onishchenko, Y. (2021). Theoretical And Technological Aspects Of Intelligent Systems: Problems Of Artificial Intelligence. International Journal of Computer Science and Network Security, 21(5), 35-38. DOI10.22937/IJCSNS.2021.21.5.6.

[3] Meera N. S. Quality education for all? A case study of a New Delhi government school, Policy futures in education, 2015, № 13 (3), pp. 360–374.

[4] Lazorko, O., Virna, Z., Brytova, H., Tolchieva, H., Shastko, I., & Saienko, V. (2021). Professional Safety of Personality: System Regularities of Functioning and Synergetic Effects of Self-Organization. Postmodern Openings, 12(2), 170-190. https://doi.org/10.18662/po/12.2/302.

[5] Alfred P. Rovai, Linda D. Grooms The relationship of personalitybased learning style preferences and learning among online graduate students. Journal of Computing in Higher Education. - 2004. - №16, Issue 1. - pp 30- 47.

[6] Andrea Santo-Sabato, Marta Vernaleone From the First Generation of Distance Learning to Personal Learning Environments: An Overall Look. ELearning, E-Education, and Online Training. - 2014. - №138. - C. 155-158.

[7] Shapiro, J., & Hughes, S. K. (1996). Information literacy as a liberal art: Enlightenment proposals for a new curriculum. EDUCOM Review, 31(2), 31-35.

[8] McMillan R. Man Builds Twitter Bot That Humans Actually Like. Wired. URL: wired.com/2012/06/twitter_arm/

[9] Mason, R. Globalising Education: Trends and Applications. London: Routledge, 1998. P. 37.

[10] Biddiscombe, R. (1999). Developing the learning support role: Some of the challenges ahead. SCONUL Newsletter, 16, 30-34.

[11] Iasechko, M., Shelukhin, O., Maranov, A. Evaluation of The Use of Inertial Navigation Systems to Improve The Accuracy of Object Navigation. International Journal Of Computer Science And Network Security, 21:3, 2021, p. 71-75.

[12] Dordick H.S., Wang G. The Information Society: A Retrospective View. Newbury Park — L., — 1993.

[13] Iasechko, M., Iasechko, S., Smyrnova, I. Aspectos pedagógicos do autodesenvolvimento de alunos de educação a distância na Ucrânia. Laplage Em Revista, 7(Extra-B), 2021, p.316-323.