Formation Of Digital Culture Of Scientific And Pedagogical Workers In The Conditions Of General Digitalization Of Education

Andrii Kononenko †, Iryna Smyrnova ††, Petro Rybalko †††, Vasyl Obraz ††††, Yuliia Balakhovska †††††, Maryna Prepotenska ††††††

† Head of the scientific and organizational department Institute of Vocational Education, National Academy of Pedagogical Sciences of Ukraine, Ukraine
†† Deputy Director for Scientific and Pedagogical Work, Danube Institute of the National University "Odesa Maritime Academy", Ukraine
††† Department of the Theories and methods of physical culture, Sumy State Pedagogical University named after A.S. Makarenko, Ukraine
†††† Department of Cinema and Television Arts, Kyiv National University of Culture and Arts, Ukraine
†††††† Departament Ukrainian Philology and literary creativity by Andrii Malyshko National Pedagogical Dragomanov University, Ukraine
††††† Department of Philosophy, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine

Summary

The article theoretically substantiated, developed and practically implemented a structural and functional model of the formation of ICT competence, taking into account interdisciplinary integration, defines the pedagogical conditions that contribute to the formation of ICT competence: interdisciplinary integration as a basis for building an interdisciplinary course, the content of which is aimed at the formation of ICT competence; the use of IEE, including information, didactic, technological components as a basis for the formation of ICT competence; integration of formal, non-formal and informal education for the implementation the integrity of the acquired knowledge, skills, experience as the basis for the formation of the ICT competence of teachers; creation and use of a set of tasks (educational (UZ), educational and methodological (UMP), educational and professional (UPZ)) as special tools for the formation of ICT competence.

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

1. Introduction

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 of 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, since it is the teachers who are called 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. Version 3 "(" UNESCO ICT Competency Framework for Teachers. VERSION 3 "(ICT CFT), adopted by the UN General Assembly. Experts from Global Education Futures and WorldSkills Russia in the Skills of the Future report (2017) highlight digital literacy, which is part of ICT competence, as one of the main skills that a person will need in the future, along with digitalization, among the future trends in education, he distinguishes the individualization of education and a competence-based approach.

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 at any level, including teachers of educational organizations.
Relevance of the problem of the formation of ICT competence

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confirms: the analysis of the results of the ascertaining experiment, which showed an insufficient level of knowledge and skills of informatics and ICT, which may be in demand when using ICT in their future professional activities; high mark the importance of the ICT competence of a modern teacher and the need for the formation of ICT competence among ECE teachers, expressed by employers and teachers of pedagogical organizations.

The need to resolve these contradictions determines the relevance of the problem under consideration and the choice of the research topic.

The highlighted contradictions determined 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.

Purpose of the study: theoretical justification, development and approbation of the structural and functional model of the formation of ICT competence, taking into account interdisciplinary integration in the context of digitalization of education.

2. Theoretical Consideration

In modern society, the economy's need for qualified specialists with professional mobility, able to work in changing economic conditions.

The task of improving the quality of training of modern specialists is becoming urgent, as determined by the requirements of the labor market, employers, and the digital economy as a whole. The consequence of this is significant changes in the field of education at all its levels.

Today, many scientists are talking about the completion of the stage informatization of education [1-13, etc.].

“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” [8].

The modern world has moved to a new level of technology development. A new stage in the development of society received the name "digitalization", which is also called a modern trend and a priority area for the modernization of Ukrainian education, replacing the process of informatization [2, 4, 7, etc.]. Process digitalization is a deep convergence of digital technologies with material, social and humanitarian technologies and practices, including educational [12]. In education, digitalization is aimed at ensuring the continuity of the learning process (life long learning), as well as its individualization based on advanced learning technologies, which include the use of teaching big data, virtualization, virtual and augmented reality (VR, AR), cloud computing, mobile technologies, etc. The productive use of digital technologies in education, the inclusion of students in independent search, selection of information, participation in project activities forms future specialists in the competence of the 21st century, including ICT competence.

The factors causing the need for building a digital educational process of vocational education and training. These factors are three components of the digital society: digital generation (a new generation of learners with special socio-psychological characteristics; “generation Z”, “processor children”, “tablet children”, “chip children”); new digital technologies ("advanced", "smart", "SMART") that form digital environment and developing in it (for example, telecommunication technologies; big data; artificial intelligence; distributed ledger technologies (including blockchain); Internet of things; digital footprint technology; virtual and augmented reality); the digital economy and the new requirements for personnel generated by it [11].

These trends are especially relevant for teaching future teachers who are called upon to further prepare the younger generation for life and work in a modern digital society.

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 organizing 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 a digital educational environment", including: learning objectives (in accordance with the requirements of the digital economy and digital society), content training and requirements for its formation, ways of organizing the learning process (based on the use of digital technologies), organizational forms, technologies and teaching methods (maximum the 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.

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 required, the result of which is the construction 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 (integrated use of various channels of information perception); hypertext (free movement through the text, use of cross-references, reference nature of information, etc.); subculture (compliance with the usual image of the world for digital generation) [12].

In addition, digital educational technologies (blended learning, mobile learning, gamification, distance learning technologies, electronic (online) learning, etc.) play a significant role in the digital educational process today.
based on the use of technical means and specialized interactive equipment (PCs, laptops, tablets, robotic kits, interactive whiteboards, electronic flip charts, an interactive panel, an interactive sandbox, an interactive floor, interactive cubes, etc.).
For the organization of the digital educational process, a trained highly qualified personnel potential of educational organizations is required. Note, that it is human resources that “have the necessary competencies in the context of the constantly growing digitalization of all spheres of the economy can become the main source of growth in labor productivity and competitiveness and the national economy as a whole ”[11]. To prepare it it is necessary to properly modernize the education system, bring educational programs in line with the needs of the digital economy, widely introduce digital technologies into the educational process of educational organizations, and provide an opportunity for citizens to learn throughout their lives.

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 changes that require a certain transformation of the familiar system of values; education of social responsibility in the system of relations "person - digital means - society"; formation of internal boundaries between virtual and real worlds, the development of the ability to differentiate these worlds and the corresponding types of responsibility; development of the ability to critically analyze information and filter information noise, advertising, etc. " [1].

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, to ensure the possibility of teaching citizens according to an individual curriculum throughout their life - at any time and in any place ”[4].

Training of teachers in the aspect of the problem of the formation of ICT competence largely depends on the psychological-pedagogical, didactic, methodological and substantive possibilities of organizing the educational process, creating a modern information and educational place. Thus, information and educational the environment of an educational organization is the basis for the formation of ICT competence of teachers.

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", a technology for organizing students' project activities to solve various professional problems. A number of researchers note that the system today remains one of the most important components of teacher education in our country, characterized by a significant volume and high quality of practical training of teachers. Consequently, pedagogical education involves the training of competent mobile teachers with high professional competencies, capable of quick adaptation to the changing content and nature pedagogical work in the context of the digitalization of society.

Analysis of regulatory documents, recommendations, research in the field of digitalization of the economy as a whole makes it possible to highlight the conditions for the digitalization of education, which include:
generation of learners; creation of a legal framework for digitalization of education; resource support for digitalization of education, including the digital educational environment of an educational organization; training of human resources for the digital economy, possessing ICT competence, including digital literacy; digital pedagogical technologies and educationally significant digital technologies (big data, distributed ledger systems, artificial intelligence, robotics components, technologies wireless communications, virtual and augmented reality technologies, digital twin technology, electronic identification and authentication technologies, digital technologies for specialized educational purposes, Internet of things); today the preparation of future preschool teachers educational organizations in the system is based on taking into account the requirements of various standards. The basis for interaction and conjugation of

these standards is professional competence, one of the components of which is ICT competence, which is the ability, ability and willingness to solve professional problems using ICT tools in professional activities; the formation of competencies in the field of ICT in the preparation future teachers in the system is expected within the framework disciplines: information and communication technologies in professional activity ". Analysis of the content of these disciplines testifies to the fragmentation of the formation of ICT competence of future teachers; systematic formation of ICT competence of future teachers during their training in the system is possible with the use of interdisciplinary integration based on information and communication technologies, which is confirmed by the analysis of research on this issue; the variable part of the training program for specialists makes it possible to provide conditions for the formation of ICT competence that is relevant today.

Conclusions

Thus, the theoretical significance of the research results lies in the expansion of scientific knowledge about the features of the formation of ICT competence, taking into account interdisciplinary integration in the context of digitalization of education; in justifying the feasibility of the formation of ICT competence in the study of interdisciplinary course, the content of which is aimed at the formation of ICT competence; in contributing to the development of the problem interdisciplinary connections, in particular, in identifying interdisciplinary connections of informatics with the disciplines of professional training based on the concentrates of the conceptual apparatus of informatics; in disclosing the principles of forming the components of ICT competence of teachers in the context of digitalization of education; in development and content filling of the criterion base, which includes criteria, indicators and levels of formation of teachers' ICT competence.

The reliability and scientific validity of the research is ensured by the correct choice of a set of methods that are adequate to the goals and objectives of the research; methodological soundness of the provisions; the complex use of theoretical, empirical and statistical methods adequate to the object, subject, goal, tasks research; approbation and implementation of the main research results; practical work of the author in the system of secondary education of the teacher.

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.