DEVELOPMENT OF DIGITAL COMPETENCE UNDER THE CONDITIONS OF DIGITALIZATION OF EDUCATION

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Summary

The development of the digital environment covers almost all spheres of life. Today, every person needs a wide range of digital knowledge, abilities, and skills in the intelligent use of the latest technologies for education, professional activities, and participation in society. Special attention is paid to providing the educational process of institutions of higher military education with appropriate digital technologies that would meet modern challenges and ensure the support and development of modern digital competencies of teachers. The article presents the results of an empirical study of the peculiarities of the development of digital competences among scientific and scientific-pedagogical employees of institutions of higher military education. It was established that in the conditions of digital challenges, the role of a teacher of a higher military education institution as a provider of digital transformations and the formation of his digital competence becomes important. It was noted that the majority of scientific and scientific-pedagogical workers paid due attention to the issue of systematic application of information technologies in professional activities. It was established that teachers need the development of digital competence related to the work of gamification tools, content visualization for solving practical, professional and general educational goals. It was determined that the digital competence of scientific and scientific-pedagogical workers of institutions of higher military education should be considered as the newest type of literacy, which is associated with special knowledge, skills, and practical skills for activities in a digital educational environment. Mandatory structural components of a teacher's digital competence are computer literacy, information literacy, communicative literacy, and safety in the digital environment. The development of digital competences of teachers will contribute to the establishment of interaction with students, overcoming the digital gap between participants in the educational process, the development of digital literacy of students, and their conscious use of digital technologies for their own realization in the conditions of a digital society.

Key words: distance learning, information and communication technologies, digital society, information and educational environment, digital competence.

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1. Introduction

The saturation of the real world with electronic and digital devices, means, systems and the establishment of electronic communication exchange between them leads to the digitalization of education, as a component of the digitalization of society as a whole. In order to realize the goal of digitization, the education system itself should play an important role. In the conditions of social distancing, distance learning became the only possible form of educational activity. The need to continue the educational process in new conditions has made the issue of rapid integration of distance learning technologies into traditional forms of educational activity more relevant.

It should be noted that one of the main obstacles to the effective implementation of distance learning technologies in the educational process was the unpreparedness of teachers, their insufficient digital competence, and the lack of necessary skills in the use of computer learning systems *(Krasnova, 2017)*. The problem of the wide implementation of distance learning in educational practice led to the need to increase the appropriate level of knowledge of teachers of higher education institutions in the field of information and communication technologies and the ability to apply them in practice.

Skills in the use of information and communication technologies are becoming more and more relevant in the professional activity of a teacher, therefore an important task for institutions of higher military education is the preparation of teachers for the use of such technologies, including the formation of digital competence as a vital personal skill *(Bond, Marin, Dolch, Bedenlier, & Zawacki-Richter, 2018)*.

The special training of teachers should be aimed at forming the skills to design and construct technologies to support the learning process in an informational educational environment, justify the logic of organizing pedagogical interaction with students both at the communicative level and at the level of network interaction, choose adequate forms and methods of managing students' cognitive activities.

To master this technology is not just to learn the theory of distance learning, to be able to distinguish it from other types and forms of acquiring knowledge, but also to be able to independently create any distance educational elements of any complexity, to carry out various professional actions with their application, remotely organize advisory, communicative and tutoring support, designing and equipping an informational and educational environment.

In the process of distance learning, distance learning technologies, which have been studied by many scientists, are gaining significant importance.

K. Pollock, C. Schwartz, D. Buck *(Pollock, Schwartz, & Buck, 2018)* noted the importance of distance learning technologies for increasing the effectiveness of information and communication technologies in the process of obtaining, processing information, and predicting future development models.

The need to improve information and communication competence today is relevant throughout the world and is reflected in key documents in the field of education. The document "Europe 2020 Strategy" declares the numerous opportunities that are opening up in the era of digital technologies for the creation of new educational strategies. Horizon's annual report highlights that education needs to adapt more to digital technologies. Studies confirm the relationship between the level of information and communication competence of teachers, the intensity of use of information and communication technologies and the effectiveness of their professional activities (*Europe 2020 Strategy, 2017; Horizon 2020,* 2017).

M. Kharbach *(Kharbach, 2012)* believes that such competence of a teacher is based on the free and appropriate use in the process of professional activity of various opportunities embedded in computer services and online technologies.

The effectiveness of using digital technologies in the educational process has been proven by the practice of organizing distance learning during the COVID-19 pandemic *(Semenets-Orlova, Klochko, Tereshchuk, Denisova, Nestor, & Sadovyi, 2022)*. They became the tool that ensured the continuity of the educational process.

Research has confirmed that the creation and use of an information and educational environment ensures effective interaction during the educational process and the organization of joint productive activities, contributes to the formation of sustainable motivation to study and the effectiveness of education as a whole *(Semenets-Orlova, Teslenko, Dakal, Zadorozhnyi, Marusina, & Klochko, 2021)*.

The aim of the study. To empirically investigate the peculiarities of the development of digital competences among scientific and scientific-pedagogical employees of institutions of higher military education.

2. Research methods and organization

Respondents were asked to answer the questions of the "Technologies of distance learning" questionnaire, which included 8 main questions related to two blocks of questions: identifying the need for the development of digital competence among scientific and scientific-pedagogical workers; level of mastery of distance learning tools. The generalized answers of the respondents to the questions of the questionnaire, which are directly related to the severity of the need for the development of digital competence, are reflected in this article. Other results will be presented in future publications. The survey was conducted using Google Forms. In the question part of the questionnaire, the respondent could either choose the proposed answer option, or independently construct an answer to the question.

3. Results

The purpose of the conducted survey was to identify the specifics of the development of digital competencies among scientific and scientific-pedagogical employees of institutions of higher military education. 249 scientific and scientific-pedagogical employees of institutions of higher military education in different regions of Ukraine took part in the survey.

According to the results of the survey, the share of scientific and scientific-pedagogical workers who had experience using distance learning technologies in their professional activities was determined (Fig. 1).

In view of the obtained results, it can be said that the experience of using distance learning technology among scientific and scientific-pedagogical workers is sufficient, since 33.3% of respondents have used such technologies in their professional activities for 3–5 years, 8.4% of respondents – 5–10 years and 4.8% – more than 10 years, that is, even before the introduction of the quarantine, which indicates a sufficiently high degree of readiness for new digitalization conditions.

This confirms the fact that the majority of scientific and scientific-pedagogical workers paid due attention to the issue of systematic application of information technologies in professional activities, as a result of which they were sufficiently prepared for the introduction of distance learning.

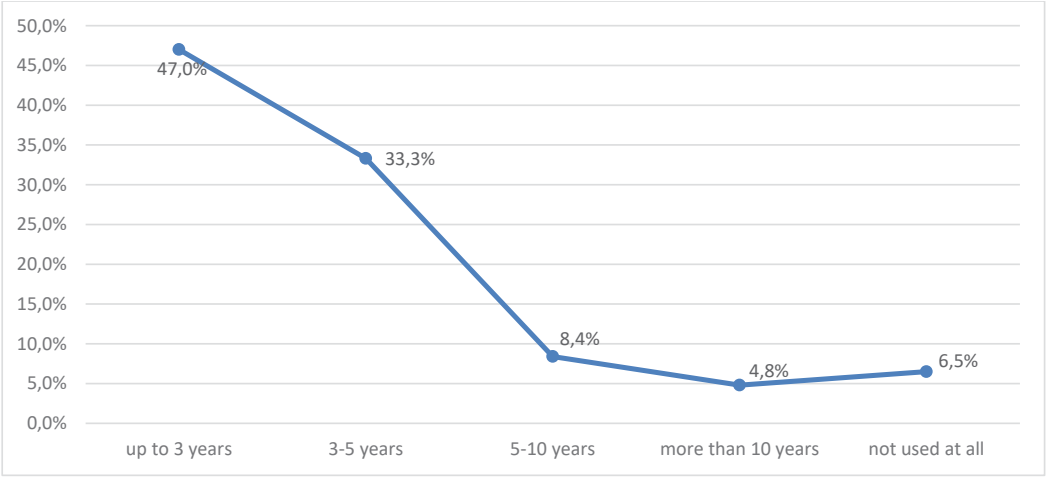

Fig. 1. Experience in using distance learning technologies in professional activities

Analyzing the opinion of the respondents regarding the improvement of the quality of the educational process thanks to the introduction of distance learning technologies, we can say that 92.5% of the respondents agree that the use of information technologies in the educational process increases its quality (Fig. 2).

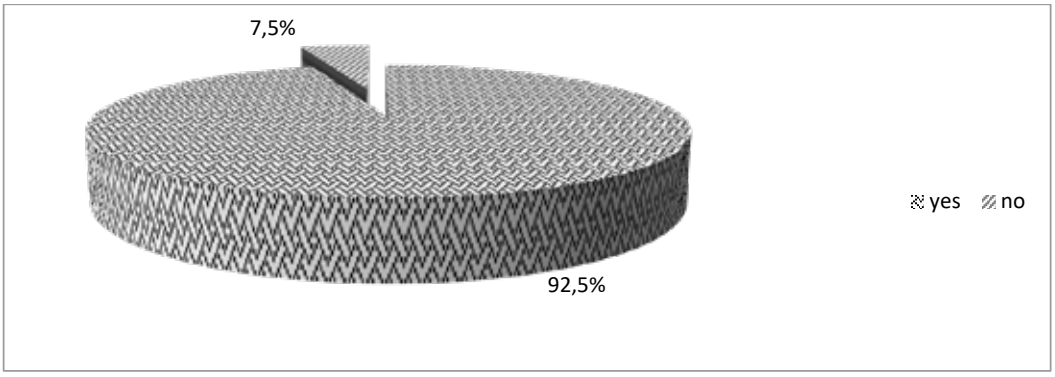

Fig. 2. Indicators of improving the quality of the educational process by introducing distance learning technologies

This testifies to the readiness of scientific and scientific-pedagogical workers to perceive changes, adaptation to modern rates of education development and the need for special training of teachers to master such technologies.

In order to introduce distance learning technologies into the educational process, it is advisable to develop the skills of using digital tools among teachers. For this purpose, the questionnaire contained questions related to the development of digital competence among scientific and scientific-pedagogical workers.

The analysis of the research results showed that teachers are interested in owning digital tools and being able to use them effectively in the educational process. The obtained results

indicate that teachers are more interested in developing such skills as working with services for creating infographics, mastering content visualization tools, using assessment tools, creating educational video materials, podcasts and 3D visualization, using gamification tools. Attention is also drawn to the low percentage of teachers' interest in using special search and testing tools (Fig. 3).

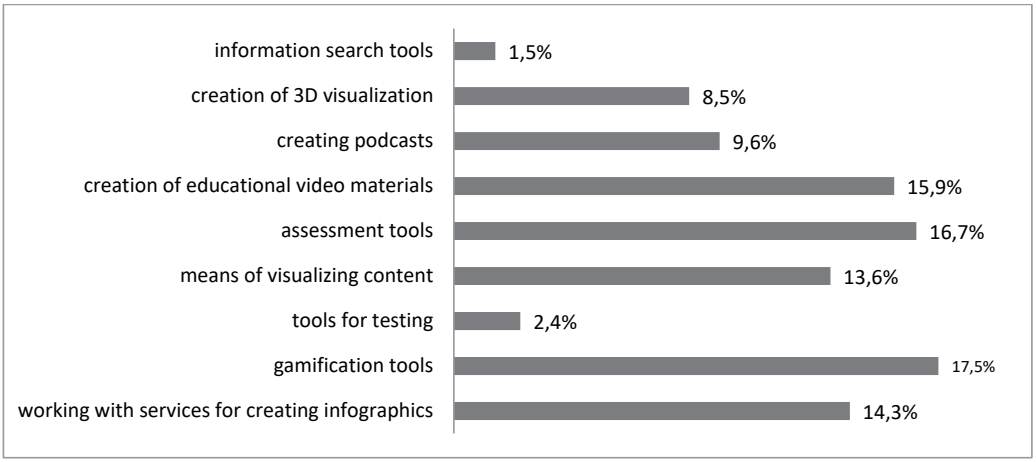

Fig. 3. Defining digital skills for development

It is necessary to include the development of digital competence related to the work of gamification tools and content visualization in order to solve practical, professional and general educational goals in the system of promotion of scientific and scientific-pedagogical employees of higher military education institutions.

4. Discussion

The intensive development of information technologies expands the range of future competencies, among which the mastery of digital technologies allows you to quickly adapt to the changing conditions of the digital world *(Racko, Oborn, & Barrett, 2017)*.

Scientists note that modern digital technologies contribute to the creation of a "smart" space – a digital environment where people and technological systems openly interact, and technologies become an integral part of everyone's daily life *(Panetta, 2018)*.

In the Concept of the development of digital competences *(On the approval of the Concept of the development of digital competences and the approval of the plan of measures for its implementation, 2021)*, the main goal is the development of digital competences and increasing the level of digital literacy of the population.

Given the rapid changes in society, the requirements for scientific and scientific-pedagogical employees of higher education institutions are constantly updated and require new, more complex sets of competencies. The spread of digital devices, their popularity among students leads to the need to develop the teacher's own digital competence.

In the structure of digital competence, the following sub-competencies are distinguished: informational (information processing skills), technological (skills for working with technical devices and software), didactic-methodical (understanding the role of digital technologies in

education and their didactic possibilities), motivational (needs to use digital technologies in professional and pedagogical activities), the culture of cyber security (safety of the subjects of the educational process in the digital space, content and means of education).

Digital competence is multifunctional, belongs to the transversal ones, able to provide "learning transfer" through the integration of knowledge, skills and metacognitive abilities of the individual to solve real-life situations, and focuses on continuous learning *(Tolochko, Bordiug, & Knysh, 2020)*.

The Digital Competence Framework (DigComp), (DigComp 2.0: Digital Competence Framework for Citizens), introduced by the European Commission, consists of six components: professional involvement (the use of digital technologies by teachers in the educational process and for their own personal professional development); digital resources (using and creating content, sharing digital resources for educational purposes); teaching and learning (organization and management of the use of digital technologies in the educational process); assessment (serving digital strategies to support assessment algorithms); expanding the opportunities of education seekers (use of digital technologies to ensure individualization of education); promoting the digital competence of education seekers (creative and responsible use of digital technologies in the process of collecting and processing information, communication, content creation, well-being and problem solving).

S. Carretero, R. Vuorikari, Y. Punie *(Carretero, Vuorikari, & Punie, 2017)* highlight the digital competencies of teachers related to digital fluency and communication skills in a digital environment.

Gudmundsdottir G.B., Hatlevik O.E. *(Gudmundsdottir, & Hatlevik, 2018)* highlight the following digital skills that teachers of higher education institutions need to develop: information literacy, information and communication literacy, communication and cooperation (table 1).

Table 1

Digital skills of teachers of higher education institutions

Digital skills	Competences
information literacy	the ability to find, interpret, evaluate, manage and share information
information and communication literacy	the ability to accept, adapt and use digital devices, programs
communication and cooperation	ability to use digital networks for teaching and research
career and management style	the ability to manage digital reputation and identity online

H. Beetham *(Beetham, 2017)* believes that the formation of digital literacy of a teacher at a higher education institution is related to the creation of a special professionally-oriented educational environment. The key principles of its operation are a variety of tools and resources to support the digital development of participants in the educational process, their partnership interaction, the use of joint mentoring initiatives, and the exchange of digital skills.

Among the digital capabilities of the teacher, the author singles out the possession of ICT proficiency; Information, data and media literacies; Digital creation, problem solving and innovation; Digital communication, collaboration and participation; Digital learning and development; Digital identity and wellbeing.

Digital technologies play a key role in organizing the educational process. They can be used as a tool for joint work, organizing active cognitive activities. Today, digital competences

have a universal character and provide participants in the educational process with mechanisms for adapting to the digitalization of the economy, and the digital competence of the teacher becomes the basis for the full participation of future specialists in the digital society.

Digital competence is the ability to confidently, effectively, critically and safely choose and apply information, communication and digital technologies in various spheres of life: 1) work with content such as: creation, search, selection, critical evaluation of content; 2) communication: creation, development, maintenance of relations, identity, reputation, self-presentation; 3) consumption: use of the Internet for consumer purposes, ordering, services, purchases, etc.; 4) technosphere: computer and software ownership, as well as readiness for such activities.

Therefore, in our opinion, the digital competence of scientific and scientific-pedagogical workers of institutions of higher military education should be considered as the newest type of literacy, which is associated with special knowledge, skills, and practical skills for activities in a digital educational environment. Mandatory structural components of the digital competence of a teacher of a higher military education institution are computer literacy, information literacy, communication literacy, and safety in the digital environment.

The development of digital competences of teachers will contribute to the establishment of interaction with students, overcoming the digital gap between participants in the educational process, the development of digital literacy of students, and their conscious use of digital technologies for their own realization in the conditions of a digital society.

5. Conclusions

Digitization remains a key trend covering various spheres of human activity and, above all, education. Distance learning technologies are not only a means of learning, but also a new learning environment. As a result, the teacher must possess distance learning technologies that change the education system and provide an opportunity to realize the concept of education – education for all, education throughout life. The formation and development of the digital competence of teachers in the conditions of the digital transformation of education acquire special significance. The issues of identifying its essence, ways of forming and assessing the level are actualized in connection with the dynamic development of digital technologies and increasing their role in human life and activity.

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