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FORMING THE DIGITAL COMPETENCE OF FUTURE TEACHERS IN THE PROCESS OF PROFESSIONAL TRAINING

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In the context of the rapid and global transformation of all spheres of human life and the formation of the VUKA-world, both a person and the state (a) as a whole are faced with hitherto unseen challenges (social, ideological, economic), which encourage adaptation in rapidly changing conditions, activation of potential opportunities, as well as consolidation of efforts in order to find effective solutions to the problems caused by the global sanitary and epidemiological situation. Modern reality forms new requests for the education system and activates the process of updating the educational paradigm in order to move to a model of education based on digitalization, which eliminates the passive role of participants in the educational process, activates the processes of personification of educational activities, and also changes the system "student, teacher, parent", roles, relationships and interaction in it (in the system "student, teacher, parent"). The indicated trends open up prospects for the transformation of education and the implementation of the transition from the introduction of information technologies in training and education to the digital transformation of the system and the formation of a "digital school".

In connection with the identified trends in modern education, the goal of our study was to search for holistic and theoretically substantiated ways to form the digital competence of future teachers in the process of professional training.

Material and research methods

The material of the study was the ideas of teachers and psychologists in the field of professional training of future teachers, the positions of domestic technology leaders in the field of education. Comparison of the ideas of scientists with modern trends in the field of information technology and legal documents made it possible to identify, firstly, the guidelines for the digital transformation of school education, secondly, promising digital tools for pedagogical activity, and thirdly, the technology for the formation of digital competence of future teachers in the process professional training.

Research results and discussion

The study of regulatory documents in the field of digitalization of the economy and education, the theory and practice of domestic and international digital transformation of education shows that the problems of digital transformation in the education system (general, secondary and higher) are associated with the presence of barriers of different levels, such as:

- at the regulatory level: focus on traditional informatization, and not on digitalization; the lack of a unified approach to the legal regulation of the use of breakthrough digital technologies in education in federal and regional legislation;
- at the instrumental level: the level of applied digital technologies (hardware and software);
- at the technological level: the readiness of managerial and teaching staff to use digital technologies in their professional activities;
- at the mental level: the lack of a clear idea of why and how to use digital technologies.

The totality of existing barriers to digital transformation in the education system is expressed, firstly, by the insufficient readiness of pedagogical and managerial personnel for digital transformation, and secondly, by the lack of a systematic approach to designing a digital environment in an educational organization (the environment



is considered from the perspective of the educational space, and not from the position "environment of opportunity").

In the process of studying the problems of digital transformation of education, we drew attention to the lack of a unified approach to understanding the phenomenon of "digital competence", as well as to the presence of categories related in meaning and content, such as "media and information literacy", "digital literacy", "digital culture".

One of the reasons for the diversity of definitions of the basic categories of the process of developing a digital school is a different understanding of the meanings and approaches to the interpretation of the terms "competence" and "competence" in both domestic and foreign studies.

Our earlier comparative analysis of scientific research and regulatory documentation in order to determine the essence and content of the concept of "competence" showed that it is possible to identify such essential features of competence as: a new quality acquired in training is the result of education; set of competencies; readiness or ability to carry out activities; mental condition; possession of mobile knowledge and the desire to update it; possession of knowledge, abilities, skills and life experience; abilities that determine behavior. A similar situation with the understanding of the meaning of the category "competence" can be traced in the Federal State Educational Standards, which determine the conditions and results of educational activities at different levels of education. In the content of the Federal State Educational Standard as the main one,

In the context of hyperinformatization in the economy and education, the personal, professional and global significance of such a phenomenon as "digital competence" is increasing. In the interpretation of digital competence, there is a situation similar to the situation with a generic concept in relation to it, this trend can be traced both in scientific research and in regulatory documents. Let's briefly present the current situation.

In domestic and foreign studies of digitalization processes, there is both a broad (integrative) and narrower (related to the specifics of research) understanding of digital competence:

- a synonym for "digital literacy", or "ICT competence";
- ability and readiness to use infocommunication technologies (I.V. Gaidamashko, Yu.V. Chepurnoy);
- awareness and responsibility when working with digital technologies;
- digital skills necessary for life in the digital world;
- understanding and awareness of the process of digitalization of education.

According to the views of researchers (E.A. Barakhsanova, Yu.V. Voronina, E. Zotova, G.U. Soldatova, E. Rasskazova, M. Resnick, A. Martin, D. Madigan), digital competence is determined through readiness (knowledge skills, motivation and responsibility) to the effective application of information technologies in all spheres of life and professional activity, taking into account the modern requirements of the information society [2-4]. In the studies of many domestic scientists, the integrative nature of the phenomenon of "digital competence" is emphasized [5, 6]. The content of digital competence and the level of its formation (digital competence index) are most often considered by domestic researchers through a combination of such components as:

- motivational component (motivation, interest, the need to use digital tools and the desire for self-improvement in the field of information technology, the ability to identify barriers);
- cognitive component (knowledge of the theoretical foundations for the use of information technology and digitalization of the educational process);
- operational component (the ability to apply knowledge about digital tools of pedagogical activity, the ability to design the educational process based on the use of information technology).

The positions of domestic scientists in determining the meanings of ICT competence are consonant with the positions of regulatory documents, such as the Professional Standard "Teacher" and the interconnected Federal State Educational Standard of Higher Education in the direction of preparation 44.03.05 "Pedagogical education" [7]. So, in the Professional Standard "Teacher", when describing the labor functions, the ICT competence of a

teacher is defined through a set of such components as general user, general pedagogical and subject-pedagogical ICT competence, a set of ICT tools common in this professional field in developed countries in solving professional problems.

Domestic ideas about the content and structure of digital competence are consonant with the European understanding of digital competence, which is presented in the model of digital competencies for education (EU Digital Competence Framework for Educators) [8].

A key role in the formation of digital competence is played by the school course of informatics and the level of digital competence of an informatics teacher. It is the level of digital competence of an informatics teacher that determines the effectiveness of the formation of students' ideas about basic knowledge and their technological skills in the field of information technology application.

Modern informatics is undergoing significant changes, which are caused by the active renewal of the field of information technology and the formation of a hyperinformation society [9]. Practice shows that the role of technological leaders in the information technology industry is increasing in the formation and updating of the content of the subject "Computer Science".

A contextual analysis of the technological areas of activity of leaders in the field of business and information technology (Gartner (<https://www.tadviser.ru/index.php/%D0%9A%D0%BE%D0%BC%D0%BF%D0%B0%D0%BD%D0%B8%D1%8F:Gartner>), Microsoft, Sberbank, Yandex), as well as innovative startups (Skolkovo), made it possible to identify promising areas for training future teachers in the field of information technology [10-12]. Among the trends in the field of information technology that are in demand in updating the content of the digital component of the training of future teachers, we highlight such as AI (artificial intelligence), Big Data (big data), Cloud computing (cloud technologies), IoT (Internet of things), Cybersecurity (information security), VR/AR (virtual/augmented reality), Biometrics (biometric technologies).

The importance of purposeful training of future teachers for the use of new information technologies in educational activities is increasing in the context of the implementation of national projects in the field of education and the active involvement of technology leaders in solving the problems of the education system. Thus, at the regional level (Lipetsk region), the joint activities of the state and business in the field of digitalization of education have resulted in the implementation of the following projects.

1. Yandex Company: – Yandex.Textbook, a digital platform for teaching basic school subjects (elementary school, algebra, Russian language, music, computer science (project in the Lipetsk region));
2. - "Yandex.Lyceum" (teaching schoolchildren of 8-10th grades in industrial programming, advanced training of teachers of computer science and preparing them for the implementation of the training program "Yandex.Lyceum"). Based on the results of the 2019/2020 academic year, students from the Lipetsk Region are in the TOP-50 best participants in the Yandex.Lyceum Olympiad.
3. – implementation of the Yandex.Informatics project (updating the content and technologies of teaching informatics, increasing the digital competence of informatics teachers);
4. Sber Company. Implementation of a personalized education model using a digital platform, SberClass (training of pedagogical and managerial personnel, technological solutions, digital tools for pedagogical activity, new pedagogical technologies).
5. Google company. Google for Education - digital tools in pedagogical activity and management of an educational organization.
6. The Quantorium Children's Technopark and the Quantorium Mobile Technopark (partners of Rostelecom, NLMK) - the project is aimed at additional education of schoolchildren in research and engineering areas.



7. Digital Education Center for Children "IT-Cube" (partners Microsoft, Samsung, Cisco, etc.) - the project is aimed at additional education of schoolchildren and students in the field of new information technologies (cyberhygiene, augmented and virtual reality, mobile development, robotics).

The transformation of school and additional education in the context of the formation of a digital school stimulates the renewal of the system for training future teachers. Taking into account the specifics of teaching different subject areas, we single out the general and special conditions for the formation of digital competence of future teachers. The general conditions for the formation of digital competence include the formation of the readiness of future teachers to use digital technologies in the implementation of the general pedagogical direction of professional training, and the special conditions include the targeted training of future teachers for the use of digital tools, taking into account the direction of pedagogical activity and the specifics of the subject.

The consistency and integrity of the process of forming the digital competence of future teachers in the process of professional training are determined by:

- actualization of the idea of digital transformation of education in the process of studying the disciplines of professional training and the formation of students' motivation and responsibility in the application of digital pedagogical tools in their professional activities;
- purposeful filling of the content of vocational training with methods of applying new information technologies in professional activities and creating a digital educational environment in an educational organization from the position of "environment of opportunities";
- the inclusion of students in the process of mastering methodological, theoretical, methodological and practical knowledge in the field of digitalization of education and the formation of skills to apply digital technologies in solving problems of professional activity.

The importance of purposeful formation of digital competence of future teachers is confirmed by international studies showing the need to increase the level of digital competence of young teachers (TASIL, ICILS) and the need to strengthen the ICT competence of teachers in order to effectively form the functional and ICT literacy of students [13].

The practice of training future teachers in the face of modern challenges (economic, sanitary and epidemiological) shows the effectiveness of activating and timely updating the digital potential of academic disciplines and their integration at the level of interdisciplinary connections (table).

Potential opportunities for the content of training courses in the formation of digital competence of future teachers in the process of professional training (on the example of the implementation of the educational program of the direction of training 44.03.05 "Pedagogical education" (Profiles: mathematics and physics)).

Disciplines	Molded Components ICT competencies	Content examples
Computer Science (1st semester)	General user general pedagogical	Fundamentals of informatics, big data, information security, biometric technologies
Pedagogical software (1st semester)	general pedagogical	Cloud technologies, Internet of things, multimedia technologies



ICT and media and information literacy (2nd semester)	General user general pedagogical	New information technologies, information processing and visualization technologies
Mathematical foundations of artificial intelligence (7th semester)	Subject-pedagogical	Fundamentals of artificial intelligence
Practice on a computer (10th semester)	Subject-pedagogical	Virtual/Augmented Reality, digital educational resources and platforms

Conclusion

Modern reality proves the vital need for the digital transformation of all spheres of human life in order to confront social, economic, and political challenges. World practice shows that the ways to effectively respond to modern challenges are the active formation of a hyper-information society and the digital transformation of all spheres of human life. The system of vocational education plays a special role in shaping the digital competence of teachers. The formation of digital competence of future teachers and the effectiveness of this process are determined by the continuity, integrity and purposefulness of the process of preparing for digital transformation, the quality of the educational environment (the presence of an "environment of opportunities"),

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