IMPROVING THE METHODOLOGY OF USING DIGITAL TECHNOLOGIES IN THE DEVELOPMENT OF PROFESSIONAL COMPETENCIES OF FUTURE TECHNOLOGY TEACHERS

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Abstract – *The purpose of this article is to single out and theoretically substantiate the component structure of the phenomenon "digital competence of a teacher" based on the analysis of scientific and pedagogical literature. The article is based on the analysis of research by foreign scientists.*

Key words: *digitalization of education, digital technologies, teacher's digital competence.*

I. Introduction

With the introduction of digital technologies, everyday human life and industrial relations are changing; the economy and education are being transformed. Digital technologies are not only a tool, but also an environment for the existence of a modern person, which opens up new opportunities: learning at any convenient time, continuous education, the ability to form individual educational routes, from users of electronic resources to become creators.However, such an environment requires teachers to take a different approach to the organization of the educational process, to acquire new skills and abilities to work in the digital educational space. Under these conditions, the system of teacher education should ensure the training of a graduate with a high level of digital professional competence.

A theoretical model of the structure of the teacher's digital competence has been formed. The results of the study show that the competence in question consists of four components: motivational-personal (the sum of internal and external motives for one's future professional activity), cognitive (a set of theoretical knowledge, skills and abilities of a future teacher for effectively building a pedagogical process using digital learning tools),activity (practical implementation of professional and pedagogical knowledge of the future teacher, his intellectual, cognitive, technical, design and technological skills, necessary skills for the effective implementation of digital technologies in the educational process) and reflective-evaluative (the ability to analyze and self-analyze the activities performed, harmonize goals, methods and results obtained, awareness of one's style of activity, readiness for their creative change).These components describe the competencies necessary for a teacher to effectively carry out their professional activities. The results of the study can be used as the basis for the development of programs for optional courses for students of pedagogical training, programs for advanced training courses and additional education for teachers.

II. Literature review

Digitalization as the main trend of the modern world has taken a leading position in education.President of Uzbekistan ShavkatMirziyoyev signed a decree "On Uzbekistan's Development Strategy ". The document has approved Uzbekistan's Five-Area Development Strategy for 2017-2021 which was developed following comprehensive study of topical issues, analysis of the current legislation, law enforcement practices, the best international practices, and following public discussion.The main condition for such development is the modernization of the national educational system, aimed at preparing a graduate who is able to live and carry out his professional activities in a digital environment, taking into account the requirements for new professions and the changing value orientations of society.The solution of this problem involves increasing the requirements for the qualifications of teachers and their competence in the use of digital technologies for the design and implementation of the educational process. According to L. V. Shmelkova, Vice-President of the Institute of Mobile Educational Systems, "among the digital economy professionals, pedagogical workers acquire special roles, directly ensuring the entire process of forming a digital economy society, implementing the digital competence model and possessing it themselves".In the context of digitalization of the education sector, the professional activity of a teacher is changing radically. The teacher becomes, first of all, "the organizer and motivator of individual and group learning activities of students, an intermediary between the virtual and real world, a mentor, and a navigator in the real social and professional world, a kind of "integrator" of various living spaces of the digital generation".

The effectiveness of the use of digital technologies in the educational process has been proven by the practice of organizing distance learning during the SOUGO-19 pandemic.They became the tool that made it possible

to maintain the continuity of the educational process. At the same time, the forced transition to distance learning also revealed the problems existing in this area. Studies by V. L. Nazarov, D. V. Zherdev, N. V. Averbukh, D. O. Koroleva, N. V. Isaeva (2020) show that under the current conditions, most teachers were not sufficiently prepared to use digital technologies (41 % was not ready for any independent actions in this direction).

In this regard, the issues of training future teachers who have the skills and abilities to organize the educational process in a digital environment, use digital technologies in their professional activities and know the features of the "digital generation" and the methods of its training and education, are extremely relevant and become the subject of scientific and pedagogical research and broad public discussion. Pedagogical universities are reviewing the training programs for bachelors of pedagogical training.The result of such activities should be a graduate with a high level of skills in working with digital devices, pedagogical technologies and methods for creating and using digital educational resources to improve the efficiency of the educational process.Thus, the structure of a teacher's professional competence is supplemented by a new component - digital competence, and the level of a teacher's professionalism directly depends on the level of possession of this competence. To solve this problem, it is necessary to form digital professional competence in future teachers.

Considering the definition of the concept of "digital competence", we find a conditional definition proposed by a team of scientists from the Faculty of Psychology of Moscow State University. M. V. Lomonosov under the direction of G. at. Soldier: "Digital competence is the ability of an individual to confidently, effectively, critically and safely choose and apply information and communication technologies in various spheres of life (information environment, communications, consumption, technosphere), based on the continuous mastery of competencies (knowledge, skills, motivation, responsibility), as well as his readiness for such activities".

III. Analysis

The authors emphasize the complexity of this phenomenon and focus on the development of responsibility, motivation and value sphere of a person as components for professional growth in a digital society, understanding by them the identification of a person's needs and desires, the degree of his readiness for development (motivational sphere) and the definition of his attitude to the Internet , the degree of its understanding and acceptance of the norms, rules and values of the digital world and the willingness to follow them (value sphere).P. S. Lomasko and A. L. Simonova interpret the concept under consideration as the ability and readiness of teaching staff to perform labor functions that correspond to professional standards in force in the field of education, taking into account the urgent tasks of the state policy of the Russian Federation in the field of education and the current level of development of digital technologies.N. P. Yachina and O. G. Fernandez define the digital competence of a teacher as "general professional competence and understanding of the general structure and interaction of computer devices; understanding the potential of digital technologies for innovation; basic understanding of the reliability and reliability of the information received, the ability to use programs for designing a training session". According to I. V. Gaidamashko and Y. V. Chepurnaya, the competence in question is "the ability of an individual to critically, confidently, safely and effectively apply and choose info communication technologies in all spheres of life, as well as his readiness for such activities".V. S. Petrova, E. E. Shcherbik believes that the digital competence of a teacher is the skills of effective use of new technologies.

The specificity of pedagogical education at the present stage of development of society is the fact that the future teacher will teach the "digital generation" of students who have specific features of perception, memorization, thinking, motivation, behavior, etc. Therefore, there will be a change in principles, approaches to the formation content of education, forms and methods of teaching.V. I. Blinov, I. S. Sergeev, E. Y. Yesenina and other scientists consider it important for the teacher to "understand the characteristics of the digital generation in order to rely on them in the educational process".

The concept of "digital competence of a teacher" is also considered by foreign experts. The development of a set of professional competencies of a teacher in the context of digitalization of education is carried out under the guidance of the Committee on Education of the European Union, where in 2017 a profile of digital competencies of a teacher Digital Competence of Educators (DigCompEdu) was proposed.It is advisory in nature and describes 22 competencies, in which the focus is not on technical skills, but on the teacher's ability to use digital technologies to improve the efficiency of the educational process. S. Klüser, S. Carretero, M. Giraldes, u. Okiff (2018) describes the practice of implementing the European Digital Competence Framework (DigComp), consisting of 50 case studies and tools.

G. Ottestad, M. Kelentrich (2013) define the digital competencies of a teacher as a set of components: general (general knowledge and skills that teachers must have in order to function as digital educators);didactic (reflects the digital specifics in each subject) and professionally oriented (describes the digital features of an extended teaching profession).

K. Zierera and N. Seal (2019) emphasize that the introduction of digital technologies in education will be effective if the leading place in it is occupied not by technology, but by teachers and pedagogy: "The main focus of the responsibility of education has always been human development. A person in pedagogy is both a starting point and an end result.

This approach should also be applied to the digitalization of education. Digital technologies cannot become a substitute for the pedagogical component of the educational process. Moreover, digitalization should be subordinated to pedagogy".

E. Meyers believes that the development of digital technologies and tools requires new knowledge and skills from the teacher: the teacher must ensure that students master digital tools in order to advance the development of the younger generation and help him master the necessary competencies to expand the availability of new knowledge.

Oxford University conducted a study of student support systems in digital learning, which showed that teachers play a leading role in the development of new skills by their students". J. Yarbrough emphasizes that in the digital space it is "the teacher who determines the pace of learning, the procedure for obtaining subject knowledge; the teacher is responsible for the progress of the student".Thus, a review of the works of foreign authors shows that the understanding, description and structuring of the digital competencies of the teacher, which develops into the professional digital competence of the teacher, is a priority area of scientific research and indicates the expansion of the content of his activities, changing the requirements for training and the conditions for the professional development of a teacher.

In 2017, The Boston Consulting Group (BCG), together with Russian companies (Sberbank, NRU HSE, WorldSkills Russia, etc.), conducted a study "Russia 2025: from personnel to talents" to study the problem of Russia's competitiveness in the global economic space. The result of this study was the "Target Competency Model 2025", which identifies three groups of skills: cognitive (self-development, independence, self-awareness, learning, managerial skills, striving to achieve results, etc.),socio-behavioral (communicativeness, skills of interpersonal and intercultural interaction in the digital environment, etc.) and informational (information management, creation of an information product, etc.) necessary for the competitiveness of a specialist in the digital economy. This model, in addition to technical skills of working with digital equipment, includes cognitive and socio-behavioral competencies aimed at ensuring a comfortable existence, effective communication and self-development of a person in a digital environment.

An analysis of the scientific and pedagogical literature showed that the concept of "digital competence of a teacher" is not fully studied (there are no clear definitions of this phenomenon; its structure is little studied). In our study, under the digital competence of a teacher, we will understand the set of competencies that are constantly updated in the conditions of improving digital technologies, which are necessary for a teacher to carry out professional activities in a digital educational environment, and we will offer a component content of this concept.

The current stage of development of the domestic system of vocational education is characterized by the implementation of a competency-based approach, which is the methodological basis of the federal state educational standards of higher vocational education of the third generation (FSES VPO) and is a necessary condition for the modernization of the system of higher vocational education in accordance with global trends that focus on the activity side of the result and the practical component of the educational process at the university.According to V. I. Zagvyazinsky, T. A. Strokova and others, the competence-based approach is more specific, mobile and, most importantly, practical and universal. It is as close as possible to life realities and is directly aimed at developing a holistic experience for students in solving life problems, performing key functions, social roles, and competencies. Its practical implementation will make it possible to educate a person who is not only trained, but also trained, ready to learn and relearn throughout his life, able to live and act productively in a complex dynamic environment.

S. L. Troyanskaya notes: "This approach focuses the education system on ensuring the quality of training in accordance with the needs of modern society, which is consistent not only with the need of the individual to integrate into social activities, but also with the need of society itself to use the potential of the individual".

The professional competences of the future teacher, his mastery of the relevant activities are built on the basis of a system-activity approach in teacher education.

According to A. V. Khutorsky, the essence of the system-activity approach lies in the fact that knowledge, skills and abilities are considered as derivatives of purposeful educational actions, since they are generated, applied and stored in the process of purposeful activity. In the context of the digitalization of the higher education system and the need to form the digital professional competence of the future teacher, the system-activity approach to the study of this phenomenon is of particular relevance.

IV. Discussion

The digital transformation of education is proceeding rapidly; the list of digital technologies for the implementation of the educational process is constantly updated and expanded.Achievement by a student of the level of digital competence necessary for professional activity involves the acquisition of not only the skills and abilities of organizing the educational process in a digital educational environment, but also the achievement of personal skills and abilities in this area, reflection of one's activities, and development of motivation for further study of digital technologies.

Under these conditions, the training of future teachers should contribute to the development of their readiness to carry out activities with the prefix "self": independence, self-motivation, self-education, self-development, self-determination, etc. L. M. Andryukhina, N. V. Lomovtseva, N. O Sadovnikova note that "the

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priority tasks include the value-semantic conceptualization of the digital transformation of education... the development of models for motivating teachers based on a student-centered approach, the transition from non-systemic innovations to building an ecosystem of digital education".

The analysis of scientific and pedagogical literature and the results of research in the field of digitalization of education, consideration of the concept of "digital competence of a teacher" from the standpoint of competence-based, system-activity and personality-oriented approaches allowed the author to draw conclusions about the component composition of the competence in question.

The comprehension of the theoretical analysis of the scientific and pedagogical literature and the application of the above methodological approaches to reveal the component composition of the digital competence of the teacher led to the conclusion that the structure of the competence in question can be represented by components that take into account the characteristics of professional and pedagogical activity: motivational-personal, cognitive, activity and reflective-evaluative.

The motivational-personal component of the teacher's digital professional competence in modern conditions is of particular interest, as it reflects the conscious need of the individual to use digital technologies in professional activities. V. V. Kislyakov and O. Y. Kolyshev believe that this component "is characterized by a system of dominant motives expressing a conscious attitude of the individual to the goals and values of pedagogical activity, to his own professional development". According to L. I. Bozhovich, motives are divided into two general categories.

The first category includes the educational activity itself and the process of its implementation (cognitive interests, mastery of new knowledge, skills). The second is related to the need for communication, evaluation and approval of feedback. Thus, the motivational component of digital professional competence can be defined as the sum of internal and external motives for their future professional activities, characterized by the desire of the future teacher to use digital technologies, the desire to improve him in this area, the formation of an internal desire to achieve success in solving non-standard tasks.

Cognitive component. The importance of this component in the professional activity of a teacher is noted by many scientists. Thus, E. G. Gutsu characterizes the cognitive component as the presence of relevant integrated knowledge, the ability to constantly improve it, readiness for creative activity, flexibility and critical thinking, the ability to analyze the professional situation and reflection.

A. A. Abdukadyrov presents the cognitive component as a set of methodological, theoretical and technological knowledge that combines general knowledge in the field of computer technology and pedagogical knowledge on the use of computer technology and is used in solving professional problems.D. V. Dudko believes that the cognitive component of a teacher's professional activity is readiness to constantly improve their educational level, the need to update and realize personal potential, the ability to independently acquire new knowledge and skills, the desire for self-development, constant enrichment of one's professional competence.Based on the analysis of the works of scientists, we will consider the cognitive component of digital professional competence as a set of theoretical knowledge, skills and abilities of a future teacher, which includes the ability and readiness to master basic and special knowledge, skills and abilities in the field of digital technologies for the effective construction of the pedagogical process, using digital learning tools, including the skills of building a digital communication process between participants in the educational process,professional capabilities and thinking, the use of an individual pedagogical style in solving professional problems, knowledge of the features of the "digital generation" and approaches to their education and upbringing.

Activity component. According to O. A. Abdullina, in the general view, the activity component determines the operational essence of the formed knowledge and skills as a result of mastering the methods and techniques of activity; as the ability of an individual to perform any activity or action in changing conditions on the basis of knowledge and skills. V. V. Kotenko understands the activity component as the active use of the capabilities of new information technologies and computers in professional activities, as a factor in the development of information culture, self-development, as well as the process of forming the same qualities in students.

V. V. Brezhnev believes that this component contains skills in collecting and processing educational information, developing creative projects, striving to master the methods of analysis, synthesis and generalization of information, the ability to technologize work with information, and choose the optimal solution.After analyzing the approaches of various scientists to the definition of the concept of this component, we will assume that the activity component consists in the practical implementation of the professional and pedagogical knowledge of the future teacher, his intellectual, cognitive, technical, design and technological skills; the necessary skills for the effective implementation of digital technologies in the educational process, for an informed choice of digital content, ensuring digital security and health standards and rules for the use of digital devices;in mastering the skills of creating your own digital content; in acquiring the skills of organizing communication between participants in the educational process, etc.This component of digital professional competence is currently under intensive development.

The reflexive-evaluative component of digital professional competence includes the ability to analyze and self-analyze the activities performed, agree on the goals, methods and results obtained, realize one's style of activity, readiness for its creative change, readiness for self-improvement and self-development, skills and abilities of self-control, self-regulation, self-awareness and self-realization.

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The teacher's ability to reflect largely determines the success of his professional actions in new conditions for him. Therefore, the importance of pedagogical reflection especially increases in innovative activity. In scientific and pedagogical research, reflection is considered in different aspects: as a component of the professional training of a teacher (I. I. Ilyasov, I. L. Mozharovsky, etc.); as an analytical stage in the development of professional and pedagogical activity (V. O. Kutiev, Y. S. Turbovsky and others);as a professional quality of a teacher-researcher (V. I. Zagvyazinsky, V. V. Kraevsky, G. P. Shchedrovitsky, etc.); as a component of pedagogical creativity (N. D. Nikandrov, V. A. Kan-Kalik, V. G. Bogin, I. Y. Lerner, etc.); as a necessary component of the teacher's innovative activity, which determines the success of the selection and implementation of new pedagogical ideas and technologies (V. A. Slastenin, L. S. Podymova, etc.).

E. F. Zeer points out that "each student needs to be aware of his positive and negative qualities, correlate with the standard of professionally important qualities (emotional-volitional, intellectual, business, worldview) in order to begin conscious work on himself, which is an important part professional and personal self-determination".

In the context of digital education, the reflective-evaluative component makes it possible to realize the professional difficulties that arise in the process of mastering digital technologies, to realize the level of readiness to use these technologies in the educational process and the degree of satisfaction with such activities.

Thus, what has been said above determines the component structure of the teacher's digital competence.

The structure of the teacher's digital competence

Component Indicators

1. Motivational-personal

1) Professional and personal position of the teacher in relation to professional activity in the context of digitalization of education;

2) interest in the problems of digitalization of education;

3) psychological comfort in the process of mastering digital technologies;

4) personal motives for the development of digital technologies and the use of digital educational resources;

5) the need to achieve the results of the development of digital technologies, the use of digital educational resources, etc.

2. Cognitive

1) knowledge of the regulatory framework of their professional activities and the requirements for designing a modern and safe digital educational environment;

2) knowledge of the characteristics of the digital generation of children and approaches to organizing the process of their education and upbringing;

3) knowledge of the capabilities of the main digital educational resources and platforms for organizing the educational process, etc.

3. Activity

1) The ability to anticipate and predict the result of their professional activities using digital technologies and platforms;

2) the ability to design and plan the pedagogical process using digital technologies and platforms using health-saving technologies;

3) the ability to distinguish the main types of digital educational resources and apply them at the appropriate stages of the lesson to improve its effectiveness;

4) the ability to build interpersonal interaction and relationships in the digital environment, etc.

4. Reflective-evaluative

1) The ability to assess the personal results of mastering digital technologies;

2) the ability to make creative responsible decisions in the development of digital technologies, the use of digital educational resources;

3) the ability to realize professional difficulties that arise in the process of mastering digital technologies, using digital educational resources;

4) self-control of the teacher in professional activities for the implementation of digital technologies;

5) the ability to carry out control and evaluation activities aimed at oneself, summing up the results of one's pedagogical activity using digital technologies of digital platforms, etc.

V. Conclusion

This article opens up opportunities for further research in the field of determining the structure of the phenomenon of "digital competence of a teacher", which is one of the components of the professionalism of a modern teacher that meets the requirements of society in a digital economy.The proposed component structure of the phenomenon "digital competence of a teacher" can be used as the basis for the development of programs for optional courses for students of pedagogical training, programs for advanced training courses and additional education for teachers.

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