

The development of the model of formation of professional competences in digital educational environment of university

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Abstract — The relevance of research is due to new tendencies of modernization of higher education which make new demands to the quality of education of bachelors of pedagogical education in digital educational sphere of modern university and their professional preparation. The analysis of scientific-methodical and normative literature showed that the model of formation of professional competences of bachelor of pedagogical education in digital educational environment is at development process at this stage. In this regard the article is aimed at investigation of modeling of the stages of formation of professional competences of bachelor of pedagogical education in digital educational environment of university. In the process of working on the problem the following methods were used: analysis of philosophical, psychological, pedagogical and special literature on the research, documentation, study plan, programmes, Federal state educational standard, teaching AIDS, learning from work experience of other universities; empirical: pedagogical observation, testing, questionnaire, pedagogical experiment, methods of mathematical statistics. In the investigation the model of the formation of professional bachelor's competences of pedagogical education in digital educational environment of university is justified into account the requirements of normative documents and requests and also the complex orientation of the educational process on the individual trajectory of the bachelor's personality is defined through the digital learning technologies. The effectiveness of the proposed model is ensured by compliance with the complex organizational and pedagogical conditions.

The results of the study were tested in practice in the framework of the educational process at the faculty of technology, business and service FSBO of HE "OSU by the name of I.S. Turgenev".

The results obtained in the course of the study can be used in the preparation of bachelors of pedagogical education for the professional sphere using the model of formation of professional competence in the digital educational environment of a modern University.

Keywords — professional competences, digital educational environment, open education, digital technologies, model of professional competence formation, organizational and pedagogical conditions

I. INTRODUCTION

Modern tendencies of development of higher education make requirements to quality of preparation of bachelors of pedagogical education and their professional training. The emergence of a new social order at the present stage of development of higher education determines the importance of training bachelors of pedagogical direction, taking into account the development of modern digital education. A modern teacher should not only have the necessary professional knowledge and skills, but also be a carrier of professional culture, the level of development of which depends on the productivity of the activity, should be able to combine professional skills with theoretical understanding of creative ideas and research. The implementation of the ambitious goals and objectives of the program "Digital economy of the Russian Federation" puts forward certain requirements for the personality of the professional and the education system as a whole. Therefore, there is an objective need for competent personnel, able to creatively organize the workflow in specific socio - economic conditions, able to quickly navigate in the information field, to improve and develop themselves. The main attention is paid to the professional competence - compliance of the bachelor with the requirements of pedagogical activity in the digital educational environment of the University.

The process of training future teachers, based on the competence approach, meets the requirements of employers. The concept of "professional competence" in relation to the quality of training of future teachers is used recently and is a combination of their professional and creative abilities. For the formation of professional competence of bachelors of pedagogical education in the digital educational environment of the University it is necessary to design the content of academic disciplines in such a way as to ensure the effectiveness of the learning process and improve professional competence, based on the requirements of professional

standards of the teacher, the requirements of modern digital economy[1,2,3].

Competence is one of the key concepts in the digital economy and is the basis of professional activity, and its level becomes an indicator of the quality of training of the future teacher. Activities on the formation of professional competencies in the digital educational environment of the University are analyzed in the works of V. I. Baidenko, I. A. Zimney, A. I. Akhulkova, O. M., Bobienko, A. V. Baranov, B. D. Elkonin, E. A. Korsakova, A. A. Vilkova, B. I. Gladkova, L. I. Gurye, I. L. Pluzhnik, N. S. Stenina, A. I. Subetto, I. B. Torshinoy, E. I., Chakhmakhchyan, I. V. Chelpanov, and others.

The aim of the investigation is the theoretical substantiation of the model of formation of professional competences of bachelors in the field of Pedagogical education (profiles: Technology and Economics) in the digital educational environment of the University. The investigation was based on the following hypothesis: the formation of professional competencies of bachelors in the direction of training Pedagogical education (profiles: Technology and Economics) will be successful if a theoretical model of the process of formation of professional competencies in the digital educational environment of the University, including content, activity and evaluation blocks is developed and implemented.

II. RESEARCH METHODOLOGY

To solve this problem, a set of methods was used: *theoretical*: analysis of philosophical, psychological and pedagogical positions of Russian and foreign researchers on the basic provisions and methodology of the competence approach in education (E.F. Zeer, V.I. Baidenko, I.A. Zimnaya); the *analysis* analysis of the design of the content of education based on the competence approach (E.F. Zeer, V.I. Baidenko, I.A. Zimnaya and others.); analysis of the theories of system approach (N.V. Kuzmina, N.V. Bespalko, E.G. Udin and others); analysis of theories and problems of design of pedagogical and educational technologies (B.V. Bespalko, U.K. Babansky, V.S. Bezrukova and others); monitoring the quality of education in Russia and methods of pedagogical measurements (V.P. Bespalko, N. F. Efremova and others), analysis of, documentation, study plan, programmes, Federal state educational standard, teaching AIDS, learning from work experience of other universities; *empirical*: pedagogical observation, testing, questionnaire, pedagogical experiment, methods of mathematical statistics[4,5].

The study was conducted in several stages: at the first stage the analysis of philosophical, psychological, pedagogical and methodical literature, analysis of practical training of future teachers, accumulation of empirical experience, development of the program of experimental work was carried out; at the second stage, the essence, content and structure of the professional competence of future teachers in the digital educational space of the University was determined, the theoretical model of the formation of professional competencies of future teachers was developed, the pedagogical conditions for the implementation of the model in practice were substantiated; at the third stage of the study was the analysis and theoretical generalization of the results of experimental work, clarified the main provisions, prepared guidelines on the topic of the study.

Modeling of pedagogical process is one of the most important tasks of modern pedagogy, as the importance of design and implementation of new innovative technologies corresponding to the advanced theoretical ideas of domestic science increases. Modeling is one of the scientific methods of research and is widely used in pedagogy.

Since the middle of the XX century in the scientific pedagogical literature the method of modeling has been described in more detail in the works V.A. Shtof, V.G. Afanasiev, I.B. Novik, V.A. Venikov, B. A. Glinsky, G. V. Sukhodolsky and others. [1, 7].

According to G. V. Sukhodolsky, "modeling" is the process of creating a hierarchy of models in which the educational process is modeled in various aspects and by various means [6].

Modeling-the process of displaying, presenting or describing existing objects and phenomena to determine their characteristics, ways to improve their construction, management. Modeling provides an opportunity to learn more deeply the essence of the object of study. The concept of modeling is understood as the activity of developing and creating, planning or designing a system, object or model.

The essence of pedagogical modeling is to identify and analyze pedagogical problems and their causes, to build a value basis and strategy of the design process, to set goals, objectives, to select methods and means of implementation and realization of the pedagogical project. Modeling studies the pedagogical process as a whole, as a result of which you can see not only the individual elements of the pedagogical process, but also their relationship. Modeling makes it possible to study the pedagogical process before its implementation, while it becomes possible to identify in advance the negative result and correct possible errors. Pedagogical modeling contributes to the creation of more technological and improved pedagogical processes [1, 7, 10].

Pedagogical modeling in the process of education allows you to prepare a modern specialist prepared for professional activity, that is, to have the necessary professional competencies.

In the present study, modeling the process of formation of professional competencies involves the construction of a model aimed at achieving certain results through the implementation of joint activities of the teacher and students in a certain digital educational environment of the University, including innovative forms of organization of the learning process [8].

The main goal of the innovative form of digital education is to prepare people for life in an ever-changing world. To make the practical need for the study of professional disciplines at the University obvious for students, at the lessons they should receive not only new and interesting information for them, but also: to participate in the acquisition and exchange of information; to focus on the practical application of this information in their future professional activities; to develop their professional competence [9].

Orientation in the process of learning to the development of personality, creating favorable conditions for the development of creative potential and creativity of students, their ability to self-realization, the formation of socially significant system of

values, the use of digital technologies and open education in general, will lead to the formation of personal qualities necessary for further professional activity, to the formation of professional competencies in the innovative digital environment of the University [10].

To carry out professional activities bachelor must have theoretical and practical readiness. The content of the theoretical readiness, which is showed in a generalized ability to professionally think, implies the existence of analytical, prognostic and reflective skills. The content of practical readiness is expressed in external skills, that is, in actions that can be observed. These include organizational, communication and applied skills.

The main goal of higher education-a versatile, harmonious development of personality-involves the unity of its education, upbringing, General and professional development [3]. With this goal in mind, the pedagogical process implements three main related functions - educational, educational and developmental.

At the basis of the pedagogical process is the task of ensuring the substantive integrity of the process of training and education, as well as the development of a pedagogical model for the development of professional competencies of a University graduate, that is, the creation of a set of conditions, tools, teaching methods that form a competitive specialist. The content of higher education should be quickly improved and adapted to the emergence of innovations in pedagogy, technology and labor organization. The content of training for professional activity is built from a large set of disciplines, therefore, the quality of professional education is determined by the degree of familiarizing the student to a holistic sphere of future professional activity achieved in the implementation of the educational program. And this is possible within the framework of designing the digital educational environment of the University [4].

Professional activity requires a holistic view of the design object, formed through knowledge of the language of formulas, drawings and diagrams, a combination of scientific and artistic styles of thinking. Therefore, each discipline at the level of the curriculum has its own importance. A modern teacher should not only possess a set of theoretical knowledge, but also be

able to effectively apply modern concepts and use innovative technologies, including digital technologies.

The digital educational environment of a modern University provides fundamentally new opportunities: to move from classroom learning to learning anywhere and at any time; to design an individual educational route, thereby meeting the educational needs of the student's personality; to turn students not only into active consumers of electronic resources, but also the creators of new resources, etc. One of the main trends of modern education is network activity, the use of social networks as educational resources and remote workshops, trainings. The characteristic features of digital education with the use of network technologies are flexibility, mobility, adaptability, dialogicity and interactivity, focus on the perception of media streams. All this contributes to the formation of professional competencies in digital pedagogy.

Analyzing the learning process, it can be noted that approaches to defining the goals and content of vocational education are often narrow, and attention is paid to individual, quite important, but at the same time local parties. Currently, the requirements to professional training of specialists are increasing, as professional knowledge penetrate into various areas of human activities, accelerating the processes of change in professional job functions as reflected in professional standards, there are new types of professional activities that require a qualitatively new approach to the content and pedagogical aspects of higher education.

Taking into account the stages of pedagogical design, based on the data obtained, understanding of qualification level, positions, corresponding to their generalized labor functions of professional activity and Учитывая этапы педагогического проектирования, основываясь на полученных данных, представлениях о квалификационном уровне, должностях, соответствующих им обобщенным трудовым функциям профессиональной деятельности и competences of the teacher of a technological profile, a theoretical model was developed (the model) of the process of formation of professional competences of bachelors in the direction of training pedagogical education (profiles: technology and Economics " in the digital educational environment of the University (picture 1).

Social order for the preparation of a bachelor's degree in Pedagogical education			
Goal - the formation of professional competencies of bachelors in the digital educational environment of the university			
Basis of preparation			
Conceptual basis for the formation of professional competences of bachelors	The main perspective directions of development of education	Requirements of professional standards of the teacher	The requirements of the Federal State Educational Standards of Higher Education in the direction of preparation Pedagogical education
Content block			
Determination of requirements imposed on the teacher by the employer (professional standards) and the Federal State Educational Standards of Higher Education in the direction of preparation Pedagogical education; designation of the structure and composition of competencies formed within the disciplines of the professional cycle; appropriate reconstruction and correction of the standard content of disciplines, giving it a competence-oriented character			
Activity block			
Development and implementation of special tools for the methodological process of the formation of			

professional competencies of bachelors of pedagogical education in the implementation of competence-oriented content of disciplines
Evaluation block
Monitoring the dynamics of the formation of professional competencies in the framework of psychological and pedagogical disciplines in the process of implementation; establishing the level of formation of professional competencies (low, medium, high); checking the adequacy of setting and achieving goals when solving professional tasks
Result - bachelor with professional competencies (formed in the digital educational environment of the university)

Figure 1. Model of the process of formation of professional competencies of bachelor in the direction of preparation of pedagogical education in the digital educational environment of the university

A feature of the created model is the systematic approach and integration of its blocks, which ensure the orientation of the educational process to achieve the intended result, by creating students an individual trajectory of the formation of professional competencies of bachelors of pedagogical direction in the digital educational environment of the university.

This model is designed for the gradual formation of professional competencies among the bachelors, that is, professionally significant personal qualities, which are characterized by a high level of scientific, technical and production knowledge, the ability to use knowledge in professional activities when performing work functions, taking into account the qualification level, corresponding to positions for which Bachelor of pedagogical direction of training profiles: technology and economics.

III. RESEARCH RESULTS

In accordance with the goal, the result of the implementation of the model of formation of professional competencies of a bachelor in the direction of preparation of pedagogical education (profiles: technology and economics) in the digital educational environment is a bachelor who corresponds to a certain level of formation of professional competencies.

To obtain the result, we have defined as the theoretical basis for the preparation of bachelors: a conceptual basis for the formation of professional competencies of bachelors; the main perspective directions of development of pedagogical education; requirements of professional standards of teachers; requirements of the Federal State Educational Standards of Higher Education bachelor.

As a *conceptual basis*, determine the formation Bachelor professional competence in the digital educational environment

selected: competence, activity and systemic approach, the use of which provides organizational complexity and efficiency of the process.

The results of experimental work revealed that the model of formation of disciplinary parts of professional competencies, which was based on the development of competence-oriented content of educational disciplines in the digital educational environment of the university, diagnostic tools is sufficiently effective.

Since the quality of mastering educational material in a number of disciplines, the study of which was carried out in the digital educational environment of the university, cognitive activity, the responsibility of doing independent work, the quality of professional knowledge, that is, the level of formation of the disciplinary parts of professional competencies in the digital educational environment of the university (fig.2).

Using the main provisions of the competence approach, based on the results of the analysis of modern regulatory documents, the study clarified professional and general cultural competencies, highlighted the disciplinary parts of these competencies that should be formed in the digital educational environment of the university. Competence-based approach in the preparation of bachelors is to design the content of training in accordance with the professional standards performed by labor functions, taking into account the qualification level, the relevant positions to which the bachelor of pedagogical education can apply. Consequently, the competence-based approach ensures that the preparation of bachelors meets the needs of employers, the labor market, and the digital economy. This means that the competitiveness of students increases, and the terms of their professional adaptation during the development of professional activity are reduced.

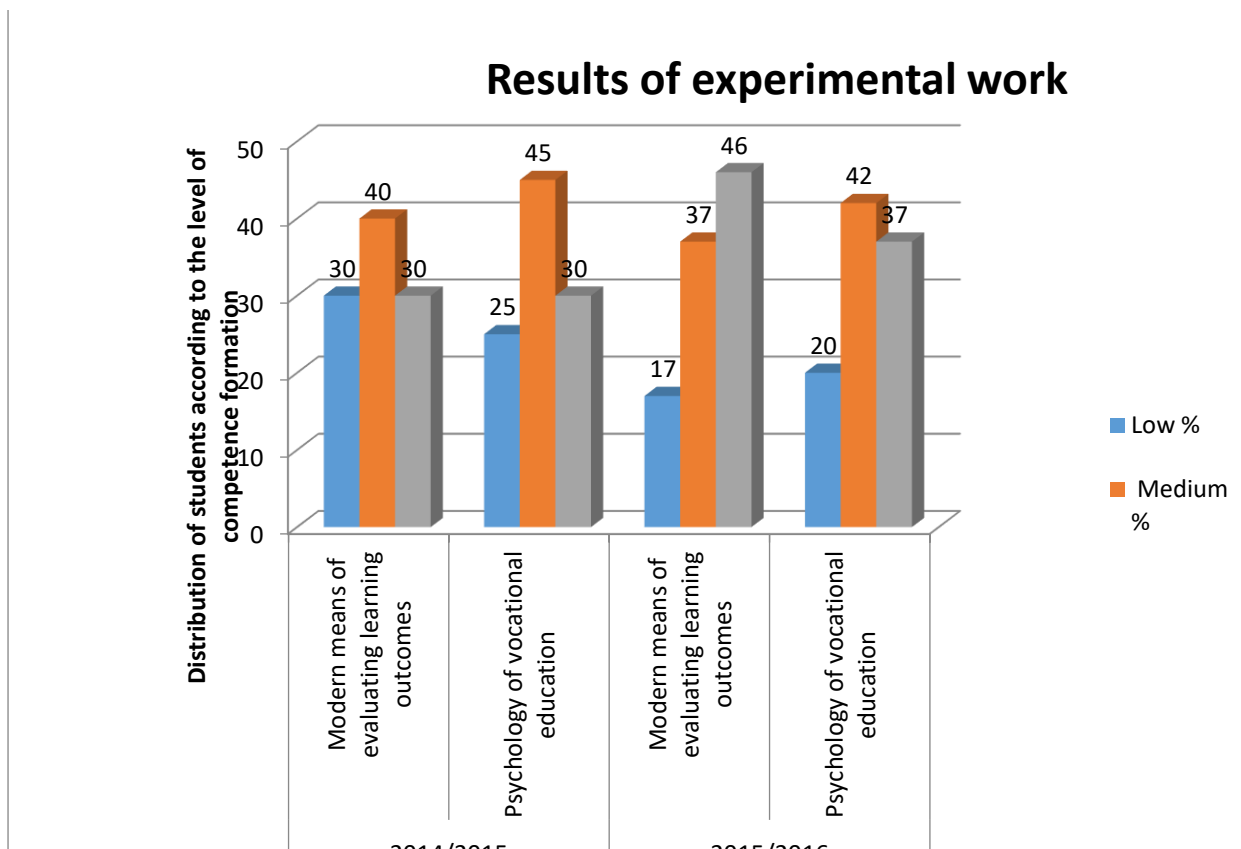


Figure 2 - Dynamics of growth of the level of formation of professional competencies

IV. CONCLUSIONS

Analysis of the scientific-methodical and normative literature made it possible to determine that the professional competencies of the bachelor of pedagogical education are professionally important personal qualities that are characterized by a high level of scientific, pedagogical, psychological, technological and economic knowledge; the ability to use knowledge in professional activities in the performance of professional functions, taking into account the level of qualification corresponding to the positions to which the bachelor of pedagogical training can apply.

The model of the process of formation of professional competencies of bachelors in the direction of preparation of pedagogical education (in the digital educational environment of the university has been developed taking into account the requirements of regulatory documents and requests and determines the integrated focus of the educational process on the individual trajectory of the bachelor's personality development, the gradual formation of the disciplinary part of professional competencies provided by informative, activity and evaluative blocks clothed.

The efficiency of the proposed model is ensured by compliance with the complex of organizational and pedagogical conditions.

The results of the study were tested in practice in the framework of the educational process at the faculty of technology, entrepreneurship and service of the Federal State Budgetary Educational Institution of Higher Education «Orel state University named after I. S. Turgenev».

The results obtained during the study can be used in the preparation of bachelors of pedagogical education for the professional sphere, namely, technology teachers using the

model of the formation of professional competence in the digital educational environment of the university.

V. THE DISCUSSION OF THE RESULTS

Discussion of the research results was carried out at the meetings of the department of vocational training, technology and entrepreneurship of the faculty of technology, entrepreneurship and service. The main theoretical and practical results of the study are reflected in teaching and methodological manuals, methodical recommendations, program materials, and scientific articles. The theme of the study was reflected in 32 publications.

The main directions of development of digital education allow determining the main ways to improve the process of formation of professional competencies of bachelors in the digital educational environment of the university.

The presented model takes into account the specifics of determining goals and selecting content, organizing students' learning activities and evaluating learning outcomes. This model is designed for the gradual formation of professional competencies among bachelors and takes into account ensuring the unity of purpose and result, as well as the dynamics of the process being studied. To implement this model, organizational and pedagogical conditions for the formation of professional competencies of bachelors have been developed.

The practical significance of the process of formation of professional competencies of bachelors is confirmed by the results of the introduction of diagnostic tools to determine the level of formation of professional competencies, allowing to stimulate various types of student learning activities; to increase their motivation to learn professional activities; to organize continuous monitoring of the quality of knowledge

and skills; to create objective criteria for assessing the quality of mastering the material of the discipline; to manage the quality of students' training based on the results of the control of knowledge and skills.

Analyzing the numerous pedagogical conditions, we can conclude that the decisive condition for improving the quality of training in the digital educational environment of the university is the following conditions:

- activation of educational activity of students in the process of preparation for professional activity;
- the formation of professional personality traits of students;
- diagnostics and the formation of personal qualities that contribute to the adaptation of students to professional activities [7].

For the formation of professional competencies of bachelors of pedagogical education, the following organizational and pedagogical conditions in the digital educational environment of the university were determined:

- designing the competence-oriented content of professional cycle disciplines in the digital educational environment of the university;
- development of diagnostic tools with the use of digital technologies in order to determine the level of development of professional competencies necessary to perform work functions corresponding to the positions for which the bachelor can apply.

It should be noted that the presented model takes into account the specifics of determining goals and selecting content, organizing students' learning activities and evaluating learning outcomes in the university's digital educational environment. This model is designed for the gradual formation of professional competencies among bachelors and takes into account ensuring the unity of purpose and result, as well as the dynamics of the process being studied. To implement this model, organizational and pedagogical conditions for the formation of professional competencies of bachelors have been developed.

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