

**HPEPA 2019****Humanistic Practice in Education in a Postmodern Age 2019****WAYS TO MODERNIZE TEACHER EDUCATION IN THE  
DIGITAL ECONOMY**

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***Abstract***

The article describes the main vectors of the development of the university's activities: the implementation of subject-oriented educational technology; the transition to active and project forms of work; the development of simulation training; integration of training with production, the implementation of dual training programs. The system of electronic educational resources created in the BSPU named after M. Akmulla allows to provide support for the professional growth of teachers, to build a vertical of interaction from student to university professor, to implement methodological, organizational and substantive support for schools. The authors consider not only individual components of the university's information system. Under investigation is a holistic information-educational environment related to the general conceptual provisions of the organization of the educational process in higher education as well as the role of the pedagogical university as a scientific, educational and social center of the region. It is stated that the most important areas of university development in the field of information technology is the introduction of open education principles in the educational process. Active networking with leading universities of the country and the world, educational process information support, forms of quasi-professional activities, dual education and simulation training are discussed in the article. The authors see the establishment of electronic support of innovative projects and distributive introduction IT solutions, electronic monitoring of the education system in the region, improving the quality of electronic education and the IT competencies of the participants, training personnel in the field of innovative information management as promising areas.

2357-1330 © 2020 Published by European Publisher.

**Keywords:** Competence, development center, pedagogical activity, teacher.

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## 1. Introduction

Modernization of education is due to dynamic changes occurring in society. The literature highlights a number of features or organizing principles inherent in modern society:

- Individualism (approval of the central role of an individual in society);
- Differentiation / hierarchization (the emergence of more highly specialized links);
- Rationalization and depersonalization of management (the increasing role of science as a means of knowledge);
- Economism (dominance over the entire social life of economic activity, economic goals and economic criteria);
- Expansion / globalization (expansion of the range of social, economic, political and cultural relations around the world, reducing the role of the national state).

The dominance of principles leads to the need for an adequate transformation of the educational process in higher education, especially in pedagogical universities (Aksenov, & Kuptsov, 2000, p. 28). There is a growing need for a teacher who is able not only to adapt to the challenges of the time, but also to shape the future generation of the country within a specially designed educational process, when attention is also paid to the age characteristics of students.

The school of the 21st century should provide the student with new competencies, the list of which is constantly expanding in line with the trends of the fourth industrial revolution. Therefore, a modern teacher cannot act on a once specified pattern, he must be able to build a flexible educational process according to the students' individual trajectory, solve problems in conditions of high uncertainty, and be the subject of their own professional pedagogical activity (De Los Ríos Carmenado, Díaz-Puente, & Gajardo, 2011). However, in order to manage teaching activities, you need to master the ways of its implementation. Turning to the current practice, in the traditional sense of teaching in higher education, we give rather an idea of the pedagogical activity, but not the activity itself. We are still discovering the predominance of authoritarian pedagogy, while innovations are needed that will make it possible to change the subject-oriented paradigm of the educational process, not transforming its essence radically, but organically incorporating into its structure.

## 2. Problem Statement

Analysis of the scientific and pedagogical literature and practice of leading universities of the country shows that in modern professional pedagogical education there are no disciplines that allow the student to see the ideal pattern of pedagogical activity, master the essence, the idea of pedagogical activity, learn how to design a structure, form their own design program of pedagogical activity: first on the model, and then practicing in the implementation of educational activities (Lednev, 1991). The logic and conditions for students to master the basics of pedagogical reality, technologies for organizing activities, transforming pedagogical reality and designing special conditions of the educational process aimed at designing routes of their own development.

### **3. Research Questions**

Such changes imply an analysis of activity in general and pedagogical activity in particular. At present, those forms of educational activity that are reflected in the curricula and work programs of the disciplines, we develop only certain functions of pedagogical activity, but this is not a complete solution to the problem (Carrasco et al., 2016). To solve this problem, a deep analysis of ontogenesis and phylogenesis of pedagogical activity is necessary (Kudinov et al., 2018). Many scientists successfully and deeply studied the methodological and theoretical aspects of this scientific problem, but the result was not a holistic educational system. In the works of Novikov (2006) the methodological approaches for preparing the future teacher are discussed. In the works of Verbitsky and Larionova (2009) the activity beginning of the content of education is revealed. The works of Asadullin (2000) and Shadrikov (2011) are devoted to the development of the subject characteristics of future teachers, taking into account the specifics of professional pedagogical activity (Krajewski, 2003). The study of the problems of professional development of specialists – teachers are reflected in the research works of Markova (1993), Mitina (2014); the ways and problems of the formation of the professional personality of the teacher are reflected in the works of Zimnyaya (2003), Potashnik (2009), Kudinov et al. (2018).

In the course of a comprehensive study of the educational process of professional pedagogical education, it was revealed that the system has preserved and cultivated traditional approaches and forms of education for many years, a similar tendency to conservatism is found in the academic environment of classical universities that had been formed in the Soviet period (Zimnyaya, 2003).

At the same time, the basis of vocational education, especially in modern economic and informational realities, is not only to teach, but also to apply synthetically. Such a meta-object task is realized through the design of educational conditions and the design of the student's individual educational trajectory in it.

### **4. Purpose of the Study**

Purpose of the work is to analyze the situation on the state of information education in the university and to develop ways to modernize teacher education in the digital economy.

### **5. Research Methods**

The basis of knowledge about the pedagogical activity is analysis, and the basis of its formation and application is synthesis. From the standpoint of the analytic-synthetic approach in cognition and transformation of reality, both processes should go in parallel, complementing and developing each other. However, in reality of vocational education they are separated from each other, there is no coherence of the processes of analysis and synthesis, and the analytical types of educational activity prevail.

The educational process of a pedagogical university, the collective, the infrastructure must arm a future teacher, first of all, with the methods of cognition (analysis) and transformation (synthesis). Analysis and synthesis are harmoniously integrated into the types of educational activities, realizing the analytical-synthetic paradigm. The structure of the content of the educational program or a separate discipline begins with students studying the most general provisions and laws, which are the basis for the consideration of

specific problems, special cases. Acting as a generic knowledge, the invariant permeates the educational material of the section, the course, while refining from topic to topic, meaningfully revealing the subject of study. This specific form of the structure of educational material is the theoretical basis of the disciplines, on which the whole system of knowledge about phenomena, patterns and connections inherent in the object as a subject of science is built.

The logic of the modernization of the educational process when introducing a subject-oriented educational technology dictates the need to expand the range of methods of contact and contactless forms of educational activity. These include pedagogy of cooperation, case technology, technology for the development of critical thinking; project technologies, adaptive learning technologies, “digital” pedagogy (open education, “inverted” learning, e-learning and distance learning technologies), hybrid learning, simulation technologies, dual learning technologies.

## 6. Findings

The fundamental legacy of pedagogical theory and subject-oriented didactics of higher education is complemented by project-oriented content of basic educational programs (Slastenina, Isayev, & Shiyanov, 2002). The main vector of transformations is associated with the introduction of infrastructure and technology of the subject-activity development of a student as a professional in pedagogical activity. At the same time, both directions of transformations are interrelated and interdependent in the implementation of the principles of the competence approach of the federal state educational standard for 44.03.05 Pedagogical education. The guarantor of the relationship is the project-oriented basic professional educational programs, since the didactic tools for their implementation will be located in both planes. In the applied aspect of the development of basic professional educational programs, there is a need to decompose the competencies declared by the standards developers to a lower level in order to familiarize the formation logic with specific departments, disciplines, and teachers. At the same time, the essence of the processes of cognition and transformation of pedagogical reality, the principles of subject-activity educational technology, the competence of the “future man” of the Agency for Strategic Initiatives, the design methods in the educational process substantially complement and expand the field of competence of educational and professional standards applicable to the future teacher and “teacher of the future”.

Decomposition is directly related to the federal state educational standard and the teacher's professional standard, drawing a parallel of the formed competencies with labor functions and actions. In the process of decomposition the augmented field of competences, taking into account the analytical-synthetic paradigm of the educational process, two conditional segments of competences are revealed: general and key. General competencies are the competencies declared by the educational standard and reflected in the technological maps of the formation of competences for specific work programs of academic disciplines. This practice is used in most universities, regardless of the profile. The levels of decomposition of these competencies depend on the particular department, discipline, teacher.

The consideration of the meta-subject competence and the quality of interdepartmental interaction plays an important role in their decomposition in its formation. General competencies are rather cumbersome in defining them as separate actions in pedagogical activity. The practice of immersion from level to level in the decomposition leads to an endless list of actions and operations that conflict with each

other and in relation to disciplines, and, accordingly, to the teacher's workload. Therefore, in the formation of general competencies, the traditional didactic experience of higher education, aimed at the effective implementation of meta-subject matter, is more tolerated. Here, a special role is played not so much by the normative as by the logistic, organizational and technological support of the educational process.

Especially important is the process of overcoming the personal egocentrism of teachers in collaboration with colleagues and combining efforts around the personality of the student. In this process, the leading position is occupied by the personality of the teacher with a rich professional, pedagogical, methodical and life experience. The implicit task of teaching disciplines is the translation of the axiological substantiation of modern processes in pedagogy, the subject-creative attitude to professional activity, the imperatives of humanism, tolerance, mercy, self-identification, citizenship and patriotism. Universal competencies represent a kind of framework of instrumental didactics of student training in the improvement of personal qualities and general cultural competences, general professional (pedagogical) and professional (subject) competencies.

Thus, the reality of the educational process becomes two-sided: invariant and variable. The invariant part translates the generally recognized conservative paradigm of the subject-oriented learning process. In this process, a segment of general competencies is formed. The variable part is connected with the creation of a special infrastructure for the formation of a segment of students' core competencies. The basis of the infrastructure are the centers of competence development (hereinafter - the CDC).

As a result of training in a higher education institution, a graduate must master a certain set of competences of three levels - universal (UC), general professional (GPC) and professional (PC). If necessary, the list of competencies proposed in the FSES HE (federal state educational standard) can be supplemented with special competences that develop the narrowly focused practice-oriented professional skills of future graduates.

Thus, the competences are: metalatent character (the delayed nature of the manifestation of competencies in activities after graduation); causal character (connection of competences with the effectiveness of follow-up); professional-oriented and multidisciplinary in nature (the formation of competences in the course of mastering meaningful polydisciplinary modules and their verifiability).

On the basis of this, it is necessary to change the perspective of solving the problems of a pedagogical university for the formation of student-future student competencies - a teacher of the 21st century. The product of training should be a graduate who is able to act in different situations (with a systematic, critical and creative thinking, programming skills, able to carry out inter-sectoral communication, manage people, lead projects, focus on customer needs; creative). Since teacher training for a changing world is one of the most acute problems of modern society, which requires a comprehensive approach, including analyzing the characteristics of a transforming learner and transformation in accordance with these characteristics of modern education.

No doubt, a modern teacher should know and love his subject, instill an interest in it among schoolchildren. It is very important that it will be mobile and flexible, able to adapt to the ever-growing flow of information and new technologies, have the ability to self-education and self-development. Taking into account these provisions and based on the conducted research, the following groups of key competencies are identified: information competencies; value-semantic competence; general cultural

competence; educational and cognitive competencies; communication competencies; social and labor competences; competence of personal self-improvement.

In general, competence is not limited only to knowledge or only to skills. Competence is a sphere of relationship that exists between knowledge and action, practice. Analysis of various lists of competencies reveals their creative orientation. The following can be attributed to the creative competencies proper: to be able to benefit from experience, to be able to solve problems, to be able to reveal the interrelation of past and present events, to be able to find new solutions. At the same time, references to these skills are not enough to provide a holistic view of the whole complex of knowledge, skills, ways of activity and experience of a student in relation to his creative competencies.

By itself, the logic of building the work of the centres involves the individualization of training, the possibility of choosing an individual trajectory depending on the profile of training, personal qualities and the initial level of training. Personalization of education and the formation of its own educational trajectory becomes possible due to the description of the ratio of competences formed in each centre and their levels with the content and requirements for the BPEP (basic professional educational program), thus forming a map of the competencies necessary to achieve specific educational results. Despite the fact that the main focus of the CDC is the implementation of the BPEP, the decomposition of competences, the description of specific exercises, simulators and simulators, training conditions and knowledge testing requirements allow students, at their request, to acquire certain competences or methods of competence training program.

In connection with the foregoing, the need to create a virtual platform becomes apparent, with providing information to everyone about all the CDCs, the competences formed in them, the principles and conditions of training, the tools for building an individual learning path, and the creation of a virtual Competence Tree. Visualization of the Competence Tree will allow you to present visually the learning trajectory depending on the BPEP or individual competencies, create an individual training schedule and provide access to information at any stage of the training.

The classification of competences is carried out on three levels: basic, generic and specific. The universal competences of the individual are aimed at developing systems thinking, multilingualism, the use of different types of communication, which is associated with the ability to manage projects, work with teams, groups and individuals, including in the high uncertainty mode and changing the conditions of tasks quickly: the ability to make decisions quickly, respond to changes in working conditions, the ability to allocate resources and manage their time, the ability to educate themselves, the ability to artistic creativity, the presence of a developed aesthetic flavor; search, analysis and selection of necessary information, its transformation, preservation and transmission; to be able to choose target and semantic attitudes for their actions, to make decisions; knowledge and experience in the field of national and universal culture; spiritual and moral foundations of human life and humanity, individual nations; cultural basis of family, social phenomena and traditions; the role of science and religion in human life; competences in everyday, cultural and leisure spheres; mastering the elements of logical, methodological, educational activities, as well as activities aimed at mastering the methods of physical, spiritual and intellectual self-development, emotional self-regulation and self-support.

The teacher's generic competences include: communicative (ability to understand texts and create them, speak in public, work with information, etc.); research (the ability to apply natural science and

humanitarian research methods); project (the ability to develop projects and participate in their implementation as the development of project thinking); organizational (ability to coordinate the activities of people to achieve goals); group work (skills of interaction with other people in the process of achieving a common goal); the ability to learn (goal setting skills, planning, execution, reflection, self-esteem, independent work on the topic, search for information from various sources, etc.); personal (ability to reflect on the strengths and weaknesses of their personality, character, ability to adapt to their personal characteristics, to accept themselves, their “I”); problem solution.

Specific competences are within the competence of the subject teacher and imply knowledge of the subject area; knowledge of the general and private methods of teaching the subject; availability of ideas about electronic educational resources, software and trends in the market of electronic publications in the general education sector, focused on the subject-professional activity, digital educational resources, implemented during the implementation of federal target programs; knowledge of the basics of the introduction of digital educational resources in the educational process on the subject.

The introduction of a competence-based approach in higher education and the use of any of the above technologies is impossible without creating specific conditions, a special educational environment that includes all components from informational educational resources and material and technical equipment to organizational and methodological support of each exercise aimed at the formation and development of competence. The university is introducing a set of innovation infrastructure facilities - Competence Development Centres (CDC).

CDC is an innovation centre providing new forms of interaction between organizations of education-science-production, practice-oriented science, training of professionals - future teachers. The development phases of the CDC coincide with the phases of the innovation cycle: research, technical, technological, innovative. The development of the CDC should occur cyclically, since the education system is open. At the same time, the CDC should become an external “agent” of educational organizations, ensuring continuous management of knowledge and training of highly qualified personnel in the pedagogical direction. CDCs play the role of a knowledge exchange network hub in an ecosystem of innovative educational development: translation (training), generation (science), application (practice), reflection (development).

The main principles of the CDC's activities are aimed at continuous competence building and professional development, in particular, in terms of realizing creative and experimental potential, using an individual approach and teamwork, organizing international cooperation in the global Internet environment, predicting the future society needs: systemic principle, activity principle, the principle of individualization, the axiological principle, the anthropological principle, the analytical-synthetic principle, the bimodal principle, the principle of recursion, coherent principle, a simulation principle, the principle of big data.

The classification of levels of competence – basic, generic, specific, special and key – is the basis for identifying the relevant types of CDC of basic, specific and generic (the basis for the classification of the type of activity).

An artificially created laboratory for practicing practical methods of pedagogical activity by students with special exercises in the chain of simplest pedagogical activities in the work on specialized simulators and simulators. Exercise (in each exercise laid the triad of human development knowledge-action-

experience). Simulator - training of one specific competence. Simulator (electronic or mechanical) - training of several competencies simultaneously.

Under the conditions of a basic CDC, the formation of universal, personal competencies is taking place. The ICT Competence CDCs are already open; the institute of family and childhood; study room for teaching practice (in children's health camps), an open reading room is also open. In the near future, the emergence of a healthy lifestyle centre, the fundamentals of physical fitness and medical knowledge, CDC ethics, aesthetics is necessary.

The university is already operating generic CDCs, aimed at the formation of general professional competencies: the studio of dual training "Open Class"; centre of inclusion. It is necessary to introduce projects of the psychological CDC.

In each structural subdivision specific CDCs should be opened, aimed at the formation of professional competencies (subject classrooms at the university, chemistry, physics, etc.).

Based on the essence of the CDC, you can define the functional logic of work in it: the teacher specifies the goal in a special way — the student's learning motive shifts to the student's goal; virtual, independently / under the guidance of a teacher until the criterion threshold is reached. Evaluation of the achievement of the goal using the assessment tools fund (ATF): The goal is achieved, therefore, the identification of the formed action / competence / complex of competences is recorded in the electronic portfolio. If the goal is not achieved, then a return to the goal setting stage takes place. The following should be noted: the functional logic of the "workout" is a set of exercises that the simulator makes up, while the set of exercises may be redundant. The sum of key exercises allows you to perform a certain type of activity on the simulator, forming a specific competence. The sum of competencies allows you to solve professional problems (situations) on simulators, including in a situation of uncertainty.

The CDCs assume a level-based formation of competences, with the result that the graduate acquires the skills of a 21st century teacher. A digital educational environment should be created in the CDC, where a student can choose his own educational trajectory, which describes the actions of students "here and now." The educational environment takes into account the needs and abilities of students and offers scenarios for further development. In the digital environment, one learning becomes the activity of the student, which is correlated with an increase in the level of perception, the implementation of productive activities and the implementation of creative activity. The CDC provides students with the opportunity to organize their studies: at any stage in the development of competence, the student must understand how much work is to be done, what means (methods, techniques) must be used, and how much he is progressing in the performance of tasks. At the same time, the digital educational environment should take into account social mechanisms - competition, cooperation, mutual learning and mutual evaluation.

Group learning develops a culture of constructive feedback: it is only in the mode of joint activity that alienation can be overcome, learn to lead a discussion, react to criticism, establish and maintain communication. At the same time, in the environment of the CDC, there are opportunities for the manifestation of the initiative within the organization of the student's creative space. An example of the initiative is mutual learning, individual or joint creativity, project-based training. It is important not only to offer different approaches to mastering educational material, but also to create your own methodological recommendations, theoretical substantiations, forming a competence structure describing the connections



of competences: tasks should be focused on synthesizing the information received, transferring the acquired logic of the subject to other disciplines or using knowledge from different areas for getting new knowledge.

Independent / individual creativity is another important part of the educational process of the CDC. The evaluation criteria should be transparent and understandable: students should receive instant, constant and individualized feedback on the actions they have taken and understand how the effort expended affects the result.

With the advent of more compact, granular learning formats, there is a need to develop maps, graphs and charts that reflect horizontal links between educational activities / actions, as well as the development of large data analysis. The creation of knowledge graphs will be the impetus for the development of new search mechanisms and recommendation systems for the basic professional educational program (BPEP). The content of education in the disciplines / modules, will effectively decompose competences and will become the basis for flexible certification systems.

In the process of mastering the students of BPEP, a number of stages in the formation of competence are highlighted.

At the first stage of the lesson students deal with the main theoretical points together with the teacher.

The second stage of the thematic lesson allows students to work independently with simulators and develop practical skills. Here, with the help of a teacher demonstrating the method of performing manipulations, students are introduced to the simulators.

At the third stage students analyze the cases – specially prepared educational material. With the successful development of theoretical material and methods of conducting manipulations, the teacher sets the students a scenario of a specific situation.

The fourth stage is the simulation training (game) itself, aimed at strengthening and more fully mastering the tools and skills used before. At this stage the ability to analyze situations, to evaluate alternatives, to choose the best options for solving problems and to plan their implementation is developed. In addition, students develop communication skills, i.e. the ability to share information with students, their parents, colleagues, to interact within the team.

Following the results the correction and improvement of simulation training are carried out. On the basis of the analysis performed, it is possible to make changes to the teaching methods, to improve the training cases.

## **7. Conclusion**

Since the creation of an integrated system of training specialists at a higher education institution involves the transformation of the real educational process by redistributing part of the educational load in the CDC, it becomes obvious the need to realize the interconnection of all centers and the logic of their work, describe the structure of the new educational space, visualize the interaction of centers and provide data in open access about a new educational approach as a key component of the innovation learning paradigm in Higher school. In addition to the so-called traditional forms of organization of the CDC, i.e. real premises with procured equipment and staffing, CDC may have other forms of organization, for example, be virtual, mobile or external, but in any form of organization they must have a clearly described structural-functional model and logic of work.

Particular attention should be paid to the selection and design of exercises / tasks for the organization of students' activities. Each exercise should include at least three components: knowledge, actions / operations, emotions. Knowledge - to form the approximate basis of the action / operation. Action - to form a skill as a skill, ensuring a relatively complete mastering of it in this quality, both in detail and in general. Sensory information - to achieve the level of motor action required for effective use through control.

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