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The Substantiation of the Model of Future Teachers' Scientific and Research Culture Formation Under the Conditions of Higher Pedagogical School

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Abstract: The article substantiates the topicality of the problem of formation of future teachers' scientific-research culture in the process of professional training, the necessity for creating an appropriate pedagogical strategy under the conditions of higher education fundamentalization and universalization. The aim is to reveal and substantiate the conceptual, content and technological aspects of the model being developed. Taking into account the modern tendencies of higher pedagogical school (globalization, humanization, continuity, intensification, integration, coherence, cognitive polymodality), a model of a pedagogical system is developed. The model is based on the polyparadigmal approach, includes invariant and variant educational strategies. Cultural, scientific and educational environment is built within the model as an integrated unity.

The content of professional training, the originality of which is the synergetic unity of fundamental, culturological, general scientific, methodological and ideological directions that will ensure the harmonious formation of a teacher-researcher's individual and personal potential is determined.

Keywords: future teacher's scientific and research culture; cultural, scientific and educational environment; professional training; integration and intensification of the educational process; fundamental, general scientific, methodological, culturological and ideological training.

Topicality of the problem. The National Doctrine on Education Development in Ukraine in the 21st Century emphasizes that globalization, technological change, transition to a post-industrial, information society, the establishment of priorities of sustainable development, and other properties of modern civilization predetermine human development as the major goal, the key indicator and the main lever of modern progress, the need for radical modernization of industry, set the task for the

state and society to ensure the priority of education and science development, the priority of solving its urgent problems.

These socio-cultural challenges correlate with the major requirements of European education, aimed at making the systems of teacher training in the counries of the European Union closer, improving these systems on the basis of finding common criteria for the professional qualities of «a teacher – a European – a researcher». European Dimension in Education is considered to be the general spiritual field, the features of which are common value orientations, understanding of the importance of a teacher as a creative personality, capable of a making scientific discoveries, creating humanist-oriented innovative and research learning environment.

The topicality of this problem is confirmed by the contradictions that arise between: the social order for search and reproduction of new didactic technologies in accordance with the modern requirements of higher education under current conditions of its globalization and expansion of epistemological horizon, and the absence of scientifically and methodologically grounded model of training future teachers with the formed scientific-research culture; modern awareness of culturological, human-centered paradigm of education, recognition of culturalogical integration between culture, education and science, and the absence of considering this interconnection while performing future teacher-researchers' training.

Analysis of basic research and publications on the problem. According to the analysis of the scientific fund, the study of certain aspects of the identified problem is carried out mainly from the standpoint of personality-activity approach and according to pedagogical scientific research has the following trends:

- scientific research activity as a system-forming factor for training highly qualified pedagogical workers, the main requirement of the Bologna process and the EU Framework Programme for Research and Innovation «Horizon 2020»;
- scientific-research activity as a cognitive process characterized by purposeful, procedural, structured activity and acting as a method for improving the efficiency of vocational and pedagogical activities;
- scientific-research activity as a means of formation of personal qualities (research skills, research abilities, research position) of a teacher-researcher

capable of performing actions in accordance with a specific method of scientific research and aimed at solving a certain scientific and pedagogical problem;

○ scientific-research activity as a sphere of teacher-researchers' professional activity, its normative and evaluation criteria; means of formation of teacher-researcher's methodological culture.

The works by S. U. Honcharenko, V. I. Zahviazynskyi, I. O. Zymnia, V. V. Kraievskyi, V. V. Polonskyi, H. P. Shchedrovytskyi acquire the fundamental importance in the development of theory and methodology of future teacher-researcher's scientific-research culture formation.

The **purpose** of the article is to substantiate the model of formation of future teachers' scientific-research culture, to reveal conceptual, content and technological aspects of the created model of pedagogical system in higher pedagogical school, the originality of cultural-scientific and educational environment.

Main research material presentation. Under the conditions of permanent transformation of educational field, the problem of formation of future teachers' scientific-research culture (FT SRC) as a personal phenomenon, which ensures a coherent and thorough study of educational issues through the acquisition of analytical-synthetic, inductive-deductive, dialectical thinking activity, its various modes, interdisciplinary thinking and scientific outlook, «meta-knowledge» and «meta-learning», which enable rapid adaptation in information flows, the ability to respond to the conditions and requirements of pedagogical science, becomes of a primary importance; and the indicated pedagogical system requires scientific substantiation.

The formation of a future teacher's scientific-research culture is viewed as purposefully-planned organization of research training, the development of pedagogical conditions and technologies based on the principles of personal orientation, consistency, reflexivity, dynamism; the formation of interaction between teachers and students on a dialogical basis that creates optimal conditions for the harmonious formation of FT SRC in the context of their professional training, which has to be culturally and acmeologically oriented, viewed as a *pedagogical process* of formation of their professional and personal newly-developed qualities and *a pedagogical system,* which specifies purposeful, content and technological characteristics of this process.

Having normative and variable character, the developed educational strategy is aimed at forming future teachers' scientific-research culture as a personal, multifunctional and polystructural phenomenon, involves the *invariance* of the structure of the educational process under the conditions of harmonious interaction of all its constituent elements, their balance, mutual compensation, and *variability* of the organization of research training, that is its adaptability to future teacher's personal and individual characteristics, using the whole range of methods of scientific knowledge in dialectical unity in pedagogical research. The variability relates, first of all, to the content of research findings, stipulated by a multi-level, interdisciplinary scientific research in the field of education.

The conceptual and theoretical substantiation of the system under research is possible under the conditions of the differentiated methodological educational strategy *(polyparadigmal approach).* The acceptability of existence of a number of methodological systems within which the integral models of formation of a researcher's personality and educational process are created and expressed in the form of pedagogical theories, technologies, educational and pedagogical systems, makes it possible to predict and implement actions from the standpoint of integrated combination of various scientific and methodological approaches, harmonization of their goal-settings. We think it rational to use the competency-based, innovative, contextual and culturological approaches that ensure the optimization and effectiveness of educational and cognitive processes, their interaction and systemic unity, can become an effective methodology for constructing practically-oriented education in a complex organizational system of professional training of higher pedagogical school considering the integrative paths of development of education, science and culture. Thus, the *competence approach* allows to focus on the activity content of education, to single out competences and on this basis to plan new contents of training future teachers as researchers, to expand the interdisciplinary, research component in the structure of pedagogical education; the *innovative approach* creates conditions for the formation of future specialist's creative resource, his or her susceptibility to new ideas in pedagogical theory and practice, provides introduction of innovative technologies; *contextual approach* sets the contents and development of academic disciplines on the context basic, ensures a flexible transition from educational and cognitive to professional and pedagogical activities, its scientific-research component; *cultorological* approach makes it possible to

interpret future teacher's research culture as a phenomenon of culture and to formulate the process of its formation. The approach is based on the principles of cultural education.

The reproduction of the developed educational strategy becomes valuable under the conditions of scientific progress, which make it necessary to possess the methodology of scientific research, research tools, to overcome the limits of accumulated information, which is caused by the intensive development of scientific fields. This involves scientific knowledge restoration and structuring in all the directions and levels of professional training, considering its dynamism and variability, and it is a complex problem of deepening the education fundamentalization. Despite some external incompatibility of the concepts of «fundamentalism» and «culture», it is necessary to define a few points of intersection between them, that is why their integration and interdependence under current education conditions are appropriate.

The deep and comprehensive interaction of fundamental science, culture and education is topical nowadays. It ensures the *creation of cultural, scientific and educational environment* with intensified research and innovative components at the level of subjects of pedagogical and cognitive processes. Functioning of such an educational space becomes possible under the conditions of implementation of principles of cultural compatibility (values and norms of education adequate to modern culture), productivity (transforming active chatacter of education), multiculturalism (diversity and plurality of values, forms of activity), integrity (personality, pedagogical process, pedagogical technologies, education content). Thus, the optimization of interaction of simultaneously existing trends (principles) of education such as convergence which preserves and maintains the integrity of the system, and divergence which causes its transformation takes place within cultural, scientific and education environment.

In this context, *innovative education* which is based on the integration of the most effective pedagogical technologies with the intensive use of scientific research; interdisciplinarity as a modern form of fundamentalism of science and education; interconnection and mutual influence of scientific research and educational and pedagogical practice, becomes important. Considering higher education as a social-cognitive complex, functioning on the basis of the unity of the functions of generation, transition and assimilation of knowledge, we can assume that

innovations penetrate all these functions. Thus, science represents the method of generation (developed scientific knowledge in the form of theories, concepts and laws), innovative and research activity serves as a method of transition (using the latest technologies, innovation training), the formed scientific and research culture as a personal phenomenon serves as a method of knowledge assimilation.

Determining the peculiarities of the educational process in accordance with global challenges and strategic orientations of higher pedagogical education requires solving a number of issues united around the mechanisms of scientific and cognitive research, which in turn focus on the problem of future teacher-researchers' professional and personal development. Such issues should include those related to the creation of conditions for: a) the formation of future teacher's value-semantic position towards cognitive processes, scientific creativity, which causes the researcher to realize the importance of science as an important element of culture, scientific thinking as a vital acquisition and «all-planetary phenomenon» (V. I. Vernadskyi), gnostic and culturally ideological functions of knowledge, their heuristic potential; b) formation and development of scientific and pedagogical thinking as a means of systemic realization of pedagogical reality and creation of modern innovative technologies; its polar-paradigm orientation, integrity and criticality should become the dominant features of such thinking; c) ensuring all the directions of a researcher's reflexive work: from ideological to philosophical and scientific ones; the formation of ideological reflection, which includes the main components of the content-related chatacter - ontological, epistemological, historical and philosophical, scientific, axiological, ethical.

As V. V. Kraievskyi [1] points out, the education process can be substantiated only from the point of view of epistemology, which enables to see the emergence, formation and self-motion of this process, which becomes rational, if we set the task of bringing a person's level of knowledge to modern scientific knowledge closer to each other. Thus, the processes of learning and cognition are dialectically related to each other and are differed by interconditionality and interdependence: if the process of cognition is dialectically complex and contradictory, the learning process will be the same.

The central place in the characteristics of the scientific-cognitive process in higher pedagogical school is given to the category of «knowledge», which indicates one of the most important and priority goals of education, determines the means of

pedagogical influence, reveals the contents and the inner side of the pedagogical process. Serving as a subject matter of pedagogical influence, knowledge as a form of normative conceptualization of practical pedagogical activity should be included in the structure of students' individual pedagogical and research experience, assimilated by them in the form of concepts, laws, principles, etc. On the other hand, pedagogical influence becomes meaningful and matters only as a part of comprehensive pedagogical activity, representing the unity of conception (intention, project) and its implementation (result, execution) and requires the teacher to «melt» the knowledge, frozen in the final forms, into the process of students' scientific and cognitive activity, to transform it into the contents of the educational subject, into the contents of students' thinking activity, the means of forming the subject of scientific-research activity. Consequently, knowledge becomes a condition and a means of realization of one's scientific-pedagogical and innovation-research strategies for a future teacher-researcher while for a teacher it becomes a subject of constructing learning material, which focuses on a teacher's pedagogical conception, sets a certain perspective for reproduction of educational and pedagogical processes, their cohesive characteristics.

According to modern requirements of higher pedagogical school it is makes sense to apply such principles (trends) of professional education as *integration* and *interdisciplinarity*. Pedagogical integration should be considered as a higher form of unity of values, principles, content of education, creation of consolidated pedagogical units on the basis of the interconnection of educational subjects, the study of main priorities in interdisciplinary integration. In this sense, interdisciplinarity corresponds to the innovative character of the development of sociality and science, their constant movement, formation and renewal.

Keeping to the logic of our considerations, we believe that solving tasks in the context of the chosen problem issues will be most effective when applying such integration methods as:

interdisciplinarity - when the knowledge of other subjects is used while studying some academic discipline, and the acquired interdisciplinary knowledge will allow to approach solving scientific and pedagogical problems comprehensively and systematically;

coordination - when a teacher focuses on other spheres of knowledge, builds his or her course of lectures and seminars in the united logic of professional activity and scientific-research activities acquire a penetrating character;

combination of several disciplines into one, which can be achieved by simultaneous study of various aspects of a particular socio-cultural or pedagogical phenomenon, as well as owing to the successive study of this phenomenon – first by one discipline and then by the other;

setting of interdisciplinary educational and professional problems, the search for their solutions, using information from various sciences (theoretical and practical material from different disciplines).

Such organization of the pedagogical process, which concentrates various ways of structuring the educational material on an integrative basis, leads to a qualitatively new level of theoretical training of a teacher as a researcher oriented at multiple and multidimensional study of sociocultural and pedagogical phenomena in dialectical logic, taking into account all the variety of forms of their manifestations and contradictions, the vision of multi-vector functioning of the educational system under study dynamically and statically.

Scientists (V. M. Monakhov, P. I. Pidkasystyi) consider pedagogical technology an organizational and methodical tool of scientific and educational educational process, acting as an intermediate link between theory and practice, representing a projection of education (education and training) on the activities of a teacher and a student, and ensuring the achievement of pedagogical goals.

In the aspect of the problem under research, the development of pedagogical technology took place at different levels in vertical and horizontal directions. Thus, in the *vertical hierarchy* there are subordinate classes of educational technologies that are adequate to the levels of organizational structures of the subjects and objects of the educational process: *meta-technologies which* reflect the socio-pedagogical level; *macro technologies* which correspond to the general pedagogical level; *mesothechnologies* which is aimed at solving individual didactic, methodological, educational tasks; *microtechnologies* which reflect contact and personal levels (technologies of individual interaction, self-influence).

In the *horizontal heirarchy* pedagogical technologies are presented by the directions, which reflect the *scientific* (conception of research), the *content-descriptive* (model, description the contents and methods for achieving the expected

result), *procedural-activity* (goal-setting, planning, organization of activities of subjects and objects of scientific-cognitive process) aspects [4].

The distinctive feature of future teacher-researchers' professional training is the synergetic unity of fundamental, culturological, general-scientific, methodological and ideological directions that will ensure the harmonious formation of a researcher's individual-personal potential. Thus, the *fundamentality* of teacher training is determined by the unity of scientific knowledge and educational process, the presence of system-forming cores, is characterized by integrity, interconnection, interaction of all its components and is based on the principles of science, systematic character and consistency. Basic education becomes *fundamental*, the main purpose of which is to spread scientific knowledge as an integral part of world culture, the specificity of vocational and pedagogical fundamentalism - in the primacy of the general humanitarian base, comprehensive humanitarian knowledge, which serves as a basis for special training. In this context, the fundamental nature of education should be considered as the focus of the educational content on methodologically important, invariant elements of human culture, which ensure a qualitatively new level of intellectual culture and stimulate the processes of lifetime self-development and self-education in a rapidly changing socio-economic and technological environment.

Culturological education is concentrated on revealing the main vectors of deployment of culture that is science and education as its phenomena, supposes practical "interiorization" and "assimilation" of cultural experience, formation of the conception of a person as a creation and creator of culture, stimulating the creative and analytical style of thinking, determining the personal sense of socio-cultural, pedagogical and research values, humanitarian, or cultural-centric paradigm, which introduces the «human dimension» into professional life, and a person of culture becomes the purpose of education. In this context, science is considered to be one of the system-forming factors of culture, causing significant changes in the "cultural" condition of the way of life, values, motives of behavior and the nature of self-consciousness of a teacher-researcher's personality.

General-scientific training is aimed at updating both the objective status of the ideal of science and its subjective characteristics as an internal semantic regulative activity; realization of different trends of research strategies (scientific and pedagogical, creative and research, research and experimental, scientific and

methodical), creation of conditions for mastering the culture of scientific-research activities, competencies of a teacher-experimenter, correlating research tasks with pedagogical, tracing their connection with the problem and purpose of scientific research; providing students with a whole range of various means and methods of doing scientific research, ability to combine them, expanding the context of scientific research, deepening its interdisciplinary, integrating character.

Methodological training is aimed at the formation of methodological consciousness, which unites such characteristics of scientific and pedagogical knowledge as conceptual role and normative chatacter; mastering methodological points, allowing to determine research general strategy and tactics; applying general scientific principles of pedagogical research (objectivity, essential analysis, unity of logical and historical, genetic principle, conceptual unity), formation of ability to understand the methodological function of knowledge, to distinguish between scientific, pedagogical and methodological context of research.

Ideological training is aimed at the formation of future teacher-researcher's scientific outlook, worldview and world perception as projections of his system of values – ideals, views, beliefs, opinions, evaluative judgments; it gives the conception of the system of current scientific knowledge, its cultural-educational, ideological, gnostic, prognostic, praxeological functions, ensures historical and philosophical, ontological, phenomenological, ethical and other directions of reflective work of future teacher's consciousness.

Conclusions and perspectives for further research. Thus, taking into account the current trends of higher pedagogical school (globalization, cognitive polymorphism, humanization, coherence, continuity, integration), a model of formation of future teacher-researchers' scientific research culture in the context of their professional training was developed. The model is based on the polyparadigmal approach and includes both variant and invariant educational strategies. The unity of cultural, scientific and educational environment is built as an integrative unity.

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