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Methodological approaches to the formation of psychological and pedagogical competence of teachers of technical disciplines

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Abstract

Postgraduate engineering and pedagogical education is defined as a specific organic part of the continuing education system, which is the process and result of the formation of a specialist's personality on the basis of a wide range of educational services, ensuring the formation of his psychological and pedagogical competence.

Methodological approaches to the formation of the psychological and pedagogical competence of teachers of technical disciplines in the system of postgraduate education are specified: system-functional, competency-based, personal-active, integrative, differentiated, anthropological, subjective, acmeological, axiological, technological.

The totality of methodological approaches allows us to study the essence, content, structure of psychological and pedagogical competence of a teacher of technical education, formulate goals and develop content and technological support for the formation of psychological and pedagogical competence of teachers of technical disciplines in the system of postgraduate engineering and pedagogical education.

Keywords:	*Schlüsselwörter:*
post-graduate education	…
system of engineering-pedagogical education	…
psychological and pedagogical competence of teacher of technical subjects	…

When studying the psychological and pedagogical competence of a technical university teacher, it is important to consider that this is a multidimensional phenomenon, which is determined by a number of factors: social factors (educational situation in the country and the world, needs and socio-economic opportunities of society in the preparation of higher technical education, directions of reforming higher technical education); professional factors (features of the professional environment, type of educational institution, corporate values, dominant style of relations in the technical university; normative-activity factors (qualification requirements for the teacher, content, types, functions of professional activity); personal factors (abilities, attitudes, values, orientations teacher's motives etc.)

The social order for training of specialists of engineering and technical profile, capable to modernize production, changes the orientation of the professional-pedagogical activity of the teacher of technical university. According to the nature of the complicated activity, new normative requirements for teacher

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qualification are set. The qualification characteristic, in essence, presents the normative model of competence, that is, reflects the composition of knowledge, skills, professional and personal characteristics of the teacher. However, this is a static model that does not change as quickly as the educational situation in the country and the world.

The content and functions of the teacher's professional and pedagogical activity are subject to constant changes, though not always noticeable for outsiders. However, it is the content and functions of the activity that determine the content and types of competency of the teacher, which, unlike the qualification characteristic, is more dynamic. The dynamics and the degree of development of the teacher's competence depend on personal factors: from initial inclinations, natural abilities, the nature of basic vocational training, work experience, but the most importantly - from work motivation and desire of the person to constant self-development, to self-actualization. In addition to these factors, one cannot ignore a number of the most important conditions that can contribute to or impede the formation of the teacher's competence: features of the professional environment (prestige of the profession in society, prospects for its development, corporate cohesion), achievement of colleagues, attitude of the administration of higher educational establishment to the issues of advanced training of the teaching staff etc.

Correct choice of methodological bases for research of psychological and pedagogical competence of a technical university teacher will allow to consider this phenomenon systematically, comprehensively, in different perspectives (from the point of view of its content, structure, dynamics of development), to identify and organize the influence of various factors on competence formation, to identify key psychologists - pedagogical competences of the teacher, which are in demand in the modern educational practice and require the first priority formation in the system of postgraduate engineering and pedagogical education.

According to the views of I. Blauberg and E. Yudin, there are four levels of methodological analysis:

- the level of philosophical methodology, the content of which is the general principles of cognition and the categorical structure of science as a whole;
- the level of general scientific principles and norms of research;
- level of specific scientific methodology;
- methodological and procedural level [1].

Each of these levels of methodological analysis has its own scientific approaches. Usually, the word "approach" means a set of ways, techniques in considering anything, in influencing someone, something [2]. As a general scientific category, "approach" is regarded as any initial principle, starting position, constituting the basis of research, as a direction of study of the object of research. As a general scientific category, the approach has two meanings.

In the first sense, it is determined as some initial principle, starting position, basic position or belief, which underlies the research activity; in another sense - as the direction of study of the object (object) of the study.

An essential feature of the methodological approach is that it contains not only a set of certain principles and theoretical propositions, but also their respective modes of activity. In other words, the structure of the approach as a holistic phenomenon can be divided into two levels:

- conceptual-theoretical, including basic, initial conceptual provisions, ideas and principles, which are the epistemological basis of activity carried out from the position and within the given approach, the core of its content;
- procedural-active, which ensures the development and application in the process of such activities appropriate, adequate conceptually oriented content of methods and forms of its implementation.

Since pedagogy is a science, focused on the practical transformation of social reality, many research approaches used to study pedagogical phenomena, especially in applied aspects, also serve as a methodological basis for pedagogical activity.

The philosophical and methodological basis of the study is the teaching of materialistic dialectics about the formation and development of being and cognition, about the most general regular relations between objects and phenomena of the surrounding reality. Relying on the laws of dialectics allows us to consider the psychological and pedagogical competence of the teacher of technical disciplines from the point of view of its development and the conditionality of the whole set of factors of natural and social nature. System-functional and anthropological approaches correspond to the general scientific level of methodological analysis. These approaches are methodological guidelines in the process of studying the essence, content, structure, dynamics and conditions of development of psychological and pedagogical competence of the teacher of technical disciplines.

The system-functional approach is widely used not only in the humanities, but also in all branches of scientific knowledge for deep analysis of complex organized objects and spheres of activity. Scientists such as B. Ananiev, V. Afanasiev, I. Blauberg, O. Leontiev, B. Lomov, V. Sadovsky, G. Shchedrovitsky, E. Yudin and others have made a great contribution to understanding the possibilities of the systematic approach. The specific of the system-functional approach is to know the integrity, orderliness and organization of the object, taking into account the functions performed. An object can be regarded as a system if it has the following characteristics: integrity, inclusion in higher-level systems, stable relationships and relationships between the structural components of the object itself, the presence of a system-forming factor, variability as a result of the interaction of this system with systems more high and low levels. A recognizable object always exists as a whole. However, penetration into the essence of an object requires clarifying its structure by isolating the substructures and elements, establishing the nature of the relations between them (defining the structure), as well as establishing the relationship of the object with other systems, the study of functional dependencies.

The use of system-functional approach in the process of research of psychological and pedagogical competence of a teacher of technical disciplines allows, first, to consider competence as a certain system, to determine its structure and to identify interdependent relationships between structural components, and second, to consider competence as an integral part of the teacher's personality system of technical disciplines as one of its basic integrative personal formations. It should be noticed, that the system of the teacher's personality is "inscribed" in the higher level systems. This allows us to consider the development and display of competence of the teacher of technical disciplines in the context of the functioning of larger systems: professional systems, education systems in the country and in the world.

When considering the competence as a system, it is important to highlight the systemic factor that determines the relative proximity, the integration of structural components into one. Such a systemic factor is the personality of the teacher, who acts as a subject of self-development of professional competence. The systematic approach makes it possible to consider both dependent and independent of the teacher conditions, methods, mechanisms of competence development, to identify a set of all internal and external factors influencing this process and to search for certain patterns.

We have also applied the methodology of system analysis to the study of such complex phenomena and realities as the system of postgraduate education of teaching staff and the system of education in the country and in the world. Modeling the process of forming the psychological and pedagogical competence of a technical university teacher in the postgraduate education system also involved the separation of structural components (purpose, content, methods, forms, means and results) and relationships between them that arise in the process of functioning of this system and cause its development and improvement.

Thus, the psychological and pedagogical competence of a technical university teacher is regarded by us as a complex, dynamic system whose development is closely connected with the development of other systems.

Thus, the system-functional approach allows determining the structure, stages, functions and principles of designing technology for the formation of psychological and pedagogical competence of teachers of technical disciplines, which they need for the successful realization of professional activity.

The competence approach is central to our study. It allows considering the psychological and pedagogical competence of the teacher of technical disciplines as a set of blocks of key competences.

The competency approach is used as a goal-setting approach for modeling the process of forming the teacher's psychological and pedagogical competence in the system of postgraduate engineering-pedagogical education (PEPE). This is dictated by the fact that the basis of the modern educational paradigm is the idea of the purpose and results of vocational education as the formation of competencies of specialists, which allows them to use knowledge, skills and personal qualities to solve various tasks in the process of professional activity. The concept of competency-oriented education is being actively developed in many countries of the world, most closely corresponds to the realities of post-industrial, information society, when knowledge has ceased to be a "self-sufficient capital", and more appreciated by the professional's ability to solve problems of varying complexity. The requirement to form the general cultural and professional competences of students, formulated in SSHTE, presupposes the presence of advanced psychological and pedagogical competences in the teachers themselves. For their formation in the system of PEPE requires generalization of experience gained in the framework of the "competent movement", comprehension of new ideas, which have yet to be implemented in mass pedagogical practice. Therefore, in our study, the competence approach is used to determine the purpose and performance characteristics of psychological and pedagogical training of teachers of technical universities in the system of postgraduate engineering and pedagogical education.

Under the competent approach to postgraduate engineering and pedagogical education of teachers of technical disciplines, we understand a unified system of defining the goals, content and technological support

of the process of preparation and advanced training based on the allocation of key competences of the teacher of technical disciplines, which guarantee the effectiveness of his professional activity.

Competent approach to psychological and pedagogical training of the teacher in the system of PEPE allows:

- to define more precisely the list of key psychological and pedagogical competences of the teacher necessary for successful performance of professional functions;
- to define more precisely the guidelines in the design of the content of psychological and pedagogical education at all levels of preparation of the teacher of technical disciplines: magistracy (specific categories); postgraduate studies (in-production, in-production); PC system (in the educational institution, at the factory);
- to develop technological support for the psychological and pedagogical preparation of the teacher, including a thoughtful selection of methods, forms, teaching aids, which are aimed at mastering the key competences of the teachers of technical disciplines;
- to develop a system of criteria for assessing the levels of teacher's psychological and pedagogical competence on the basis of determining the list of key competences.

Competent approach to the psychological and pedagogical training of a teacher in the system of postgraduate engineering-pedagogical education involves the widespread use of what has emerged in the world educational practice in recent years and generalized within the "competence movement":

- the modular principle of the construction of educational programs, which provides their flexibility and variability;
- flexible problem-group forms of organization of classes that implement individual routes of teachers;
- application in the educational process of postgraduate engineering and pedagogical education of active and interactive teaching methods (business and social-role games, educational discussions, case-method, training methods etc.), which allow purposefully to form key psychological and pedagogical competences;
- strengthening of the cross-curricular component, inclusion in the content of psychological and pedagogical training of teachers of tasks, the solution of which is possible on the basis of the synthesis of psychological and pedagogical and specially professional knowledge;
- new procedures for assessing the formation of teachers' psychological and pedagogical competence using tests (qualification, minimum competence), case-meters, generalized expert evaluation etc.

Competent approach, unlike others, comes primarily from the fact that in the course of education, it is necessary not only to "supply" a person with some knowledge and develop some of his abilities and qualities, but to purposefully prepare him to practically apply this knowledge and add these qualities to those or other life circumstances. The purpose of education is thus to promote not only the development of a person who is detached from the social situation, but his successful adaptation in a modern, extremely difficult, organized post-industrial society. At the same time before the organizers of education first of all there is a problem not of

selection of knowledge which should be mastered by the learner or identification of qualities of the personality demanding development, and selection of branches and spheres of results of education which are most significant for the person in its "extra-curricular" social and professional activity, key competencies.

Another important aspect that distinguishes this approach is that key competences not only express the personal, individual needs of the modern person, but also those requirements that society, that is, public educational needs, or the social ordering of society to education. In other approaches, these needs are either taken into account declaratively or not taken into account at all.

Key competences determine the selection of knowledge (the content of education), which distinguishes this approach from the traditional, which is based on the idea that the content of education should be "pedagogically adapted social experience of mankind, isomorphic, that is identical in structure to human culture in all its culture structural completeness. " While not denying the importance for the person of intellectual development, which gives priority to the activity approach, the competent approach at the same time emphasizes the formation in the process of education its ability and readiness for practical social action.

Summarizing the above, the conceptual idea of a competency-based approach in education can be formulated as follows: competence-oriented education is aimed at the complex development of knowledge and methods of practical activity that ensure the successful functioning of a person in key areas of life in the interests of both the individual and society, the state.

Therefore, the competence approach provides for a unified system for defining the goals, content and technological support of the postgraduate education process based on the allocation of key competences of the teacher of technical disciplines, which guarantee the effectiveness of his professional activity.

The personality-activity approach emphasizes not so much on mastering, for students, professional knowledge, but on mastering at the same time basic bases of activity, first of all - educational, through which all other kinds of activity are mastered. In this aspect, emphasizes G. Sarantsev [429], the personality-activity approach as a methodological basis of teaching accentuates the activity nature of knowledge. In this case, educational activity is considered, first of all, as a means of intellectual development of the learner, which is supposed to provide him with success in the development - both in the learning process and in the life - of all other necessary activities. In other words, if a person has learned to think, "understand", then it will help him to adapt to any life situations.

Therefore, the most important methodological guideline in the study of the psychological and pedagogical competence of the teacher of technical disciplines in the system of postgraduate education is applied personality-activity approach. The foundations of this approach were laid in the works of: L. Vygotsky, P. Halperin, V. Davidov, O. Leontiev, S. Rubinstein, A. Petrovsky and others. In domestic psychology, the category of "activity" has traditionally been used as an explanatory principle for the formation of mental processes and properties of the human (mental is considered as the interiorization of external, related to the implementation of activity).

Personality and activity approach in the system of postgraduate education puts in the first place the personality of the learner, and accordingly, the whole educational process is built taking into account the personal characteristics and inclinations of the learner, aimed at comprehensive development of personal

qualities, creating conditions for self-awareness of personality, free expression of personality in the learning process and the like. From these points of view, it is believed that a comprehensive and complete personal development of the person and his training in accordance with personal requests will ensure success in the next personal, social and professional life.

However, how he realizes himself as a person outside of education depends entirely on the teacher of technical disciplines. For education, these aspects of life are not benchmarks; they are secondary to the results of education and personal development.

Therefore, a personality-activity approach aimed at the formation of teachers of technical disciplines who have a high level of psychological and pedagogical competence, general and professional culture and intellectual development, ready for active professional activity.

An integrative approach, considers pedagogical phenomena as holistic entities in which the unity of procedural and resultant parties, processes of universalization and harmonization are observed; they have a mutual transformation of the parts that are cooperating not for the benefit of each other but for the benefit of each other; this approach characterizes the presence of common points of contact between the cooperating components, which are complemented by the coexistence of opposite, sometimes mutually exclusive, sides of being. In the course of its implementation, such tasks as the maximum disclosure of the intellectual-spiritual, cognitive-epistemological and physical potential of a person can be solved; creation of conditions for self-disclosure and self-realization of the human inner potentials; assisting a person in defining the meaning of life in the conditions of radical socio-economic transformations; the formation of basic life and civic values from those being taught; cultural education, assimilation of the cultural and labor traditions of its people; development of abilities for cooperation, communication; development of internal freedom, etc. The solution to these problems "ultimately has an integrative-integral person.

Thus, the integrative approach allows harmonizing the content of basic and postgraduate education of a teacher of technical disciplines with the purpose of formation of his readiness for professional activity.

The anthropological approach developed within the framework of the psychological and pedagogical sciences requires reliance on a holistic view of man as a biosocial being, on integrated knowledge about him, obtained within the social sciences and humanities, on data from interdisciplinary studies [3]. It allows studying the person in all complexity, taking into account the multidimensionality, heterogeneity of its components.

The anthropological approach to the study of man as a biosocial being requires consideration of both biologically conditioned and socially conditioned properties. To date, there is no universally recognized approach to the definition of human (personality) structure that could be used as a reliable methodological basis for theoretical and empirical research. Scientists, when conducting research, often rely on the structure of personality, proposed by K. Platonov, who considered the personality as a certain asocial hierarchical structure and distinguished in it: biologically conditioned, socially conditioned properties, individual features of the manifestation of mental processes and individually acquired.

Psychological and pedagogical competence of the teacher of technical disciplines is considered by us as integrative professionally significant personal quality, as individually acquired life and professional experience.

It should be borne in mind that the formation of competence is influenced by biologically predetermined and socially acquired properties of the teacher. Therefore, the study of competence requires, on the one hand, to find out the natural individual-psychological characteristics of the teacher, determining his ability to pedagogical activity, on the other hand, the study of socially conditioned qualities, first of all, the orientation of the individual, work motivation, professional consciousness.

Studying the peculiarities of teachers of technical disciplines, comparing among themselves representatives of different departments, different age and length of service, most of them pay attention to their social qualities. However, the study of some individual psychological properties, such as temperamental, helped determine the degree of professional suitability, identify typical features of representatives of various departments of technical universities and, most importantly, understand the differences between them. All this, in the end, allowed to identify "weaknesses" in the process of formation of psychological and pedagogical competence and to adjust educational programs of postgraduate engineering and pedagogical education so as to pay attention to the development of insufficiently expressed natural abilities and socio-professional qualities of teachers.

Therefore, an anthropological approach, which allows studying the personality as a biosocial being, requires consideration of both biologically conditioned and socially conditioned properties.

However, for a deep study of the psychological and pedagogical competence of teachers of technical disciplines anthropological approach is not enough, because competence is caused not only by personality development, but its basic components (knowledge, skills, skills and inextricably linked competences) are formed directly in the activity (educational). In view of this, a subjective approach is used as the most important methodological guideline in the study of the teacher's psychological and pedagogical competence, which allows him to be considered as a subject of activity, who disposes of his resources for solving professional tasks. The term "subject" is widely used in the philosophical, psychological, pedagogical and other social sciences and humanities.

Subjective approach, developed in psychology, considers the person as a subject of mental development, that is, in terms of his ability to self-development, self-determination, self-improvement, self actualization (K. Abulkhanova, A. Adler, A. Brushlinsky, S. Buehler , A. Derkach, A. Maslow, V. Petrovsky, K. Rogers, C. Rubinstein, L. Rybalko, V. Smichenko, V. Tatenko and others).

It will harmonize the whole system of its individual, psycho-physiological, mental and, finally, personal capabilities, features with the conditions and requirements of activity not in a partial but holistic way" [2].

The subjective approach, developed in pedagogy, places in the center of the educational process the student (V. Kremen, O. Sedasheva), who is the subject of educational activity, which requires changing the position of the teacher, shifting the emphasis from teaching to learning, from upbringing to create favorable conditions for self-education and self-development of the individual.

Subjective approach is central to the study. It allows you to study the teacher of technical disciplines at the same time as the subject of improvement of professional activity, and as the subject of professional and personal self-improvement, which collectively ensures the progressive development of his competence. Therefore, we consider psychological and pedagogical competence, first, as a condition for improving the

effectiveness of professional and pedagogical activity, and secondly, as a condition for creative self-realization of the teacher himself. The subjective approach is also used in the development of the concept of formation of psychological and pedagogical competence of teachers of technical disciplines in the system of postgraduate engineering and pedagogical education. The central figure of the educational process in the system of postgraduate engineering and pedagogical education is considered to be a master's student (specific categories), a graduate student, a listener of the advanced training system, production personnel who have the following characteristics of the subject: independence, activity, initiative, selectivity, freedom of choice, responsibility.

Thus, the subjective approach allows to study the teacher at the same time both as the subject of improvement of professional activity, and as the subject of professional-personal self-improvement, which in the aggregate ensures the progressive development of his psychological and pedagogical competence.

Achieving a high level of competence in a competitive environment in the professional environment has become not only a socio-professional necessity, but also one of the most important conditions for creative self-realization in the profession, the achievement of self-esteem, good emotional well-being and job satisfaction. Since the formation of psychological and pedagogical competence occurs in parallel with the personal development of the teacher, with the achievement of life maturity, one of the main tasks of the study is to determine the conditions that provide the opportunity to achieve a high level of psychological and pedagogical competence, as well as identify possible problems and difficulties along the way.

The acmeological approach is productive also in the development of programs of formation of psychological and pedagogical competence of teachers of technical disciplines in the system of postgraduate engineering and pedagogical education. He assumes the rejection of manipulative techniques, for example, training narrowly focused, aimed only at the formation of the required set of competencies in the pedagogical work, "pulling" the teacher to master specific technologies. From the point of view of achievement of professional maturity by the teacher and maximum creative realization in professional and pedagogical activity effective trainings of acmeological orientation developed in practical psychology [5].

Therefore, the acmeological approach emphasizes the needs and abilities of the teacher to self-improvement, and relies on the idea of the unity of his professional and personal development. At the same time, spiritual and moral development of the teacher's personality is of great importance for the successful implementation of professional and pedagogical activity.

The acmeological approach, which emphasized the teacher's needs and abilities for self-improvement, relies on the idea of the unity of his professional and personal development. At the same time, the spiritual and moral development of the teacher's personality is of great importance for the successful implementation of professional and pedagogical activity. The more harmoniously all aspects of personality development are combined, the more free, creative, and psychologically mature she becomes. Therefore, an axiological approach is also a methodological guideline for the study of the teacher's psychological and pedagogical competence. The core of the psychological and pedagogical competence of the teacher's personality is the set of learned humanistic values. These are the most common and generalized meanings of his life that are

understood and accepted by man [64]. Values cannot be externally imposed, only conscious and possessed by personality, they become internal regulators of activity and behavior. If the norm is an external regulator of human activity and behavior, then values, according to M. Kagan's definition, are an internal, emotionally mastered subject of his activity, and therefore he is perceived by him as his own spiritual intention, not super-personal, alienated from him behaviour controller [6]. Philosophical theory of values is developed by axiology, which is an independent section of philosophy (Greek origin).

The formation and development of pedagogical axiology was influenced by the works of V. Andreev, V. Genitsynsky, I. Isaev, N. Krylova, N. Nikandrov, Z. Ravkin, N. Rozov, V. Slastionin, G. Chizhakova, E. Shiyanova and others. Pedagogical axiology examines educational values from the standpoint of self-worth of a person and implements value approaches to education on the basis of recognition of the value of education itself [7].

The axiological approach to researching a teacher's competence views it as a value, as an end in itself for professional and personal development. Therefore, the main task of psychological and pedagogical training of teachers in the system of postgraduate engineering and pedagogical education is considered to create favorable conditions for deep awareness of pedagogical values, on the basis of which they will carry out their activities and build relationships with students and colleagues.

Therefore, the axiological approach to the study of the psychological and pedagogical competence of the teacher of technical disciplines considers it as a value, as an end in itself for professional and personal development.

The technological approach to the competence formation of the teacher of technical disciplines considers the pedagogical process, which thanks to a clearly defined sequence of steps aimed at achieving the planned goal, allows achieving results with predefined quantitative and qualitative indicators and meets the criteria of manufacturability.

Today the tendency of interpreting the category "pedagogical technology" on the principles of a systematic approach is becoming more and more noticeable among the educational community both in Ukraine and in CIS and CIS countries. In this context, the phenomenon under discussion is interpreted as "a systematic method of creating, applying and defining the whole process of teaching and learning, taking into account technical and human resources and their interaction, which is considered as the task of optimizing forms of education" (UNESCO definition) [8].

The application of technological approach to scientific research in the pedagogical field contributes to their efficiency, accuracy, consistency of results and, as noted by G. Selevko, "absence of many if" due to scientific substantiation of goals, their diagnostic formulation, as well as the design of pedagogical conceptualization , optimality and reliability.

Thus, a set of methodological approaches (system-functional, competence, anthropological, personality-activity, integrative, subject, acmeological, axiological, technological) allows investigating the essence, content, structure of the psychological and pedagogical competence of the teacher of the technical institution. key competences of the teacher of technical disciplines, formulate goals, develop the content and technological support of the process of formation of psychological and pedagogical competence of teachers of technical disciplines in the system of post-graduate engineering and teacher education.

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