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MEANS OF THE FUTURE ENGINEERS-TEACHERS' PROFESSIONAL COMPETENCE FORMATION: PEDAGOGICAL AND PSYCHOLOGICAL CONDITIONS

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The article considers the psychological and pedagogical conditions of the future engineers-teachers' professional competence formation, pedagogical creativity as a component of pedagogical skills, as well as features of working with talented and gifted students as an important factor in effective professional development.

The psychological and pedagogical principles of linguistic activity of able and gifted students were studied. Scientific approaches to understanding of "ability" and "dedication" and their influence on language activity of non-philological specialties students are defined. The psychological and pedagogical principles of organization of interaction of the teacher and students were formulated.

Pedagogical psychology investigates the processes of development of students' thinking, attention and memory, ability to perceive language facts and phenomena in their dialectical unity. For gifted students there are high enough development of thinking, long-term memorization of educational material, high efficiency, developed self-control skills in educational activity, ability to give doubt and scientific thinking certain stereotypes. They are distinguished by an increased propensity to mental activity, originality, the formation of different kinds of memory, respect, assembly, speed of reaction, richness of imagination.

For effective work with gifted students teachers have to know their psychological and pedagogical peculiarities and specifics of their learning, to be recognized with the concept of diligence, to understand the content of understanding "ability", "dedication", "talent", types of diligence. It is important in the teaching of the future profession, that students are aware of their own activities, both theoretical and practical. The development of professional competence is the development of creative individuality, the formation of readiness to accept the new, the development of receptivity to pedagogical innovations

Keywords: *professional-creative skills, motivation, pedagogical creativity, practical training, creative abilities, diligence, future engineers-teachers*

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1. Introduction

Changing the paradigm of vocational education in Ukraine, the integration of our country into the world educational space determine the quality of teachers' training, staff who will solve the problem of educating the younger generation with innovative thinking and multicultural consciousness. To implement this important task requires competent engineering and pedagogical staff with a creative style of thinking and activity, capable of carrying out innovative processes. Professional self-determination and professional development of future specialists is an urgent problem of both modern psychological and pedagogical science and practice, as well as one of the priority areas of modernization of higher pedagogical education. Studying in a higher education institution is the first stage of a person's professional development. The professional qualities that a student acquires during his/her studies will be manifested in his/her professional activity in the future. The problem of professional training of personality in psy-

chology is considered in terms of propensity and abilities to a particular field of professional activity, its specific set of psychological characteristics and traits (so-called psychological profile), which determine the compatibility of personality with the professional environment. This requires new approaches to the process of training future specialists in engineering and pedagogical profile.

Fundamental subject knowledge is a compulsory but not sufficient component of education. Future engineers-teachers must not only master the "sum" of knowledge, skills and abilities, which is largely aimed at the domestic education system. It is much more important to instill in them the ability to independently obtain, analyze, structure and effectively use information for maximum self-realization and useful participation in society.

That is, they must acquire professional competence and become true professionals of a high level that meets the requirements of the time.

2. Literature review

The study of numerous studies and publications shows interest in the problem of forming professional competence of engineers-teachers. The methodological and theoretical basis of our study is the position of the theory of knowledge about the active role of the individual in the acquisition of knowledge; theory of gradual formation of mental actions; the principle of general psychology of the unity of consciousness and activity; learning motivation strategy; achievements in the field of psychology of creativity and modern pedagogical technologies.

H. Ball initiated a new scientific field, concerning the definition of psychological and pedagogical principles of humanization of general and vocational education [1]. A thorough explanation of the modern interpretation of the concept of “professional competence” is given in the study “Competence-oriented higher education: the formation of a scientific thesaurus” by S. Sysoieva [2]. L. Karpova believes that teacher’s professional competence is a complex individual psychological formation on the basis of theoretical knowledge, practical skills, significant personal qualities and experience that determine the readiness of teachers to perform pedagogical activities and ensure a high level of self-organization. According to the researcher, the teacher’s competence has no narrow professional boundaries, as it requires constant understanding of the diversity of social, psychological, pedagogical and other issues, related to education [3]. The structure of teacher’s professional competence is revealed by V. Slastonin and Ye. Shyianov through pedagogical skills, namely the concept of “competence” determines the unity of theoretical and practical readiness of teachers to carry out pedagogical activities [4].

The works of many scientists, in particular, M. Basov [5], Ye. Klymov [6], V. Zinchenko [7], N. Kuzmina [8] and others, are devoted to the issues, related to the effectiveness of professional activity. Scientists S. Batyshev [9], M. Makhmutov [10], Yu. Platonov [11] studied various aspects of professional orientation. However, there is a certain lack of theoretical research on the conceptual problems of professional development, professional competence and professional activity in general.

The consideration of numerous studies and publications shows interest in the problem of forming professional competence of engineers-teachers.

3. The aim and objectives of the research

The aim of the research is to determine the psychological and pedagogical conditions for the formation of professional competence of engineers-teachers.

To accomplish the aim, the following tasks have been set:

1. Describe scientific approaches to understanding the concepts of “professional competence”, “pedagogical skills”, “pedagogical creativity”, “abilities and talents”.

2. Reveal the importance of pedagogical creativity as an important factor in the professional development of students, future engineers-teachers.

3. Consider features of work with capable and gifted students as the important factor of effective education of professional skills.

4. Materials and methods

A set of theoretical methods was used during the study: comparative and retrospective analysis of philosophical, psychological, pedagogical and methodological literature in order to study the conceptual provisions and categories of research; structural and system analysis to determine the tasks, functions and structure of readiness of future engineers-teachers for professional activities;

5. Research results and discussion

The engineers-teachers’ work can be considered as professionally competent when pedagogical activity is carried out at a high level and high results are achieved in the training and education of future specialists. According to the definition of the dictionary of foreign words, competent (from Latin – appropriate, capable) – one who knows a lot, informed, authoritative in any field. A professional is a specialist who has the norms of the profession, independently sets professional goals, develops abilities on his/her own initiative, has a high level of motivation and self-regulation, is able to manage their condition [12]. Professional competence is attributed not so much to the substantive content, but to the established personality traits: responsibility, perseverance, desire to acquire new knowledge, creativity, as well as high morality, without which no professional is conceivable.

Professional competence of an engineer-teacher is considered as a complex pedagogical education, which is the basis of successful professional activity, includes a system of activity-role (knowledge, skills and abilities) and personal (professionally important qualities) characteristics. The level of competence of the future engineer-teacher must meet the requirements of innovative pedagogy.

O. Pometun considers engineering and pedagogical competence of a specialist as his/her orientation in different professional situations, based on consciousness, abilities, needs, sensory and social experience in the field of production and educational activities. The following vectors of education are a priority in the system of vocational education: self-improvement, self-determination, socialization and development of individuality.

Scientists understand teacher’s professional competence as personal qualities that contribute to the independent and effective implementation of the goals of the pedagogical process. To do this, you need to have to study pedagogical theory and be able to apply it in practice. Teacher’s professional competence is the unity of his/her theoretical and practical readiness to carry out pedagogical activities. Psychological and pedagogical training includes knowledge of methodological principles and categories of pedagogy; essence, goals and technologies of teaching and education; laws of age anatomical-physiological and mental development of children, adolescents, youth. Such training is the basis of teacher’s humanistic-oriented thinking.

Thus, the professionalism of a teacher is the ability to think and act professionally, possession of the necessary means to ensure not only the pedagogical impact on the pupil, but also interaction with him/her, cooperation and co-creation. Solving pedagogical problems in practice provides skills and abilities based on theoretical, practical and methodological knowledge.

Bearing in mind the peculiarities of the future engineers-teachers' profession, it is advisable to consider ways to form their professional competence in connection with the psychology of learning. However, special (professional) and psychological and pedagogical knowledge is a necessary but insufficient condition for professional competence. It is impossible to teach the competencies of a future engineer-teacher. You can help him/her become a professional, find and test different patterns of behavior in the subject area, choose the ones that best suit his/her style and aspirations. For this purpose, it is necessary to use active teaching methods: project, creative-problem, method of role models investigation, presentation of ideas, etc. It is also possible to form the professional competence of the future engineer-teacher with the help of organic involvement of students in research activities. At the same time, students not only assimilate scientific and pedagogical information, but also creatively apply the acquired knowledge in practice.

Professionalism of a person in any sphere of activity depends largely on the level of professionalism. Pedagogical skill is a characteristic of high level of pedagogical activity. The criteria of pedagogical activity are the following: humanity, scientific knowledge, pedagogical expediency, optimal character, efficiency, democracy, creativity (originality) [13].

Pedagogical skill characterizes the expert of high culture, the master of his/her business, who deeply knows the subject, understands the issues of general and child psychology, has perfect knowledge of the method of education and training.

Pedagogical activity is a creative process. An important component is pedagogical creativity that is an original and highly effective approach of the teacher to educational tasks, enrichment of the theory and practice of education and learning.

Pedagogical creativity includes both creative pedagogical activity of the teacher and creative educational activity of the pupil in their interaction and interrelation. It is personality-oriented developmental interaction of teacher and student, due to certain psychological and pedagogical conditions, which provides further creative development of the individual.

Pedagogical creativity is a personal quality of a teacher, an inexhaustible source of activity, initiative, innovation, inspiration for improving the pedagogical process. I. Rachenko identifies the following levels of pedagogical creativity: the level of professional development, the level of spontaneous self-improvement, the level of planned rationalization, the level of optimization of processes and results.

Professor S. Sysoieva pays great attention to the formation of the teacher's pedagogical creativity. The researcher defines the following principles of pedagogical creativity: diagnostics, optimality, creativity, interdependence, etc. [14].

Scientists define the essence of pedagogical creativity as an integral process of professional realization and self-realization of the teacher in educational space, in which the development of creative potential of the teacher takes place due to development of creative potential of the student. Thus, without creativity active interaction of the educator and the student is impossible.

Outstanding scientist-didactic M. Danylov highlighted the following sources of pedagogical creativity: social order, practical activity of educational character, research of the pedagogical process, its content, forms and methods. High quality of knowledge, pupils' skills, comprehensive and harmonious development of the person is conditioned by social order. Success of practical activity of educational character depends on pedagogical secrets, riddles, discoveries; it is a sphere of primary pedagogical discoveries and inventions, real innovation of teachers. The third source of creativity (research of the pedagogical process, its content, forms and methods) is theoretical and experimental activity, which leads to new discoveries, research best practices, and scientific conclusions. The condition of pedagogical creativity is interest, acceptance, internal need for recommendations of pedagogical science, experience of rationalizers and innovations, it coincides with at least some recommendations, with own experience of work and especially appearance of innovative thinking.

Psychology of creativity is a relatively independent branch of scientific research, the works of I. Ziaziun [15], V. Moliako [16], S. Sysoieva [2, 14], N. Talyzina [17] and others were engaged in the analysis of different variants of creative structures.

Scientists associate the emergence of creative thinking with the presence of a problem situation, established stereotypes (formed by the successful application of certain methods of solving problems), motivation to make unusual decisions and the corresponding emotional state of human, thesaurus, a stock of various knowledge, including those who go beyond professional activities). Creative activity is certainly associated with a special way of self-organization of the individual, a certain deep internal order, the integration of activities, which is aimed at creating a fundamentally new. Taking into account the peculiarities of creative thinking is an important component in the teaching of engineering and pedagogical creativity.

In order to form a high level of professional competence of the future engineer-teacher, the main life and professional situations should be reflected directly in the learning process. This approach to the learning process requires consideration of the abilities, cognitive abilities and level of development of students' thinking. Abilities are individual psychological characteristics of a person that contribute to the successful performance of a particular activity and are not limited to the knowledge, skills and abilities he/she has. From birth, a person has only the makings of abilities, from which under the influence of the external environment, learning and education develop general, mental, intellectual, special abilities [18].

The problem of abilities in psychology is complex and multifaceted. Most psychologists single out only one aspect to define this concept. Under this approach in domestic and foreign psychology, there is no generally accepted definition of the concept of ability. Thus, V. Krutenkyi, A. Petrovskiy, K. Platonov based the understanding of abilities as individual psychological characteristics of the individual on the principle of mental development; O. Kovalov, V. Miasyshchev consider abilities as a complex, synthesis of properties; H. Kostyuk,

S. Rubinshtein review them as psychological properties. We accept the definition that abilities are “individual psychological features of a person that are manifested in the activity and are a condition for its successful implementation” [19].

The success of acquiring knowledge of the subject, the formation of relevant theoretical and practical skills depends on abilities. However, scientists do not equate abilities with existing knowledge, skills and masteries. Those who, on equal terms, master them faster than others do and cope with the requirements more easily, and show creativity and initiative are considered capable of learning activities. In psychology, a high level of development and manifestation of abilities is denoted by the term “diligence”.

The structure of abilities depends on the development of personality. There are two levels of development of abilities: reproductive and creative. A student, who is at the first level of development of abilities, shows high skills to acquire knowledge, master the activity and carry it out according to the proposed model. At the second level, the student finds new (non-standard) ways to solve educational problems. Creativity determines the creative type of personality, which is characterized by individual differences such as flexibility, critical thinking, the ability to easily find non-traditional ways of solving problems, and so on.

For the development of creative potential of students in the teaching of engineering and pedagogical creativity, it is necessary to take into account the following components: inclinations, tendencies, manifested in hypersensitivity, a certain selectivity; interests, their orientation; curiosity, desire to create something new; quickness in assimilating new information; tendency to constant comparisons; manifestation of general intelligence, such as grasping, understanding, adequacy of action; emotional coloring of individual processes, the influence of feelings on subjective evaluation; persistence, purposefulness, determination; intuition as the tendency to ultra-quick assessments, decisions; relatively faster mastery of skills, abilities.

Pedagogical abilities are a special type of abilities; they are mental features necessary for successful mastering of pedagogical activity, the main of which is tolerance to the personality that is being formed. Pedagogical skills also include the ability to actively influence others; emotional stability; optimism; creativity; influence; intuition; ability to perceive and understand others; ability to inspire trust and respect.

The engineer-teacher must be a creative person, a high professional, must be able to interest students in the learning process, create an atmosphere of enthusiasm, while having the skills to lay the foundations of mastery and bring their students to a high professional level. The combination of such traits in one person is a rare phenomenon, so, in our opinion, future teachers of vocational schools should be chosen from talented and gifted students. After all, a person who works with children must not only know their psychological characteristics, but also care about their interests and problems; he/she must be able to recognize the abilities of wards, activate and develop them. It is well known, that only a person can nurture a person and only talent can contribute to the growth of new talent.

It should also be noted, that the engineer-teacher, like any teacher, must be primarily an educator, because the main purpose of education is to form a unique creative personality, patriot of the homeland, a person with a developed creative consciousness, high general culture, responsible and conscious choice under different life circumstances.

The teacher is in charge of the learning process: he/she chooses the appropriate forms of its organization, applies certain methods of work, develops the interest and motives of educational activities, provides the educational impact of learning. However, the main thing is that in joint activities the teacher instills in students the desire to acquire knowledge independently, taking into account a significant factor - the predominant positive motive in the educational activities of talented and gifted students. Among the methods of teaching such students should be dominated by independent work, exploratory and research approaches to the acquired knowledge, skills and abilities. Control over their learning should stimulate in-depth study, systematization, classification of educational material, transfer of knowledge to new situations, the development of creative elements in learning. Independent tasks should be creative, promote the development of thinking. It is important to keep in mind that it is at a young age that the emotional and volitional sphere is formed and developed, which in the future becomes the basis for the formation of the individual's ability to work as a necessary component of professional competence.

These aspects should be complemented by a system of extracurricular activities: classes in scientific societies, participation in scientific events, competitions of various kinds of creativity, meetings with scientists, teachers. Individual forms of extracurricular work include the performance of various tasks, participation in full-time and part-time competitions, competitions for the best research work. Teachers have to help in choosing the profile of extracurricular activities, taking into account the interests and inclinations of students.

Working with gifted students requires a proper content of classes, focus on the novelty of information and various types of search, analytical, developmental, creative activities.

Every talented and gifted individual is a unique person, so it is impossible to make uniform recommendations for teaching gifted students. It is necessary to look for an individual approach to everyone, because he/she is a unique person with a pronounced individuality, independence. Independence is an integral part of a creatively gifted person. On the one hand, it is easier to work with talented and gifted students because they have high mental abilities, and on the other hand, it is more difficult because they need special attention, working with them requires deep professional, thorough pedagogical and psychological knowledge of the teacher.

Some scientists consider the intellectual and creative abilities of human in the structure of intelligence as separate species. The question of the relationship between intellect and creativity has received an experimental definition in the concept of intellectual activity. The quality of personality unites all types of creative activity; it is defined as intellectual activity - the integrative psychological quality of any personality.

Based on the research of P. Blonskyi, L. Vyhotskohyi, V. Davydov, L. Momot, I. Lerner, we can conclude that intellectual and creative activity are components of a single system, among them there is a positive correlation, and creative abilities - a higher level of development of intellectual abilities. The essence and specificity of creativity are generally reflected in two features: the transformation of images, things, processes; originality, novelty of the activity process.

Also, one of the main requirements for the organization of students' educational activities of the future profession is the intensification of the educational process.

Intensification involves achieving the desired results due to qualitative factors, ie due to the strain of the mental capabilities of the individual. After all, in the framework of an extensive approach in the learning process, the brain's capabilities are used by only 15-20 percent. Therefore, the first prerequisite for the intensification of the educational process is a more efficient use of brain capacity [20].

Intensification of education involves an increase the amount of work, spent by students over a period of time. The more actively they worked in the classroom, the higher the productivity of their work. Of great importance for the intensification is the teacher's ability to involve students in the implementation of cognitive, practical and creative tasks, aimed at developing professional skills and abilities.

It is also important to take into account the problem of formation of creative, research thinking and psychological regularities of its development when studying the future profession. Since the research activity of students in the course of study involves mastering of the appropriate kinds of activity, the research abilities of the person should be considered from the perspective of psychological theory of activity, psychology of scientific activity, psychology of creative activity etc.

Research abilities occupy a special place among special abilities as a necessary condition of student's creative activity. However, neither directly research abilities nor psychological preconditions of their formation have yet become the subject of special researches. Some aspects of this problem were considered in works by L. Antsyferova [21], V. Andreiev [22], H. Kolinets [23] and others [24–26]. The essence and structure of research capabilities in psychology remain undisclosed.

N. Levitov, K. Platonov, Ye. Rehirer believe that the structure of research abilities together with intuition includes a number of special qualities: scientific independence, the ability to analyze and synthesize, the ability to semantic memory. Research abilities are a multi-level dynamic psychological formation that ensures success in mastering any theory.

Structural psychological components of these abilities are creative orientation of the student's personality; non-standard way of thinking; high level of intelligence; motivation-free support of research activity [19].

Research learning is a special approach to learning, built on the natural desire to study the material independently. The main purpose of such training is to form readiness and abilities of students independently, to learn new ways of educational activity creatively. From the point of view of pedagogical psychology and educational

practice, educational research is closely related to forecasting, and therefore can serve as a means of developing intelligence and creativity. Able and gifted students are able to solve new tasks, achieve high results in learning through the development of motivational readiness for this activity, the presence of proper endurance, diligence, perseverance, attentiveness and more.

The prospect of further researches we see in the development and implementation of a system of tasks, aimed at forming creative, research thinking of future engineers-teachers, the development of creative potential of students in the teaching of engineering and pedagogical creativity

5. Conclusions

1. The study characterizes scientific approaches to understanding the concepts of "professional competence", "pedagogical skills", "abilities and diligence". Such work of an engineer-teacher is defined as professionally competent, when pedagogical activity is carried out at a high level and high results are achieved in training and education of future specialists. Professional competence is attributed not so much to the substantive content, but to the established personality traits: responsibility, perseverance, desire to acquire new knowledge, creativity, as well as high morality, without which no professional is conceivable.

Pedagogical skill is revealed as a characteristic of a high level of pedagogical activity, the criteria of which are the following features: humanity, scientificity, pedagogical expediency, optimal character, efficiency, democracy, creativity. We have adopted the definition of abilities and diligence as individual psychological characteristics of human, which are manifested in the activity and are a condition for its successful implementation.

2. Pedagogical creativity is considered as a component of pedagogical skills as the ability to think and act professionally, possession of the necessary means to ensure not only the pedagogical influence on the pupil, but also interaction with him/her, cooperation and co-creation. We see pedagogical creativity in the original and highly effective approach of the teacher to educational tasks, enrichment of the theory and practice of education and training. We have determined that pedagogical creativity includes both creative pedagogical activity of the teacher and creative educational activity of the student in their interaction and interrelation, it is personality-oriented developmental interaction of teacher and student due to certain psychological and pedagogical conditions; essence, goals and technologies of education and upbringing, the laws of age, anatomical, physiological and mental development of children, adolescents, youth), which provides further creative development of the individual.

Thus, psychological and pedagogical training is the basis of humanistic-oriented thinking of a teacher, a necessary condition for the formation of professional competence of future engineers-teachers.

3. It is determined, that working with talented and gifted students requires proper content of classes, focus on novelty of information and various types of search, analytical, developmental, creative activities.

It was found, that the ways of stimulating active thinking in the learning process are of paramount importance, the success of which is directly related to cognitive activity and independence of students, the presence of cognitive motives, the use of appropriate teaching aids, aimed at educational research tasks that require explanation and proof of natural connections and relationships.

It is concluded, that important in teaching the future profession is students' awareness of their own activities, both theoretical and practical, that the development of pro

fessional competence is the development of creative individuality, formation of the readiness to accept new, and development of receptivity to pedagogical innovations.

Thus, the formation of creative individuality and professional competence of the future engineer-teacher is an important condition for his/her personal development and professional growth.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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