On the improvement of the methodology of engineer staff's graphic training on the basis of optimization of psychological and pedagogical approaches

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Abstract. Questions of taking into consideration psychological and pedagogical principles are essential for improving the methodology of engineers' graphic training at the present stage of reforming higher educational system. Development of abilities to correctly perceive, create, as well as store and transmit any technical graphical information are top priorities of graphic training of professional engineering education. What is necessary for developing professional graphic competences is a complex combination of traditional and active learning methods.

***Keywords*:** *methodology, psychological and pedagogical approaches, engineer staff, professional competences*

At the present stage of reforming Ukrainian higher educational system implementation of European and world achievements into domestic practice of training implies a detailed study of subjects on the basis of a broad introduction of new informational technologies into the educational process and improving the quality of education, as well as forming a competency-based approach to teaching. An effective system of education is a major factor in ensuring sustainable growth and development of the economics and society which involves the issues of training professionally competent engineer staff in any area.

The aim of our study is to analyze and summarize the results of experiments on the effect of quality of graphic training and psychological motivation of technical colleges students which contributes to the effectiveness of their professional competences development. Long-term practice of teaching and exchange of experience in the methodology of graphic disciplines at leading universities of

Odessa has shown that the formation of professional competence of prospective engineers is impossible without a thorough study of the foundations of graphic literacy, whose essence lies in the study of the discipline **“Engineering Graphics”**, since it is that point from which improving of skills and elements of graphic culture starts. Formation of professional graphic competences of prospective engineers, in conditions of meeting contemporary demands to the level of future specialists training, will be much more effective if special attention in the process of a specialist training is given to differentiated teaching based on psychological and pedagogical approaches to its content.

The studies in the field of professional education, based on the formation of professional competency of prospective specialists have been recently developing. Our review of the scientific literature allows us to conclude that at present there is no unanimity on the issue of defining the essence of the concept of “competency”, neither of its structure nor content filling. For example, professionalism is the word, which is characteristic for a particular profession, professional training is a set of special knowledge and skills, allowing to carry out the work in a certain field. At this time, this concept is often used intuitively to express a high level of skills and professionalism. Current approaches to treatment of professional competence are different. Contemporary definitions of professional competency as “deepened knowledge”, “the state of adequate conducting the tasks”, “abilities to actual realization the activity” and others do not fully concretize the content of this notion [1; 5].

Graphic education is a process which leads to student’s gaining knowledge and skills of work with graphical information. The development of the ability to correctly perceive, create, store and transmit different graphical information about objects, processes and phenomena is the task of graphic training of professional education. Study of fundamental mathematical sciences in technical universities, as well as geometry and engineering graphics is of great importance for prospective engineer development. The decrease in hours of this discipline leads to a decrease in the considered curriculum issues. However, the qualitative study of graphic disciplines is

possible on the basis of a comprehensive approach to the educational process. Of great importance is the presence of pre-university training of graphic training, which is, unfortunately, almost absent (a lot of schools do not have the subject “Drawing”). In this regard, the first-year students have difficulty related to the development of spatial imagination and later with reading blueprints and other technical documentation. It is modern methodological and psychological techniques of teachers in the organization and activation of the learning process and methods of teaching graphic disciplines based on a differentiated approach to each student individually which play an important role in improving the quality of teaching and increase students’ interest.

The present article summarizes the results of experimental studies of graphic quality of education of the 1st and 2nd year students of social engineering and marine specialties of 10 academic groups, with the total number of 225 students in 2014-2015 and 2015-2016 academic year [2; 3; 4]. For six groups of the first year students during the first semester the tasks in practical lessons were carried out on a single plan in the form of express control of students’ knowledge. In computer classes test sessions and tutorials were held.

As an independent extracurricular work under the guidance of the teacher, every graphic work was worked out and the timing of its implementation was controlled. For the four groups of the second year students were selectively conducted test surveys on the most important sections of the discipline with a differentiated assessment and certification according to the criteria of residual knowledge. It is noteworthy that each control engaged approximately 95% of the total number of students.

It should be emphasized that the qualitative organization of students’ self-guided work (SSW), and in the future – the pass-through graphic training presupposes the necessary classroom fund – drawing rooms, computer labs with Internet access. The educational and methodical, informational support includes the required amount of literature, teaching and visual aids, texts of lectures and examples of solving common tasks on paper and electronic media; educational and methodical

documentation on the organization of different types of self-guided work; the required number of variants of tasks and guidelines for their implementation. An important methodological aspect of teaching graphics is the development of student's conscious active approach to learning based on a clear understanding of the problem and thorough study of the depicted object. Particular attention of the student is attracted to the design features of the depicted objects, their volume structure. Great importance is given to the development of persistent graphic skills, the ability to graphically intelligently and expressively perform drawings and other technical documentation.

This method of teaching is very laborious. It requires the teacher not only in-depth knowledge on the profile subject. It is recommended for creative teaching for interested, enthusiastic and positive-minded teachers to focus on the active, self-motivated students, so that when considering the overall geometry and graphic information the ability to correctly perceive, process and reproduce the graphic information could be formed.

Final analysis of the results of the research showed that in order to improve the quality of education it is important to improve the methodology of teaching graphic disciplines that is ensured by teachers' professionalism, availability of sufficient training and methodological support. In addition, self-guided work as an important factor of mastering educational material, forms the student's autonomy, the level of his individual skills and knowledge which in case of the first-year students firstly requires a teacher's guidance, and then – without his direct involvement. SSW, in our opinion, during the first year should be systematically monitored by the teacher. And finally, the desire to achieve better results in education is shown by psychologically motivated students who feel the presence of the competitiveness in the future profession, who are interested in a deeper exploration of theoretical material and practical skills.

At the present time, obviously, that the main purpose of professional education is not only the formation of students' system of knowledge and practical skills necessary for their future profession, but also education of highly moral, socially

mature, creatively active person which is an integral part of the professional competency of engineers. Competency should be measured by the result of person's professional activity.

Annualy for more than 30 years the department of descriptive geometry and engineering graphics of Odesa State Academy of Civil Engineering and Architecture has been holding the traditional open Olympiad on descriptive geometry among the first-year students of the leading universities of Odessa, which is attended by up to 110 students per year, that confirms that they have the motivation and some positive results in the system of graphic training.

Thus, increased motivation is an important cognitive activity control lever. In psychology, motives stand for the reasons of actions caused by certain needs. A strong motive significantly affects the purpose of the activity, conditions the phenomenon of "motive shift on target". Motives of learning should make the new knowledge necessary for a learner, form his need to obtain it.

One of the most important areas of learning should be the creation of conditions for professional and personal development of prospective engineers, the formation of their creative personality and professional competence. Professional competency is a set of integrated fundamental knowledge, person's generic skills and abilities, his significant professional and personal qualities, a high level of culture and mastery, creative approach to the organization, readiness to continuous self-development.

In conclusion, we will note that the final results allow us to conclude that an effective formation of students' professional competence depends on the precise professional and pedagogical orientation of the educational process, as well as the complex combination of traditional and active learning methods. At present stage of professional competition in the labor market, the formation of stable quality graphic competence plays an important role, so the graphic training of future specialists is an essential component of the technical education of engineer staff.

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Бредньова В.П. Удосконалення методології графічної підготовки інженерних кадрів на основі оптимізації психолого-педагогічних підходів і професійних компетенцій

Анотація. Питання врахування психолого-педагогічних принципів мають важливе значення для удосконалення методології графічної підготовки

інженерних кадрів на сучасному етапі реформування вищої освіти. Розвиток здібностей правильно сприймати, створювати, а також зберігати та передавати будь-яку технічну графічну інформацію є основними пріоритетами графічної підготовки професійної інженерної освіти. Для формування професійних графічних компетенцій необхідно комплексне поєднування традиційних та активних методів навчання.

Ключові слова: методологія, психолого-педагогічні підходи, інженерні кадри, професійні компетенції