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The Main Directions for the Formation of Creative Competence of Future Engineers in Modern Technical Universities

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Abstract: the article is devoted to the urgent problem of the formation of creative competence among students of technical universities. Various approaches to organizing the teaching of general education are considered and tested.

Keywords: education, competence, professional competence, development, profession, activity, quality, engineer, student, experience, practice.

The ongoing changes in modern society determine the need to reform the system of specialist training in order to achieve its compliance with the educational and professional needs of the individual. The problem of achieving high quality education is concentrated around three main issues:

- changing the structure and content of state educational standards;
- introduction of modern pedagogical technologies into the educational standard;
- creating conditions in the educational environment for the implementation of new content and new learning technologies.

One of the most global pedagogical ideas of the twentieth century can be considered a project approach to education and training, which has now received a new round in the system of education development. The ideas of project-based learning emerged at the beginning of the twentieth century and were associated with radical approaches to changing the educational paradigm. In fact , D.Dew and his followers (W.H. Kilpatrick, E. Parkhurst, S.T.Shatsky and others) proposed an alternative to the existing classroom-after-school system (within the framework of school education) and the disciplinary-subject system (within the framework of vocational education). Let's focus on the main features of project training:

- отход от репродуктивного и знаниевого подхода в обучении в сторону продуктивности знаний и получения их посредством активизации мышления и практической деятельности;
- transition from the subject construction of the educational process to the construction of the process within the logic of activity:
- implementation of the principle of linking learning with the realities of future professional activity;
- focus on individual creative development of students;
- increasing the motivation of students for cognitive activity, for learning through personal interest in the problems being solved, independent work on them;

V.H. Kilpatrick described the project method as follows: "this is a method of planning expedient (purposeful) activities in connection with the resolution of some educational task in real life conditions ..." [1].

Ch.Chuck-Merry notes that the project that arose in the child's head and he himself carried out on the basis of his personal experience is a much better basis for education, since independence and active meaningfulness are developed in the process of project implementation. At the same time, a type of creative thinking is developed, which then passes into further occupation, into life as a method of research and organizing knowledge.

The proponents of the project method proceeded from the priority value of accumulating information through thinking. Due to the fact that information was acquired in connection with the needs of a certain position, people with little book learning can often really use every drop of their mind, while people with great erudition are often confused by the amount of their learning, because memory acted more than thinking in acquiring it.

In Russia, S.T. Shatsky, P.P.Blonsky, L.E. Levina, E. Kagarov and others attached great importance to the project method of teaching. They identified the following elements of this training:

- the real experience of students, which should be identified by the teacher;
- organized experience;
- contact with accumulated human experience;
- exercises that give the child the necessary skills and abilities [2].

In the 20s of the twentieth century, the subject system of education was excluded from the Soviet school, which was replaced by a comprehensive (actually project-based) one. In the early 30s, project training was condemned. By the middle of the twentieth century, the American school for the most part also abandoned the mass use of project-based learning, which in the current situation did not show its high efficiency.

Despite this, vocational education turned out to be more receptive to the ideas of project training (probably this is due to the fact that project activity is inherent in any qualified specialist), which was fixed in the integral forms of the organization of the educational process in professional institutions, such as laboratory work, course and diploma design.

Since education should be of a proactive nature, and, first of all, this applies to vocational education, one of the main tasks of training is to prepare competitive and meet the demands of the labor market specialists.

Modern trends and approaches have led to a rethinking of the place and role of project-based learning in the education system. The UNESCO report notes that improving the quality of education in modern conditions depends on the level of understanding achieved during training of the ever-increasing interconnection and interdependence of science, technology and society [3].

The important place that design occupies in the modern culture of society (project culture) in a new type of organizational culture (design and technological culture), in modern requirements for a specialist (project creative thinking), etc., suggests that it is the ideas of project training that will allow us to move to new mechanisms and the training of high-quality, competitive personnel adapted to the labor market. It is necessary that every university graduate who dreams of an interesting and prestigious job should realize that creative, active personalities are in demand in modern society, who are able to repeatedly change the profile of their activities, adapt quickly enough to their future profession and apply their knowledge in various fields of professional activity. In order for the future engineer-technologist to meet all the requirements of society, modern universities need to shift the emphasis in the learning process from the accumulation of ready-made knowledge, skills and abilities to "the formation of a person who owns the technology of creative work, able to create new things and bear personal responsibility for it" (G. V. Lavrentiev). The ability to think outside the template, to abandon stereotypes in time, to act boldly and in an original way, to solve problems

outside the box, as well as the ability to realize their individuality and uniqueness are the components that will help a young specialist find his place in society, become in demand and "convertible"[4].

The formation of a student's creative competence finds its expression in non-standard methods of educational activity, in original methods of design of their works, in independent behavior in educational situations, in a tendency to search, research, initiative, to express their own proposals, creativity of thinking. The formation of a student's creative competence as a future specialist occurs first through his educational, and then educational and professional activities. The formation of his creative attitude to his future profession can be traced in the following stages:

1. in the process of mastering the subjects of the block of general humanitarian and natural science disciplines. The formation of the creative potential of university students will be most effective if the formation process begins as early as possible, simultaneously with studying at the university. That is why the formation of the creative potential of students must begin directly at the initial stage of training, namely in 1-2 courses. At the initial stage of studying at the university, a large number of hours are devoted to humanities, in the process of studying which it is possible to create the most favorable conditions for the formation of a creative approach to educational activities, the ability to think freely, to defend one's own point of view in a reasoned manner, to creatively approach problem situations. In this regard, the problem of creativity of the individual, his creative abilities and creative potential is of particular importance;

2. in the process of professional theoretical and practical training. The training of a creatively active specialist is not an end in itself: the creative engineering activity of a specialist, on the one hand, is a component of general education, and on the other hand, it is a component of the professional readiness of a graduate of a higher educational institution. At the present stage of the development of pedagogical science, the management of general technological and industrial practice of students can be carried out in three directions:

- practice using traditional methods of organizing students' work (practice at the factory, preparation of a practice report, preparation of accounting documentation and protection);
- industrial practice using innovative methods of organizing students' education;
- industrial practice with a combination of traditional and innovative methods of organizing students' work.

In the first case, when organizing an internship, the student is guaranteed to receive a standard set of professional qualities and skills. At the same time, the level of professional creativity often depends on the personality of the supervisor and the conditions of origin of the practice by the student. If the teacher formally refers to the management of the intern, offers him a reproductive style of activity, the professional creativity of the student-intern remains at the same level as before the practice, although the level of professional skills is undoubtedly increasing [5].

With an innovative form of practice organization, there is another dangerous extreme – excessive fascination with various non-traditional teaching methods, which can lead to excessive fragmentation of the student-intern's work, distraction from the main goals and objectives of the practice. Originality and other pseudo–creative forms of activity may, at the initial stage, lead to a surge of creative thought, but later confusion, dissatisfaction with their work will inevitably appear and, as a consequence, lack of positive motivation for professional activity in general [6]. It can be noted that innovative teaching methods contribute to the development of creativity. However, unilateral or illiterate use of such forms of work can lead to undesirable results. The solution to this problem in this case can be a combined form of organization of industrial practice, when traditional forms of organization of practice are successfully intertwined with innovative ones.

Another direction of the implementation of the methodology for the formation of a student's creative activity at the university is rationalization and inventive work within the framework of scientific research conducted by the university, Participation in rationalization and inventive work allows the student to make sure that the choice of training in the chosen specialty is correct; to move from reproductive thinking to conscious accumulation of knowledge in the learning process, creative

understanding of knowledge in the learning process; to master the skills, skills for solving non-standard production tasks, often solved by specialists.

Integration of competence-based and acmeological approaches is no less important for the pedagogical system of professional training of students focused on self-development of competitiveness. Each of them has its own conceptual base and technological component, practical application in professional training. Orientation to the formation of basic professional, creative competencies develops students' desire for the highest professional achievements, which stimulates the processes of development and self-development of professional, creative competence [7]. In this context, such competence is a synthesis of knowledge, skills and corresponding abilities to effectively solve professionally creative tasks.

This approach has been effectively used in recent years at KSTU and is confirmed by the results of pedagogical measurements demonstrating noticeable improvements in the professional and personally significant qualities of students of future engineers, the topics of diploma and course projects are expanding.

The problem of formation of creative competence among students is multifaceted, requiring innovative approaches, modern scientific views and research, this problem is especially relevant today, when the higher technical school is on the verge of introducing state educational standards of higher professional education of the third generation.

Thus, using the example of KSTU, it can be shown that one of the urgent problems of higher professional education is the organization of such a pedagogical process that would become the basis not only for the expansion of professional knowledge, but also contributed to the self-development of a creative, competitive personality of a young specialist.

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