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Based on a Competent Approach Mechanisms of Professional Creativity Development of the Future Engineer for Engineering Activity

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Abstract: *The article describes the mechanisms of development of students' professional competence in engineering activities in higher education institutions on the example of the development and application of information maps in the form of a systematic list of textual and graphic* information *on specific topics of the science "Engineering and computer graphics".*

Keywords: *higher, education, international, student, training, professional, competence, engineering, computer graphics, textual, graphic, imagination, activity, intellectual, creative, cognitive, ability, efficiency.*

According to international best practices, Office of International Science and Engineering [OISE], American Society for Education and Development [ASTD], National Society of Professional Engineers (NSPE), Institute of Engineering and Technology (ABET), Engineering Council of Great Britain (ECUK), Australian Institution of Engineers (IEAust) and the Japan Accreditation Council for Engineering Education (JABEE) are innovative intellectual centers that provide professional development opportunities, organize and provide education for engineers, develop the professional competence of future engineers by applying innovative approaches to the development of the engineering field, and applying modern methods to the educational process. has set the main goal of instilling global skills in engineers.

That's why defining promising directions for improving students' engineering professional competence, optimizing various forms of educational process organization, developing criteria for evaluating the professional competence of future specialists, modern trends of economic development place more and more demands on the professional qualities of a specialist.

The transformation of the technologies of educational activities with the methods of organization of educational activities, which depends on the changes in the forms and technologies of the teaching process in our country, the criteria for evaluating the quality of training of engineers, provides wide opportunities for the activities of pedagogues-researchers, and forms the gradual implementation of the approach to professional activity in our country accepted in world practice. these needs are reinforced by a number of circumstances.

In particular, the priority tasks defined in the Action Strategy for the further development of the Republic of Uzbekistan, such as "promoting research and innovation activities, creating effective mechanisms for the implementation of scientific and innovation achievements" and ensuring the development of innovations in the education system from the main areas of activity of the Ministry of Innovative Development in the higher education system competitive engineer demands the need to prepare personnel for innovative activities.

A. Abdurakhmonov, D.F.Kuchkarova, Sh.K.Murodov, J.Ya.Yodgorov, U.A. Nasritdinova, T.Rikhsiboev, D.S. Saidakhmedova, many scientists on studying various problems of teaching and

improving graphic education in different periods. S.S. Saydaliev, A.K. Hamrakulov, D.Sh. The Dilshodbekovs conducted scientific research on the problems of graphic preparation of specialists and the development of graphic design competence.

The problems of learning the following engineering graphics subjects: drawing geometry, engineering graphics, design basics, engineering and computer graphics, and other geometric-graphic subjects have not been sufficiently analyzed in connection with teaching general subjects, taking into account the characteristics of future professional activities.

It should be noted that the quantitative and qualitative criteria for assessing the level of professional competence at the stage of mastering graphic subjects, which include the organizational, pedagogical, methodological and technological foundations of the educational process, have not yet been developed.

The above thoughts prompted us to theoretically justify and experimentally check the effectiveness of the system of general engineering-graphic training of students of higher educational institutions, which is especially relevant in the conditions of high demand for the quality of specialist training. Summarizing the practical experience of graphic training of students and analysis of scientific and methodical works allowed to identify the following shortcomings and contradictions in the process of graphic training of highly qualified future specialists.

First:

- Сўнгги ўн йил ичида олий ўқув юртлари профессор-ўқитувчиларининг The results of many studies on the preparation of engineering graphics have been published. The problems of developing spatial imagination are considered in them;
- there is no comprehensive methodological theory of formation of professional skills in the field of engineering work and production technology education;
- there are no studies that allow to increase motivation in studying engineering and computer graphics in order to ensure a high level of use of graphic knowledge in course work and graduation work;
- graphic preparation problems are not analyzed in the process of adapting young specialists to practical, design and production activities.

The quality of graphic training is the most important feature of professional formation of future engineers during their studies at a higher educational institution. This requires the creation of pedagogical conditions that can ensure the effectiveness of students' graphic activities, taking into account modern requirements.

In the design and implementation of the teaching process of engineering and computer graphics, it is very important to have a consistent connection of knowledge, which implies that what has been achieved at the previous stage is taken into account at a higher level of education. all topics are highly interrelated, and deficiencies in preparation for the earlier topics of the course begin to have immediate negative consequences in the later topics taught.

The development of new scientifically based forms of organization of the engineering and computer graphics teaching process in the higher education system is based on the analysis of the purpose, structure and dependencies of the educational system. Recently, the following trends are emerging: the increase in the volume of educational information; significant limitation of the time allocated for its study and, as a result, the complexity of the educational content.

The integrity of the level of education and the implementation of new methodological methods in the structure of graphics training allows the integration of the subject "Engineering and computer graphics" into the general system of training specialists. The formation of students' intellectual,

creative and cognitive abilities takes a leading place in teaching based on the standards of continuity of educational materials.

The sequence (consistency) of the character of the educational and cognitive activity of students in the forms and methods of teaching, the systematicity, harmony of using the experience of leading specialists - pedagogues at the present time, and the issues of professional training of future specialists. Khodjaboev, R. Hasanov, N.Saidakhmedov, Q.O'.Tolipov, S.S.Bulatov form the basis of scientific research of scientists from the CIS countries, such as S.I. Arkhangelsky, V.P. Bespalko, V.A. Slastenin.

After an in-depth study of the qualification requirements, curricula, sample and working programs, we have come to the following conclusion, analyzing the relationships between the specialty disciplines of 5310600 - Transport engineering, 5340600-Road engineering, 5320300-Technological machines and equipment and other areas of education: technical higher education Intensive target training of specialists in our countries cannot be based only on the traditional curricula and work plans that we use. The professional direction of education seems to be stuck in the interdisciplinary space. Each department in a higher technical educational institution trains students in their own subject, and none of them teaches the comprehensive application of the acquired knowledge in solving the professional problems facing the graduates of higher educational institutions in life.

In Engineering and Computer Graphics, almost all topics are traditionally covered at the same level, and students struggle to know exactly what they need to master in order to successfully pursue their studies and careers. It seems that we are training "knowledgeable" professionals, but not "capable" professionals. Students view final examinations as a benefit to themselves. In the minds of most of them, the concept of passing exams and tests prevails, not the acquisition of knowledge, skills, and qualifications.

In order to eliminate the indicated contradictions, we tried to analyze the experience of designing, carrying out and researching the educational process for students of "Engineering and computer graphics" as an example. This process should reveal new aspects of the importance and place of engineering and computer graphics in the development of the specialist's skills, and allow to study the connection of this subject and the special subjects of the program, including the graphic part.

As one of the general engineering subjects, "Engineering and computer graphics" is the main subject in the training of engineers. Each of its sections contains materials related to the content of other subjects and involved in their study. Therefore, in the process of studying engineering and computer graphics, it is very important to ensure a coherent connection between this subject and the subjects of the higher education institution and the future professional activities of students. Such coordination increases the importance of "Engineering and computer graphics", arouses interest in studying and studying the chosen profession.

In our research, we are based on the experience gained by teaching different subjects in secondary schools, vocational schools, technical schools with different directions and higher educational institutions. At the same time, we are I. Rahmonov, Sh.A. Abdurahmonov, T.D. Azimov, N.J. Yodgorov, K.A. Zoyirov, R.Q. Ismatullaev, P.O. Odilov, M.H. Pirimzharov, I.T. Rahmonov, E.I. Ro'ziev, and foreign scientists: James D. Bethune, G.S Phull, H.S. We turned to the experience reflected in the works of Sandhu, R.B. Gupta, N.D. Bhatt, which are presented to a certain extent in their scientific and methodological work.

In the research of T.V. Chemodanov on this issue, the concept of "professional graphic preparation" is very interesting and sufficiently expressed - it is an opportunity to solve educational and professional problems using the methods of geometric modeling of flat and three-dimensional images and to perform them adequately for future education. gives "This graphic

cycle is a combination of geometrical, engineering-graphical, information-technological, methodological knowledge, skills and skills in the field of general engineering sciences. However, in these works, taking into account the connection of the curriculum with mixed disciplines, the scientific and theoretical foundations of teaching are not fully covered, the student's professional interest the method of selection of material that actively increases is not presented. The existing forms of organization of the educational process in engineering and computer graphics do not fully correspond to the potential opportunities related to solving problems in teaching this subject with an emphasis on the studied specialty.

One of the ways to overcome the indicated contradictions is to search for new content and forms of educational activities that fully realize the potential of teachers and students.

The considered problem is relevant both in terms of preparing students for educational activities in general engineering and graduate departments, and in terms of increasing the efficiency of the educational process and increasing the mental activity of students.

Secondly:

The leading activity of the student is his educational and cognitive activity, and for the teacher - educational work. All this requires the teacher to think deeply and reflect on the didactic support of preparation for lectures and practical sessions.

Today, it is necessary to further democratize the society, raise the activity of higher technical educational institutions to a new level of quality, in the conditions of wide opportunities for the activities of private higher educational institutions. First of all, this should be manifested in the rejection of the principle of uniformity in education, in the establishment of different types of educational institutions, in the creation of new curricula and textbooks whose contents correspond to the educational fields of higher education institutions, and in the revision of teaching methods and tools.

Modern trends in the development of higher educational institutions present a number of new theoretical and practical problems to professors and teachers working in technical higher educational institutions. One of them is a reflection of the integration and differentiation of knowledge in the content, nature and activity of education.

This problem cannot be solved without taking into account the result of interdependence of studied subjects, Uzbek scientists R.H.Djuraev, N.J.Isaqulova, M.Kh.Lutfillaev, I.V. Makukhina, A. Musurmonov, M. Q. Mukhliboev, B. N. Oripov, A. A. Salomov, N. I. Taylakov, N. S. Fayzullaeva, N. I. Hurboev; and others are studied developed in the works of pedagogues.

The sooner higher education abandons ineffective forms of teaching in the educational process, the faster and better it will achieve. Today, there is a need for research based on the existing reality. One of the tools that have a positive effect on the training of specialists is to increase their interest in the profession.

The researches of some foreign specialists deserve attention. The works of these authors have great scientific and practical value, but most of them are related to the training of future teachers, and they are not sufficiently connected with the educational process and methods of teaching in higher technical schools. The transformation of engineering and computer graphics education should be related to the formation of professional qualities of the future specialist based on the awakening of interest in the chosen specialty. In our opinion, such an approach to the design, organization and implementation of training helps to form the following basic, professional qualities of future specialists: culture (communication, information), interest in the profession, competence, professional pride, pride in the profession, intellectual professional self-development, etc.

Thirdly:

in connection with the sharp increase in the amount of information that a person needs to perceive and process both in the course of professional activity and in everyday life, informatization in the field of education is becoming a real force. The result of many production and non-production processes depends on its quantity and quality. Modern concepts of the educational system of Uzbekistan are being directed more and more to the requirements of new ideas, didactic principles mainly related to the use of ICT - information communication technologies. The computer plays the role of a tool in professional activities not only in engineering and science, but also in the humanities, business, economics and education. In general, computer technology has become an integral part of modern human daily life.

Informatization of education is one of the priority directions of the process of informatization of modern society. The tools and possibilities of new information technologies allow the intensification and acceleration of the educational process, increasing its quality and efficiency.

The use of information technologies in education creates great opportunities for both teachers and students. with the help of a computer, students work with activated educational materials, their activity, competence increases and their creative abilities develop.

Using a computer, students, in addition to the traditional perception of existing information, have the opportunity to observe in dynamics many processes previously studied in a textbook or a teacher's lecture. The computer allows to model various possible solutions according to certain criteria with a high level of visualization, selects the most optimal one according to certain characteristics from the number, that is, it significantly expands the possibilities of visualization methods in the educational process.

The improvement of the quality of specialist training depends on a number of factors:

- ✓ the spread of information technologies, computer training leads to becoming one of the main criteria determining the professional training and professional culture of a young specialist;
- ✓ the use of computer technologies in the study of engineering and computer graphics by students at the initial stage is a connecting link connecting the departments of technical schools to a single system of interdisciplinarity.

The analysis of the work carried out in the teaching of "Engineering and computer graphics" shows that first-year students' mastery of graphic subjects, especially in the first semester, is insufficient. The main reason is the low level of graphic preparation at the drawing school or its complete absence (not studied at school).

According to the above-mentioned opinions of pedagogues and psychologists, it can be assumed that there are different concepts about the structure of interests, and this assumption makes it possible to formulate a general theory of interest in pedagogical activity and develop a methodology for its implementation in the example of teaching graphic sciences, taking into account the activation of professional interests (1 - picture).

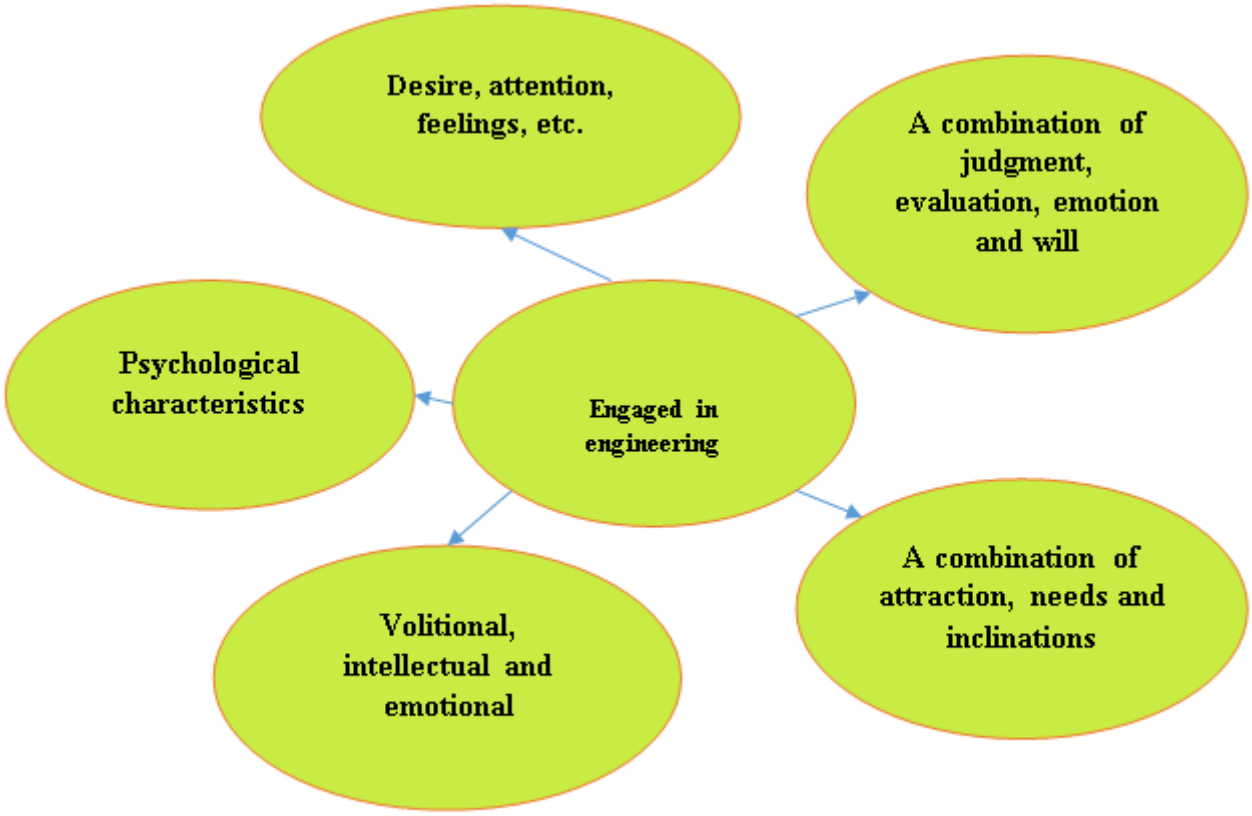

Figure 1. Students are engaged in engineering activities scheme of mechanisms of professional competence development

In contrast to cognitive interest, professional interest is characterized by great accuracy, goal orientation, completeness of content, and stability, because this type of interest is related to the chosen profession and is constantly developing and strengthening as a result of daily educational activities of the person to acquire the profession.

It should be noted that the concept and place of professional interest is clearly defined in pedagogical and psychological literature. But methods of activating professional interests in the process of learning engineering and computer graphics in engineering universities, their effects have not been sufficiently studied, and this partially determined the task and purpose of our research.

As future specialists, students should creatively study curriculum materials, acquire necessary professional skills, and know how to apply scientific and technical achievements in practice. The goal of any educational process in engineering universities (among other conditions) is to activate the professional interest of students with the help of a specially designed program, which, in our opinion, is the basis of the pedagogical process as the main process in the development and improvement of a specialist.

Taking into account all of the above, the following conclusions can be drawn:

The main criteria for conducting a lecture are as follows: its necessity in discussing important and conflicting opinions; ease of studying the most difficult topics for independent analysis.

Lecture classes in engineering and computer graphics have their own characteristics. At the same time, there is a need to change and improve the presentation of traditionally structured theoretical material.

A methodically organized lecture ensures perception, understanding, ability to understand and remember the educational material.

It is necessary to create a methodology for teaching lectures at a level that activates and increases the intellectual potential of students, that is, directs it to the main directions of individual educational research activities.

Taking into account the presentation of a large amount of theoretical material to students in a time-limited environment (reducing the time of lectures), it is relevant to develop and use information cards in the form of a systematic list of textual and graphic information on specific topics of "Engineering and computer graphics" subject classifiers in addition to the lecturer's explanations.

The practical lesson is one of the important elements of the formation of the educational process in the higher educational institution.

The rational organization of practical training based on the maximum activation of the process of acquiring knowledge, skills, and abilities is very important for improving the quality of professional training of specialists.

Engineering and computer graphics are not new subjects, and the method of conducting practical training in the classroom is considered to be well developed, but it does not fully meet the requirements necessary for the organization of studies.

A detailed analysis of many methods of conducting practical training in higher education institutions training engineers made it possible to highlight some of their shortcomings.

Dependence of the teacher's individual characteristics on the quality of clarification of the theoretical materials necessary for checking the volume of homework and correcting errors.

There is almost no control over the level of knowledge acquisition of each student individually.

There is no opportunity to organize the educational process at the level of effective and creative activity of students in practical classes.

Not using the time allocated for training wisely.

The problem of checking homework in practical training in engineering and computer graphics is not sufficiently developed.

The content of the material studied in the practical lesson does not meet the requirements of the future educational activities of students in the study of special subjects in higher courses.

In order to improve the quality of knowledge acquisition, it is necessary to revise the educational process in the practical lesson.

To strengthen independent work, it is necessary to revise the method of conducting any class activities.

Organization of management of the independent work management system at a qualitatively new level.

Under the guidance of the teacher, students' work in the classroom should be focused on independent activities outside the classroom.

It will be effective to engage students in independent work if the new materials contain theoretical rules that are as complex as possible.

We believe that in the process of organizing independent work, it is necessary to establish the chain of personal thinking and reasoning of students.

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