

The main directions of the development of the intellectual potential of engineering university students

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Abstract. The article discusses the conceptual directions of the development of the intellectual potential of students of an engineering university, associated with the use of innovative forms of education, which are formed in the context of new trends in technological engineering processes.

Keywords: intellectual potential of students, engineering university, innovative technologies, project activities

Among the most pressing and controversial problems of the development of the intellectual potential of students of an engineering university is the lack of innovative advanced professional education, as well as the inability of students to independent educational and cognitive activities. As a result, ensuring the quality of training of specialists should be associated with the organization of practice-oriented training based on the widespread use of the latest pedagogical and information and communication technologies.

The directions of the development of the intellectual potential of students are determined by the adopted state program of the RF "Development of education for the period 2018–2025", where one of the main goals is the intensification of the education system of the Russian Federation in the International Program for the Assessment of Educational Achievements of Students. The development of effective methods for assessing the quality of education of graduates of engineering universities depends on the level of knowledge, abilities, skills and professional competencies, taking into account the peculiarities of engineering specializations.

Students of an engineering university, according to A.A. Prokhorov, should be focused on global internationalization and digitalization in the system of engineering and technical education [5].

Conceptual directions for the development of the intellectual potential of students of an engineering university are associated with the use of innovative forms of education, which are formed in the context of new trends in technological engineering processes. Student innovation

projects today must correspond to the modern trend, solving various kinds of problems. Programmable images and a biometric terminal, start-up projects bring innovative ideas to life in universities using the development of various stages of their approbation.

The concept of "potential" today cannot be considered without reserves, a set of opportunities, the choice of goals for achieving results, development and mastering of knowledge. The intellectual potential of a person is the ability to master new levels of knowledge of the world from the point of view of intellectual thought processes, as well as personality activities aimed at mastering various meanings and values in any business. Many scientists note that the intellectual potential is a body of knowledge that determines the skills and abilities of students from the standpoint of their desire for self-improvement in the context of the application of knowledge that determines the human thought activity from the standpoint of assessment and forecasting, as well as the advancement of hypotheses.

O.F. Piralova revealed that the development of professional competencies of various types and levels in future engineers is based on professional thinking - analytical, practical, creative, spatial and the ability to integrate knowledge at various functional levels. The author came to the conclusion that the modern system of general and vocational education should be based on innovative systems, models and technologies for training an engineer [4].

Today, without special knowledge of programming, IT technologies, it is impossible to develop the intellectual potential of students of an engineering university, which affects the implementation of their ideas in life. All technical projects of the youth of our university are forms of solving innovative problems, especially when it comes to creativity, aimed not only at popularizing science at various events, but also increasing the intellectual potential that affects the competence of digital production and project activities. This is aimed at the participation of students in hackathons, championships, engineering slams, master classes, university seminars, meetings with business partners of the university.

The methodological basis for building the innovative potential of the educational communities of an engineering university is the expansion of the interaction of the university with its stake holders, the development of network interactions with other universities in the macroregion. The training of elite engineering personnel is carried out in the context of the introduction of new technologies, in the framework of cooperation of the university with science and production.

Various training technologies for young professionals allow them to make decisions and make choices in engineering professions that match their training needs. This is indicated by a number of sources [1,2,3,6], which note that early specialization is one of the key features of education in Russia, where the choice of professional qualifications is ensured by obtaining

better results in the context of students' orientation towards a narrow list of subjects. As a result, students can get the opportunity to lay a foundation in their choice of profession, future professional growth and career, which is especially important in engineering and physical sciences.

The emphasis on developing new courses is provided in engineering education at the expense of the changing needs of employers. To solve this problem, a stake is placed on the creation of new training programs that provide for the acquisition of special knowledge, as well as the improvement of teaching and learning in the field of additional vocational education.

An important place is given to teaching based on innovative pedagogical practices, where students receive practice-oriented education and the implementation of the "Engineers of the Future" programs. To better understand the expectations of employers, gain experience in an industrial environment, acquire special personal qualities and professional skills, the university implements engineering educational research clusters and laboratories. As a consequence, many students have a high interest in science and demonstrate high scientific and technical knowledge at an early stage of learning.

An important feature of engineering education is the involvement of representatives of the largest manufacturing companies, as well as sectors that are the basis of the modern industrial system, in teaching students. For this, the participants study the basics of optimization of production, management and organizational processes within companies, technology of fundamental updates, development and promotion of innovative products.

The intellectual potential of students of an engineering university is associated with the ability to evaluate technological processes, which forms the main directions of project thinking. Working with projects in an engineering university plays a key role, as it allows you to align synthesized and abstract concepts towards an effective mechanism and its practical implementation. Project thinking of an individual in conditions of development of intellectual potential contains the ability to correctly set goals and objectives, choose tools to achieve them, predict and predict the results of their work.

Modern design at the university is based on the receipt and use of new industrial materials, automated, intelligent, autonomous systems. The training of students is associated with many complex knowledge, which requires the renewal of all competencies: researchers, developers, engineers, technologists. Our students work on projects on various topics: development of a technology for the production of nitrogen fertilizers, development of cleaning cosmetics with bactericidal and antiviral action, development of magnetic flocculants for bio-applications, development of a method for increasing the energy efficiency of chemical technological systems, development of a technology for the production of an alternative reagent

for water purification and other directions.

All of these topics relate to the use of new developments and are based on global standards and practices for effective design and manufacturing.

At the same time, in the conditions of the development of the intellectual potential of students, it is important to combine the knowledge, abilities, skills acquired in the study of humanitarian and technical disciplines. An interdisciplinary approach to teaching, in this case, provides a synthesis of information-subject knowledge and an improvement in the assimilation of educational material by students.

So, we refer to the main directions of the development of the intellectual potential of students of an engineering university:

- implementation of additional educational modules based on project-based learning forms that form skills in the field of programming and algorithmic thinking. Training modules provide opportunities for building individual educational trajectories for each student, implementing a fundamentally new educational model based on the rapidly growing capabilities of digital technologies. Global competitiveness poses new challenges for reorienting engineering students to develop projects in both fundamental and applied research and professional practical projects in the fields of engineering, design, communications, software development, management, marketing, nanotechnology, medicine, etc.;

- the use of innovative educational technologies in teaching, allowing for the variability of the analytical and research structures of the personality and aimed at the formation of research and project competencies of students;

- approbation of real scientific results of students at various sites, competitions, seminars, allowing to identify the most talented students, focused on quality results;

- the application of an interdisciplinary approach to teaching, which forms a new research position aimed at expanding the external capabilities of students. This allows the creation of unique technology startups that form links with innovative systems for their implementation.

At the same time, the forms and methods of teaching students with high intellectual potential can change depending on the proposed technological chains, which allow gifted students to build an individual trajectory from the standpoint of the culture of creative work, knowledge and skills.

Thus, the considered directions of the development of the intellectual potential of students of an engineering university allow us to conclude that new learning mechanisms should depend both on the methodology of education and on the ability of the university to create an infrastructure aimed at identifying the scientific and creative potential of students, competent methodological support and support of students in their independent educational and cognitive

activities.

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