

FACTORS OF PREPARING STUDENTS FOR PROFESSIONAL ACTIVITY AS ENGINEERS AND TEACHERS

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Abstract. The article discusses the theoretical and practical foundations of training engineering and pedagogical personnel in higher educational institutions, advanced practices in this area, effective methodological approaches in the educational process, the fact that engineering and pedagogical activity is a process of conveying knowledge to students through pedagogical technologies, that it integrates two important areas - engineering and education - and creates highly qualified personnel, the need for this professional direction is important not only in production, but also in vocational education and higher education institutions, the connection between education and production, new approaches to the process of training personnel in accordance with the requirements of market relations, important scientific and practical research in the system of training engineering and pedagogical personnel, issues of improving the quality of education, establishing innovative professional training, ensuring the integration of education with production, bringing engineering and pedagogical personnel training to a new level, revising educational programs, ensuring that students have not only theoretical knowledge, but also practical skills, The formation of communicative potential, creative thinking and the ability to use modern pedagogical technologies, the improvement of the system of preparing students for the professional activity of an engineer-pedagogue in higher educational institutions, the integration of science and production, the increase in the effectiveness of practical training, the introduction of advanced practices aimed at the formation of pedagogical skills in this process, and the possibilities of further improving this area, the features of the professional activity of an engineer-pedagogue are analyzed in depth.

Key words: science, technology, development, education, upbringing, student, process, profession, engineering, pedagogy, methodology, innovation, research, action, opportunity, feature, result, creativity, formation.

Introduction. The 21st century is an era of scientific and technological progress and digital transformation, with radical reforms, innovative approaches and technological renewal processes taking place at a rapid pace in all spheres of society. In such conditions, one of the main factors determining the development of countries is the training of knowledgeable, modern-thinking, deeply versed in their field of specialization and with excellent pedagogical skills. From this point of view, the issue of training engineering and pedagogical personnel is of strategic importance not only

for the education system, but also for the development of the economy and industry.

Engineering and pedagogical activity is the process of conveying engineering knowledge to students through pedagogical technologies, which integrates two important areas - engineering and education, creating highly qualified personnel. Today, the need for this professional direction is growing not only in production, but also in vocational education, technical schools and higher educational institutions. The connection between education and production, new approaches to the process of training personnel in accordance with the requirements of market relations require significant scientific and practical research in the system of training engineering and pedagogical personnel.

Currently, the issues of improving the quality of education, establishing innovative professional training, ensuring the integration of education with production are receiving special attention [1, 2]. This creates the need to bring the training of engineering and pedagogical personnel to a new level, revise educational programs, and form in students not only theoretical knowledge, but also practical skills, communicative potential, creative thinking, and the ability to use modern pedagogical technologies.

From this point of view, improving the system of training students for professional activities as engineers and educators in higher educational institutions, integrating science and production in this process, increasing the effectiveness of practical training, and introducing advanced practices aimed at the formation of pedagogical skills are one of the urgent tasks of today [3].

In addition, in the process of training engineering and pedagogical personnel, the normative and legal framework of educational content, professional standards, qualification framework, criteria for assessing the quality of education, interactive and innovative teaching methods, the use of information and communication technologies, STEAM approaches are of particular importance. Also, the formation of interest in independent learning, the ability to self-development, a culture of teamwork and social responsibility in students are also important pedagogical tasks.

Main part. In the current conditions of globalization and scientific and technological progress, the process of training specialists requires not only professional knowledge, but also pedagogical competencies. In particular, the need for engineering and pedagogical personnel who can manage production in the oil and gas sector based on modern technologies and effectively introduce scientific and practical knowledge into the educational process is increasing day by day [4, 5, 6, 7]. In this regard, the formation of students in higher educational institutions not only as engineers, but also as teachers is an urgent task today.

Engineering and pedagogical personnel are specialists who have deep knowledge in this practical field, who are able to teach and effectively organize the educational

process. In the oil and gas industry, it is important to correctly understand technological processes, comply with safety regulations, and implement innovations, as well as the ability to transfer knowledge and experience to a new generation of specialists. Therefore, this article analyzes the issues of improving the system of training engineers and teachers using the example of the oil and gas sector.

Scientific and technological progress in the 21st century is fundamentally changing not only production processes, but also the education system. In particular, the increased demand for energy resources, industrial automation and digitalization trends have further increased the need for highly qualified specialists in the oil and gas sector. This makes the training of not only high-level engineers, but also personnel with pedagogical competencies along with industry knowledge - that is, engineer-pedagogues - a strategic task [8, 9, 10, 11, 12]. An engineer-pedagogue is a specialist with knowledge and potential in two areas: technology and education. In order to convey knowledge about rapid innovations in the oil and gas sector, safety in production, environmental sustainability, and the use of digital systems to the next generation of specialists, personnel with pedagogical functions are needed. This requires a review of the content, form and methods of education and a radical modernization of the industry's educational process.

Results and Discussions. An engineer-pedagogical cadre is not only a possessor of knowledge, but also a specialist with a high level of cognitive and emotional intelligence, multifunctional competencies, who can manage the educational process. Studies show that pedagogical training for specialists working in the oil and gas sector is necessary not only in educational institutions, but also in production itself (for example, in the mentor-apprentice system) [13, 14, 15].

Analysis of the current situation in higher educational institutions

Pedagogical disciplines are not adapted to the requirements of the industry (there are many abstract theories, there are not enough industry cases);

Psychodiagnostic work has not been established to identify and develop pedagogical abilities in students;

Pedagogical disciplines are not integrated with profile disciplines;

Practical training is more focused on engineering, the use of educational simulators and pedagogical scenarios is low [16, 17, 18].

Analysis of advanced foreign experiences

Canada: Polytechnique Montréal has introduced the “Engineer-Educator” model. Pedagogical technologies have been integrated into engineering education programs;

Norway: A symbiosis of production and pedagogy has been created through SINTEF centers. Specialists working at the enterprise participate in training students;

Russia: students participate simultaneously in production and in the educational process [19, 20].

Two main paradigms emerge in the organization of engineer-pedagogical training [21]:

- the structural-integrative paradigm is the integration of pedagogical and engineering disciplines;
- the functional-competence paradigm is the development of students based on specific competencies (communicative, didactic, methodological, technological, ethical).

Education in the oil and gas sector must directly reflect production, form a culture of responsibility, safety and production in students. In this regard, engineer-pedagogical personnel must not only teach, but also form safe labor, technological discipline and ecological thinking in students.

Problems in the training of engineering and pedagogical personnel:

- practical training is not sufficiently organized;
- pedagogical disciplines are taught theoretically, but practical skills are not formed;
- there is no integral connection between production practice and the educational process.

Students' abilities and interests:

- most students plan to work only as engineers;
- there is little interest in pedagogical activities, since modern pedagogical technologies are rarely used in the teaching process;
- some students have a tendency to teach, but the opportunities for their development are limited.

Analysis of best practices:

- in developed countries of the world (Canada, Germany, Japan) there are integrated curricula of engineering and pedagogy;
- training students in cooperation with industrial enterprises is yielding effective results [22, 23].

The results show that deep reforms are needed in the education system in the field of training engineering and pedagogical personnel. Especially in high-tech industries such as the oil and gas sector, there is a high need for qualified personnel not only in production management, but also in the process of training new personnel. This need is supported not only by the local labor market, but also by the global economy.

Engineering and pedagogical personnel should have not only technical knowledge, but also creative pedagogical approaches. It is necessary to increase the number of practical classes in the educational process, introduce students to STEAM and interactive teaching technologies, and restructure production practices.

At the same time, it is advisable to rework pedagogical disciplines in a way that is adapted to the industry, that is, introduce specialized courses such as “Engineering

Pedagogy”, “Professional Education Methodology”.

Conclusion. The training of engineering and pedagogical personnel in higher education institutions is a complex but strategically important process that needs to be reconsidered in accordance with the requirements of today's education and industrial integration. Along with engineering knowledge, it is necessary to form the skills of organizing education, testing and assessing, motivating students, and leading them to professional maturity.

The training of engineering and pedagogical personnel plays an important role in the oil and gas sector. This requires not only specialized knowledge, but also a combination of pedagogical thinking, teaching skills, and production experience.

Recommendations:

1. Introduction of the engineer-pedagogue module: development of an interdisciplinary course “Engineering Pedagogy” as a separate module in higher education programs;
2. Creation of a simulation environment: organization of laboratories based on AR/VR to practice the pedagogical side of education;
3. Professional pedagogical diagnostics: introduction of special testing and monitoring systems to identify pedagogical abilities in students;
4. Pedagogical internship: organizing students' internships not only in production, but also in vocational education organizations.
5. Introducing modern teaching technologies (AR/VR, simulation, case methods);
6. Conducting motivational events aimed at developing pedagogical skills and interest in students.

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