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PREPARING COMPETENT ENGINEERS IN MODERN EDUCATION FOR COMPETITIVE PROFESSIONAL ACTIVITY

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Abstract:
This article presents information on the ways of forming the technology of training competent engineers in modern education, the fact that in the current period, techniques and technologies are being updated in production, the rapid development of science and technology requires specialists to independently and systematically deepen, update, supplement and expand their knowledge, the purposeful training of highly qualified engineers with the ability to acquire knowledge of modern engineering technologies, systematic and creative thinking skills. As a result of the research, effective educational methods and main directions of training competitive engineers are presented.

Keywords: Engineer, technology, competence, imperative, competitive, modern, activity, education, science, highly qualified engineer, modular technology, scientific and pedagogical.

Introduction

Today, science and technology are developing rapidly around the world. Therefore, in our country, great attention is being paid to improving the education system in order to train well-rounded, mature, independently thinking, strong-willed, dedicated, and инициативе-driven specialists. In the current era, the continuous renewal of equipment and technologies in production, along with the rapid development of science, requires specialists to independently and regularly deepen, update, supplement, and expand their knowledge.

The development strategy of the New Uzbekistan is aimed at solving global problems related to the rapid advancement of technology and innovation. One of the key tasks in this direction is not only to identify current problems but also to stay informed about the latest achievements in science and technology,

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acquire knowledge in modern engineering technologies, and purposefully train highly qualified engineers with systematic and creative thinking skills.

In today's digital society, training highly qualified engineers is one of the most important strategic tasks. Specialists in engineering must work closely with modern production, automation, artificial intelligence, and digital systems. Therefore, introducing digital technologies into higher education institutions to develop the professional competence of future engineers is a highly relevant issue.

The concept of "competence" has been defined in various ways by scholars, specialists, and researchers. In general, competence can be defined as an integrated set of qualities based on knowledge, experience, and skills that manifest in successful professional activity and readiness. In our view, the concepts of competency and competence are interrelated and encompass knowledge, skills, and abilities, as well as qualities such as goal orientation, deep understanding of problems, attentiveness, and creative thinking [1].

Main Part

In the educational process, the training of modern engineers is carried out through the design of system-oriented technologies and the implementation of active learning systems using modern technologies. In pedagogy, within the framework of the Bologna Process, a number of methodologically grounded approaches have been proposed to modernize technical education in accordance with the idea of a "student-centered" position of teachers and the requirement to present learning outcomes in the format of competencies.

The essence of methodological approaches to training modern engineers in technical higher education institutions is revealed through the technologies used in the teaching and learning process. The concept of "technology" can be translated from Greek as knowledge about performing a certain activity skillfully and masterfully [175]. At present, the term "technology" is used in combination with various didactic concepts [91; 349]. In scientific and pedagogical literature, the following terms are widely used: teaching technology, pedagogical technology, educational technology, upbringing technology, communication technology, development technology, formation technology, modular technology, group learning technology, and engineering training technology [40; 157].

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The education system is a complex structure, and a technological approach can be applied to any of its components; therefore, the term "educational technology" does not allow for a single, unambiguous interpretation [44]. The phrase "educational technology" indicates its relation to the education system but does not refer to a specific subsystem. Concepts such as "educational technology," "upbringing technology," "development technology," and "training technology" form a group of related notions within the class of educational technologies. Each of them is considered a subsystem of the overall educational technology.

In the "Glossary of Modern Education," three approaches to defining pedagogical technology are identified [72]:

- a method of planning, implementing, and evaluating the entire teaching and learning process by considering the interaction between human and technical resources to achieve more effective education;
- solving didactic problems through clearly defined goals in managing the educational process;
- identifying and developing methods for optimizing the learning process by analyzing factors that improve educational effectiveness through the design and application of methods and materials.

A narrower interpretation of educational technology as a set of tools available to the teacher has also been proposed [39, p. 6].

However, the above definitions are characterized by excessive algorithmization of the process, which is not typical for social systems. The educational process should be approached as the development of a humanitarian system; therefore, uncertainty in educational technology is inevitable, and complete formalization is practically impossible. The operational aspect of pedagogical activity cannot be separated from its personal-subjective parameters, nor rational regulation from emotional regulation. The subjectivity, delay, and variability of results do not allow the same level of predictability and guarantee as in engineering and technical fields. Nevertheless, pedagogical technology must possess all the characteristics of a system: logical structure, interconnection of all its parts, and integrity [158, p. 10].

Educational technology encompasses both the process and the result of creating a system for socialization and personal and professional development that is adequate to the needs and capabilities of individuals and society. It consists of

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methodological, didactic, psychological, intellectual, informational, and practical actions, operations, methods, and steps designed to achieve educational goals while ensuring conscious choice and freedom for learners [339]

Educational technology represents a system that includes:

- a model of the initial state of students, characterized by a set of properties necessary for the implementation of the technological process;
- a clearly defined and diagnostically described model of planned learning outcomes (final state of students);
- tools for diagnosing the current state of the system and predicting development trends (monitoring);
- a set of teaching models;
- criteria for selecting the optimal teaching model for specific conditions;
- a feedback mechanism that ensures interaction between diagnostic data and the selection of an appropriate learning model.

The value of educational technology is measured not only by the operationally recorded result but also by the process itself, which must take into account the stochastic nature associated with the intellectual and emotional activity of participants. Educational technology is a complex functional system, to which pedagogical technologies contribute by implementing both subject-specific training and self-learning processes.

In the pedagogical process, teachers, by mastering technology, manage needs (upbringing), set goals, structure content (teaching), and select methods for developing abilities. The standardized provision of these components—goals, content, methods, and forms—in their unity and interconnection constitutes pedagogical technology. Students in technical specialties who become deeply engaged in a particular technology adopt it as a methodology for their own activity [81].

A psychological-pedagogical approach to forming engineering competence among students in technical higher education institutions requires identifying the following invariants: interdisciplinary, logical, and psychological components. The interdisciplinary component includes laws, facts, and methods of theoretical and practical activity across different fields. The logical component includes logical operations and thinking methods necessary for

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solving complex interdisciplinary problems. The psychological component relates to planning activities, monitoring their progress, making necessary adjustments, and evaluating results in relation to objectives.

Within the modern project-technological type of organizational culture, technologies, alongside projects and programs, have become a leading form of organizing activities. Today, dozens of effective pedagogical technologies have been developed and introduced into the educational process. There is an increasing need to design "open architecture" pedagogical technologies based on the integration of higher education systems, academic and industrial disciplines, production, and business, ensuring high coordination and transparency at all levels regardless of ownership forms.

Conclusion

In modern conditions of integration between education, science, and production, developing technological approaches to solving the problem of training qualified engineers for competitive and broad professional activity is of great theoretical and practical importance. Undoubtedly, it is impossible—and unnecessary—to standardize or replicate unique pedagogical technologies created by talented educators.

In training engineers, it is important not only to develop professional knowledge and skills but also to foster independent thinking, problem-solving abilities, and teamwork skills.

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