

## GENERAL DIDACTIC PRINCIPLES OF PREPARATION FOR SOLVING GENERAL TECHNICAL PROBLEMS FROM PHYSICS TO PROFESSION.

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**Annotation:** *In this article, the technique is aimed at preparing students in higher education institutions to solve general engineering (theoretical mechanics, theory of machines and mechanisms, resistance of materials, machine details) problems oriented to the profession.*

**Key words:** Continuing education, types of education, developmental education, competency-based education, developmental education, physical modeling.

### Introduction

In the course of large-scale targeted work carried out in our republic, the fundamental reform of the education sector, the tasks provided for in the Law "On Education" and the "National Program of Personnel Training" are being implemented step by step. At the heart of the reforms envisaged in the continuing education system is the task of "Development and implementation of thorough mechanisms for the integration of continuing education with science and production." In the full implementation of the tasks set forth, the stated goals and tasks "Strengthening the material-technical and informational base of educational institutions, providing the educational process with high-quality educational literature and advanced pedagogical technologies" forms the basis.

The current stage of the development of the field of physics is characterized by the presence of various types of education (approaches to it), the main of which are:

- knowledge-oriented (subject-oriented) education aimed at mastering the system of knowledge, skills and qualifications of students;
- developmental education that prioritizes the mental development of a person, first of all, the development of his intellectual abilities;
- personal (person-oriented, developmental) education, self-determination, self-development and self- provides the conditions for its implementation
- competence-based education, as a result of which a person acquires knowledge and personal qualities oriented to a certain practice, which will enable him to successfully and effectively operate in the professional and social spheres;

A.S. Makarenko's general approach to the selection of pedagogical tools for reasons of expediency, that there are no "bad" and "good" pedagogical tools; "best" in some cases is necessarily "worst" and vice versa. In this regard, we determine what role approaches play in preparing students to solve general engineering problems from physics; each of the above approaches, focusing on issues of general importance.

The question of knowledge and skills formed in the process of solving general engineering problems from physics is of interest. It is central to the context of knowledge-based learning, the acquisition of knowledge and skills is its goal, and is fundamentally important in the context of other types of learning.

The most important thing is the possibility of forming knowledge in the following areas in the process of solving general technical problems from physics:

- physical principles of operation of modern technical devices;



- physical approaches to the design of instrumental constructions with the necessary functional characteristics;
- physical basis of technologies and skills.
- goal setting;
- problem-deterministic search, selection and analysis of available data;
- use of acquired knowledge as an indicative basis for building professional activity;
- implementation of the program for achieving results;
- critical analysis of the achieved results.

Developmental education is the main issue of formation of intellectual qualities of a person. According to S. L. Rubinstein, the manifestation of the mind is both a thinking process and an objective activity. "The core of intelligence," wrote S.L. Rubinstein is the ability to distinguish the characteristics necessary for action in a situation and to adapt one's behavior to them."

In this regard, two features are of particular importance in solving general technical problems from physics:

- targeting;
- enriching the content.

Ushbu muammolarni hal qilish jarayonida barcha asosiy aqliy operatsiyalarni amalga oshirish qobiliyatlari rivojlanadi: analysis, synthesis, generalization, abstraction, comparison. Analysis is necessary, first of all, to reveal the physical content of a technical problem. In solving physical and technical problems, a systematic approach is widely used, which consists in considering or designing the object under study, and their interrelation determines its properties as an integral part, which are the sum of the properties of individual components. is not reduced and interacts with the external environment. The implementation of this approach, of course, requires analysis to show the studied and built objects as a system, to determine its structure, to establish the internal connections that make up the system (integrative) and the external factors that significantly affect the behavior of the object. (systematic analysis) involves using.

The final result of the development of the physics of technical objects is to understand and predict their properties after analysis. Physical and technical problems are characterized by the presence of objects, which requires the generalization of conclusions about the characteristics of the studied object.

The need for abstraction in solving general technical problems from physics is determined, first of all, by the role played by physical modeling in this case, which implies the selection of the most important properties and relations from the point of view of the problems of the object being studied.

Physical modeling, in turn, involves the use of comparison of the model with reality. This is necessary both at the stage of developing a model designed to reflect the object of study and to replace it in such a way that its study provides new information about the object, and at the stage of experimental verification of the model, when its predictions are realized. The mental operation of comparison is also required in connection with the need for critical evaluation (self-evaluation) of the results obtained and the experience gained by students.

When students study a certain class of objects in new situations, the sought-after knowledge is manifested in the application of acquired techniques in the process of expanding the problem area of activity.

Solving general technical problems from physics, according to their content and nature of activity, helps to develop a number of the most important intellectual qualities of a person:

- clarity of mind - simplicity and transparency of thought;



- logical thinking;
- depth of consciousness - the ability to distinguish and understand the most important things in events;
- breadth of mind - versatility of thinking;
- flexibility of mind - the ability to change the direction of thinking;
- independence and originality of consciousness - creative nature of thinking;
- criticality of the mind - reasonableness of judgments, serious attitude to the objections that arise.

In the conditions of personal approach to education, the most important feature of the process of solving general technical problems from physics is its creative nature. With the problematic nature of learning, when each studied issue is the subject of research, it includes all the main stages of creative activity and requires the manifestation of relevant personal characteristics. First, the stage of emergence of a creative situation related to the novelty and relevance of the subject of study. At this stage, goal setting and logical analysis aimed at revealing the physical nature of the problem being studied are carried out.

In addition, the heuristic stage itself, in which ideas are created and the properties of the object are predicted. The most important thing here is intuition, creative imagination, originality of thinking.

And finally, the final stage is the justification and implementation of the product of creative activity (one's solution), which includes a critical reflexive analysis of the process and its result. All the main methods of creative activity are in demand and developed accordingly:

- search for unknowns with the help of analysis through synthesis, which consists in introducing the studied (structured) object into new connections, allowing to discover new features in it;
- searching for unknowns using a heuristic method based on reliable discursive thinking, which significantly expands the possibilities of thinking in connection with formal logic;
- searching for unknowns using the associative mechanism, which involves the extensive use of analogies and information obtained from existing results;
- search for unknowns using the mechanism of interaction between intuitive and logical principles.
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In the process of gaining experience in solving general technical problems from physics, a number of socially important personal qualities are formed, including:

- aspirations and self-awareness;
- independence in judgment;
- self-confidence;
- initiative and flexibility;
- criticality and high reflexivity;
- openness to newness.

In this regard, we pay attention to two points. First, the main role of qualities in any creation. They develop in scientific and technical creativity and create conditions for independent production activities in various fields. According to L. S. Vigotskiy, creative activity is the highest form of activity, creating something new, whether it is the creation of something of the external world or a well-known construction of mind or feeling that lives and is found only in the individual.

Secondly, the educational importance of problem solving is related to the development of the qualities of education, intellectual independence and conscientiousness that determine human intelligence. Thus, the formation of students' skills in solving general technical problems in physics is compatible with ensuring the unity of education and training.

Forming the skills to solve general engineering problems from physics corresponds to a competent approach. This depends on a number of reasons. First, the main focus is on ensuring the student's readiness for independent production activities. Secondly, it depends on the consistency of developed personal qualities that correspond to the integrative nature of competence as a personal characteristic. Finally, it is important to acquire skills and experience in solving professional problems that are important to a wide range of professionals.

Aimed at the development of self-awareness and an individual activity method, the formation of the skills of solving general technical problems from physics helps to form a specialist in a number of acmeological aspects, including:

- volume and level of cognitive-professional knowledge;
- the ability to use existing normative knowledge in solving problems;
- readiness to establish communicative and mutual relations.

Summarizing the above, it can be noted that achieving the goal is compatible with the implementation of the current main approaches to education and can contribute to solving the important problem of its theory and practice.

Solving the studied problem requires not only basic teaching approaches in higher education, but also a number of general didactic principles:

- principle of scientificity;
- the principle of professional orientation;
- the principle of availability;
- principle of differentiation and individualization.

The number of fields of practical application of physics is huge and constantly growing. Taking into account the role of physics in the development of intellectual and creative abilities of a person, his cognitive abilities, the methodology of teaching physics can be included among such directions, because it can be considered as applied physics with the most complex object around.

In the conditions of the implementation of the scientific principle, the main thing is to achieve the unity of the fundamental and practical components of the educational content in the process of solving general technical problems from physics.

The possibility of implementing the principle of professional guidance is mainly determined by the conformity of the content of education with the content of professional activity, mental operations in the educational process and the demand for practical actions used in it. The implementation of the principle of availability helps by developing the knowledge acquired in the process of mastering the experience of scientific and technical creativity by students, which expands the problem area available for mastering.

And finally, various goals, approaches to their achievement, used methods and tools open the possibility of differentiation and individualization of education as a means of creating conditions for the full manifestation and development of abilities. It contributes to the implementation of the general didactic principle of every student in physics education.

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