

## IMPROVING THE METHODOLOGY OF DEVELOPING THE TECHNICAL THINKING OF ACADEMIC LYCEUM STUDENTS IN PHYSICS

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### Abstract

This article talks about improving the methodology of developing the technical thinking of academic lyceum students in physics. Based on physical data, the author analyzed the problem on the basis of available scientific literature and studied the existing specific aspects of improving the methodology of developing the technical thinking of academic lyceum students in physics.

**Keywords:** physics, technical thinking, integrative technology, non-standard task.

### Introduction

To this day, humanity still needs qualified people who can find effective ways to solve the problems that have arisen on all fronts. Therefore, one of the urgent tasks of academic lyceums is to develop methodological approaches and methods that can teach students to be creative independently. These include the ability to solve creative problems, learn to know, and develop one's own knowledge. It has become clear that the traditional forms of teaching in physics classes based on traditional methods are usually focused on repetition, memorization of material and reproductive learning activities, which do not ensure the development of creative thinking. Therefore, it is important to identify new effective approaches that serve to form a creative personality in teaching physics.

### Main Part

In the methodology of teaching physics, great attention was paid to solving creative problems, their pedagogical importance was emphasized (B. Izbosarov, T. Rizaev, B. Ibragimov, H. Makhmudova, B. Nurillaev, V. I. Lukashik, A. S. Kondratiev, S. M. Kozel, S. V. Bublikov, etc.) . General approaches to solving such problems have been developed, but the range of functions aimed at developing students' creative thinking as a whole and its individual aspects has not been considered. Ways to create content and solve creative, non-standard tasks for military-academic lyceums are largely undisclosed. Recommendations for solving certain types of creative problems have been developed in heuristic, cognitive studies (G.S. Altshuller, Yu.S. Murashevsky, etc.), however, this is not enough to meet the growing needs of various educational systems.

There is a conflict between the demand for effective methods of organizing students' creative activities at the level of developing the ability to solve creative problems in academic lyceums

and the insufficient development of theoretical approaches to the methods of designing and solving such problems in physics. It is also an important methodological problem to determine the class of such tasks that will be effective in terms of developing different aspects of students' creative thinking. The process of solving such problems should be built on an active and integrative basis. Today, integration processes are actively developing in various spheres of human activity. The integration of sciences is also reflected in the education system. Integrative courses, educational topics, lessons, special courses and elective courses, elective subjects are being developed.

In the studies of some Russian scientists (G.A. Bordovsky, V.N. Maksimova, I.I. Sokolova, V.P. Solomin, etc.), the importance of integrative education in modern education was noted in connection with the increasing need for specialists with new, systematic and integrative thinking skills. The fundamentality and integrity of general secondary special education without natural sciences, especially physics education, the formation of a value system, including environmental education, the achievement of methodological and informational skills of graduates, critical and logical thinking, comprehensive and multifaceted development cannot be provided. It is impossible to properly form and educate the student's personality. For a modern, competitive workforce, it is important to be able to solve practical critical tasks that require integrative knowledge and action methods.

It is especially important to find ways to increase the creative activity of students in the conditions of reduced study time for learning physics. Tasks of an integrative nature ensure the expansion of the information field, the formation of the skills of applying knowledge in new conditions, the formation of a holistic natural-scientific image of the world in the minds of students, and the development of creative thinking. Our research is dedicated to identifying the features and functions of integrative education in the teaching of physics in military educational institutions, and their solution is aimed at developing various aspects of students' creative thinking, developing methodological recommendations for designing and solving them in the physics course.

### **Results and Discussions:**

Such tasks, whose content is built on an integrative basis and involved in the process of organizing the student's overall creative activity in a step-by-step, expanded form, we called integrative activities and set the following tasks as our goal:

1. Analysis of psychological-pedagogical ideas about the essence, components, and factors influencing the development of creative thinking.
2. To study the concept of "learning task", to determine the role of problem solving in the process of teaching physics in order to develop students' creative thinking.
3. To determine the psychological, pedagogical and methodological bases of designing and solving effective problems for the development of students' creative thinking.
4. To determine

the role and meaning of the integrative property in the context of the physics problem solving process.

5. To determine the content, signs, characteristics of didactic functions of the class of tasks that provide the most complete and effective organization of creative activity in the process of solving (integrative tasks).

6. Development of guidelines for designing and solving integrative problems.

7. Development of specific examples of integrative tasks for the physics course of military-academic lyceums.

8. To determine the impact of solving integrative problems on the development of students' creative abilities. The following were considered as criteria for the effectiveness of integrating integrative issues into the educational process:

- the quality of students' knowledge and skills in physics;
- students' ability to understand the methods of knowledge and cognitive activity;
- positive dynamics of developing students' cognitive interest;
- level of development of students' creative thinking;
- interest of practicing teachers in the proposed methodology;
- willingness of teachers to use integrative tasks in the educational process.

Our research shows that, on the one hand, solving even a large number of integrative problems cannot form students' ability to solve complex problem situations, and cannot fully include them in their creative activity. On the other hand, the development of creative thinking often helps to solve creative problems in science olympiads, but they are not interesting for everyone, because it is a difficult task to prepare every student for science olympiads. The following problem arises, that is, which classification of creative problems can be used as a means of developing the creative thinking of every pupil and student who is interested in learning the methodology of teaching physics. Several years of our research have shown that the solving process is step-by-step, and the physical problems solved as a whole creative activity in an extended form develop creative thinking most effectively. In order to provide a step-by-step process of problem solving in an extended form, it should include all methodological stages of problem solving, in particular: motivation, dividing the problem into some meaningful parts, searching for and choosing a method for solving the problem (setting the goal), creating a model of a physical phenomenon, the process of solving the problem (with mathematical calculations, if necessary), analysis of the results, etc. In conclusion, the following should be noted:

- Integrative problems of physics are an effective means of developing creative thinking, and the process of solving them includes holistic creative activity in an extended form. The hallmarks of an integrative problem are: heuristic content, interdisciplinary content, informational issues, and interesting issues.

- The process of solving integrative problems related to physics performs motivational, informational, analytical-synthetic, research, outlook and diagnostic functions.
- Solving integrative problems related to physics is based on the activity model of teaching methodology.

### **Conclusion:**

Solving integrative problems in physics includes the following stages: motivation, search and selection of a solution method (setting a goal), creating a model of a physical phenomenon or process, obtaining results, analyzing and correcting them, as well as reflecting creativity at each stage.

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