

ASPECTS OF INDEPENDENT STUDY AND REPEATING OF PHYSICS BY STUDENTS

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“Knowledge is only knowledge when it is acquired by the efforts of one's own thought, and not by memory”.
L. N. Tolstoy

ABSTRACT

The article outlines the aspects of re-studying and repeating the elementary physics course by students themselves, and also highlights the problems of assessing students' knowledge of physics.

Keywords: Physics, concepts and terms of physics, laws, rules, laws, physics processes, supporting abstract, problems and tests in physics, knowledge assessment, external studies, certificate.

INTRODUCTION

The position of a student in modern society leads to the need to teach him the ability to independently search for the necessary information from a wide variety of sources. A physics teacher needs to promote the development of students' independence in cognitive activity, teach them to independently master knowledge, and independently apply knowledge in learning and practical activity [1, 1993].

Organization of independent work, the leadership of which is the responsible and difficult work of each teacher. Speaking about the formation of independence in schoolchildren, it is necessary to bear in mind two closely related tasks. The first of them is to develop students' independence in cognitive activity, to teach them to independently possess knowledge, to form their world outlook; the second is to teach them to independently apply the knowledge they have in teaching and practice. Independent work is not an end in itself. It is a means of struggle for deep and solid knowledge of students, a means of forming their activity and independence as personality traits, the development of their mental abilities [1, 1993. 3, 1988].

In conditions when the independent work of students acquires special importance, the role of the textbook and teaching aids increases. The textbook is increasingly taking on teaching functions that previously belonged entirely to the teacher. From a passive carrier of information, the textbook turns into an active didactic system that should provide the student with self-control over the assimilation of knowledge, as well as contribute to the formation of a physical style of thinking and a specific language culture. Being the leading didactic tool, the physics

textbook is designed to provide optimal conditions for self-educational work: the student must have a real opportunity to study and understand the educational material contained in it [4, 1998].

Relevance. As the **types of knowledge**, a textbook on physics contains all the elements of the theory that are included in it directly and indirectly. Seven main types of knowledge can be distinguished: *concept, law, regularity of scientific fact, experiment, theory, applied knowledge* (knowledge that implements the connection of science with technology and technology).

The problem of preparing students for final and entrance exams, as well as for contests and competitions is urgent. One of the directions in solving this problem is the organization of repetition.

The main didactic goal of repetition of physics is to prevent forgetting the learned material, systematize and deepen information about previously studied, clarify the acquired physical concepts. Therefore, any work related to the repetition and consolidation of material carries elements of systematization and generalization. For systematization and communication, the key issues of the program are highlighted. When organizing repetition, overview lectures, oral questioning, performing exercises and solving problems to deepen practical skills are used.

THE MAIN FINDINGD AND RESULTS

Mental development with repetition is provided by its variability. Usually, repetition is carried out on new examples, in a different order, using new methods of activity with a constant increase in the complexity of tasks. Thanks to this, the repeated material is examined from different angles, its connections with other sections of the course are revealed, which contributes to a more complete and deep systematization of students' knowledge.

The organization of collective repetition includes the solution by the teacher of the following tasks:

- development of technologies allowing to purposefully organize the repetition of educational material at all stages of the educational process;
- providing positive motivation for students to repeat previously studied material;
- acquaintance of trainees with the requirements for their training in physics;
- highlighting the key questions of the program intended for repetition;
- the use of various types of repetition (introductory, current., supporting, final, systematizing, generalizing);
 - use of diagrams, models, supporting abstracts, reference books;
 - to implement a personality-oriented scientific and methodological approach in teaching physics;
 - implement the selection of a system of tasks, which contributes to the expansion, deepening, systematization of students' knowledge;
 - the content of the repeated material and the ways of its presentation should contribute to enhancing the mental activity of students in the classroom and in the process of independent acquisition of knowledge;

The test system for passing examinations creates significant psychological problems for students with delayed reactions. They often have good abilities, but do not know how to quickly switch from one task to another. Therefore, it is advisable, at the final repetition, to offer students the practice tests that were used in previous years.

An important role in the process of repetition and in the educational process in general is played by the independent work of students with educational literature, with reference books, and manuals on physics. Independent work is understood as the activity of students without the direct participation of the teacher, but on his instructions, under his supervision and guidance, in a specially allotted time. This work assumes active mental actions of students associated with the search for the most rational solutions and analysis of the results.

Self-study goals:

1. Independently acquire knowledge.
2. Independently apply knowledge in educational and practical activities.

When compiling assignments for independent work, the teacher is guided by the basic pedagogical principles:

- availability and consistency;
- the principle of connection between theory and practice.
- creative activity.
- a gradual or phased increase in complexity.
- differential approach to students, etc.

One of the most important tasks facing teachers is the formation of students' skills of independent work with a textbook and teaching aids. To solve this problem, it is necessary first of all to teach the following skills and abilities to work with textbooks, teaching aids and materials in physics:

1. To highlight the main thing in the read.
2. Understand the conclusions of mathematical formulas.
3. Use tables, graphs, diagrams, pictures.
4. Obtain information from figures, graphs and tables.
5. Make a basic summary of what you read.
6. Be able to retell.
7. Ability to read the text.
8. Find answers to security questions.
9. Use the table of contents, subject and name index.
10. Use reference books and additional literature.
11. Use electronic and other materials via the Internet.
12. Be able to solve thought experiments.

To form the ability to highlight the main thing in the read, you can offer students generalized plans, which serve as an algorithm for assimilating the read. Here are examples of typical plans:

I. About physical phenomenon and process:

1. Signs by which a phenomenon or process is detected;
2. The condition under which they are performed;
3. The essence of a phenomenon or process and its explanation by modern science;
4. Use of a phenomenon or process in practice;
5. Ways to prevent the harmful effects of phenomena or processes

II. About the physical law and regularities;

1. The relationship between any quantities is established by law and regularity;
2. The wording of a law or pattern;
3. Mathematical expression;
4. Experiments confirming laws or patterns;
5. Explanation of a law or pattern from the point of view of a modern view;
6. Application of laws or patterns in practice;
7. Limits of application of the law.

III. About physical quantity:

1. What property or phenomenon does it describe?
2. Determination of the physical quantity;
3. Units of measurement;
4. Formula expressing the relationship with other quantities;
5. Methods for measuring a physical quantity.

When starting to teach a topic, the teacher plans not only the main goals of its study, but also thinks over a system of educational independent tasks, with the help of which it is possible to judge whether the goals set have been achieved. With a skillful formulation of the question (problem) by the teacher, the level of independence in the acquisition of knowledge, the desire for self-improvement in the intellectual sphere increases. Over time, knowledge gained independently, consciously drawn conclusions from experiments, independent work on additional literature remain in memory for a long time, and this is what remains when everything learned is forgotten.

It is common knowledge that learners only firmly internalize what has passed through their individual effort. The problem of student autonomy in learning is not new. Scientists of all times have assigned an exceptional role to this issue. Particularly clear concepts about the role of independence in the acquisition of knowledge are found in the works of K.D. Ushinsky, N.G. Chernyshevsky, D.I. Pisarev and others. This problem is still relevant today. Attention to it is explained by the fact that independence plays a significant role not only in obtaining secondary education, but also in continuing education after school, as well as in the further work of schoolchildren.

For organizing and conducting independent classes for students in physics, as well as for independent preparation and repetition of physics in a short time, as we noted earlier, **the following educational literature and reference books are needed** to remove a number of psychological barriers and tight-fitting detail of students.

1. Physical dictionary, allowing a more accurate translation of a physical term from Russian into the language in which the student is trained;
2. Physical explanatory dictionary, allowing to briefly characterize a physical term or physical parameter (quantity);
3. Glossaries on physics, which allows you to characterize and explain the essence of a physical term and concept in a short time;
4. Reference books or reference books on the language, allowing a relatively short time to study the essence of a physical phenomenon or process;
5. Textbooks or teaching aids in physics in the form of a basic outline;
6. A collection of problems and questions in physics with problems with different categories of difficulty, allowing you to remove a number of psychological barriers of students;
7. Electronic textbooks and electronic materials to teach physics and control the knowledge of students and applicants.

In this regard, a number of aspects have been resolved in the Republic of Uzbekistan, which makes it possible to teach and independently study and repeat in physics. Under the leadership of academician P.K. Khabibullaev developed and published the "Explanatory Dictionary of Physics" [5, 2002], covering the entire course of general physics. Step by step, we, as well as the staff of the National University, are developing glossaries for individual sections of physics [6, 2014].

We have developed and published a handbook on physics in the Uzbek language "Let's repeat physics" [7, 2007-2009], which allows you to study in a short time the essence of a physical

phenomenon, process and laws of physics. Textbooks on physics have been created and published in two volumes in the form of a pivotal synopsis in physics [8, 2007. 9, 2007], allowing you to study physics in a short time, and making up a pivotal synopsis. They also have tests and test problems in physics with answers (more than 900), which allow them to independently control the degree of mastery of the material by students. Developed and published a textbook “Collection of problems in physics” [10, 2003], having problems in all sections of elementary physics with five categories of problem difficulty, as well as including all the necessary formulas in physics, and with examples of solving problems.

Together with O. Tigai, a control and educational electronic textbook [11] has been developed, which has theoretical material on general physics, virtual laboratory works, animation materials, as well as theoretical questions, tests and test tasks with answers. This allows students and applicants to intensively study and repeat physics in a short time, as well as to control their knowledge independently in stages [5, 2002].

CONCLUSION

Thus, the types of the listed teaching aids, teaching materials allow you to easily compose a basic outline of each topic, systematize and form knowledge, concepts in physics, independently find answers to a set of control questions, and also train in solving tests that have answers. On the other hand, in these textbooks and materials, a set of problems related to independent teaching of students in physics, set out in the text of the article, are solved.

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