METHODS OF FORMATION OF EXPERIMENTAL SKILLS IN PHYSICS PRACTICUM

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ABSTRACT

In this article, the widespread use of modern pedagogical technologies is of great importance for improving the effectiveness of physical education, and in this regard, a lot of scientific and medical research is carried out. Therefore, this section discusses the developed methodology of the enrichment process, organization and maintenance of laboratory work in general physics.

Keywords: experimental, scientific analysis, scientific result, merit, observation, Knowledge, Skills, Qualification, logical thinking.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

Before starting to perform tasks in laboratory work, the teacher introduces students to the structure and rules of their implementation. To this end, he informs that there is a control work for obtaining initial data, understanding the order of tasks and rules for recording results, as well as for checking not only knowledge, but also for the formation of practical skills and qualifications.

It is emphasized that the tasks are intended for individual, independent performance by the student. In this case, students should consult about the order of the task, discuss the results obtained, and help each other. When submitting a report, each student must consciously explain the procedure for completing the task assigned to him.

If completing assignments is a problem for some poorly assimilated students, then it is worth giving these students easier options. The degree of complexity of the options, it turns out, is determined by the teacher himself. In conclusion, one should not fully hope that they will give an independent understanding of the phenomena observed by students. The teacher must "convey" the conclusions of the students to the desired academic level. Therefore, the teacher reviews the results obtained together with the students, separates the main ones from the secondary ones, helps students to draw the right conclusions. The need for a close connection in the experimental and cognitive activities of students is the reason for the gradual completion of tasks. And the results obtained at individual stages are summarized.

The teacher should know all the features of the tasks that are given to students, at what limit there may be deviations from the expected result. Only then will he be able to quickly notice the mistakes of the students, correct them in time and actively lead the work of the entire group. Since the proposed tasks must be completed at the final stage of the lesson, when preparing for a specific task, the teacher must carefully consider the purpose of each task and its place in the lesson, the content of the conversation between the beginning and the end of the task, the time of presentation and the completion of the path, the content In some cases it relies on a system of instructions for completing tasks, in other cases are developed questions that require students to find answers to them from experiments and observations.

The level of detail of the tasks will depend on the complexity of the actions performed by the students, the equipment used, as well as the practical skills and qualifications of the students. Initially, when students do not have the necessary theoretical training, experimental skills and qualifications, it is important that the methods of performing individual practical work be demonstrated by the teacher.

With the formation of experimental skills of students, the independent execution of tasks is facilitated. The questions in the tasks of this or that phenomenon, along with the fact that the law is given for practical study and deepening of theoretical and practical knowledge, are also aimed at improving their professional competence in the teaching profession. Only then can students consciously accept assignments. In order to clearly understand the students' thinking, sometimes the performance of experimental tasks can be included in the lesson process to provoke problematic situations. Such tasks arouse students' enthusiasm for acquiring new knowledge, encouraging them to assimilate new material. The enthusiasm to find out the cause of the incident attracts the attention of students to the teacher's explanation, contributes to the emotional perception of the educational material. At the same time, they are not only well versed in the phenomena and laws being studied, but are also quite familiar with the elements of scientific research. The teacher will be informed about the state of their knowledge, skills and qualifications, monitoring the work of students on all tasks. This gives the teacher the opportunity to individualize teaching and evaluate the object based on the rating system of students.

Depending on the purpose and methodology of teaching, as well as the preparation of students, the teacher should remember that the same tasks can perform different tasks independently. One of the priorities when performing tasks is to discuss the result of the work. The discussion will help to identify important links between the studied events and their generalization. Therefore, after completing the task, it would be advisable to invite some students to talk about the results they received. The presentation of the content of the task and the analysis of its results will contribute to the development of logical thinking in students. Before students draw conclusions based on the results of the work, it is necessary to achieve a full understanding of what actions they perform and how they are related to a general practical lesson in physics. This gives the teacher the opportunity to monitor the performance of tasks, discuss the results obtained, evaluate the theoretical knowledge, skills and qualifications of students. The teacher actually hears about the results of the work by asking questions one by one, and can evaluate each work

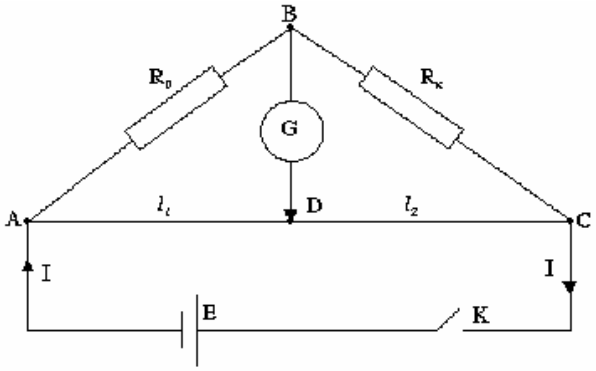
individually. Encourage these students to do experimental tasks with a greater sense of responsibility.

We will consider the above methodological views and recommendations as an example of performing several laboratory studies.

Determination of unknown resistance using the Wheatstone Bridge Necessary tools and equipment: DC power supply, low-voltage rectifier, galvanic (internal resistance 2.3 ohms, sensitivity 6.3 V/v), resistance store (in the range of 10-100 ohms), reoxord, switch, connecting wires.

The purpose of the work: to get acquainted with the principle of operation of the Wheatstone bridge, to study and test the current implementation of Kirchhoff's laws, to study the method of determining resistance using the Wheatstone bridge and their sequential, parallel, mixed resistance at the time of connection.

The experimental device of laboratory work is assembled according to the following scheme (Fig. 1).



1-picture. Schematic diagram of the laboratory work device.

Before starting this laboratory work, students should have the following skills: choosing the necessary resistance from the resistance storage; using a demonstration galvanometer, determining the value of the scale sections; assembling an electrical circuit according to a given scheme; serial and parallel connection of conductors.

Therefore, they should know the following: a) what is called resistance? b) what is the formula for calculating the resistance of the orkney?

C) units of resistance; d) What is called comparative resistance?

D) marking of circuit elements in the form of a circuit;

e) in order for the token to pass through the chain, it must be blocked; i) in the network areas of the chain (node), the token is divided or added;

j) calculation of the resulting qarsh for serial, parallel and mixed connection of conductors; z) Ohm's laws for a part of the circuit and for the Burke circuit, as well as the Kirkshof rules.

To determine the knowledge and skills mentioned above, the student will be asked questions based on knowledge gained from lower-order physics. We called these questions test questions, which are targeted. A student who answers these questions satisfactorily will be given permission to start performing laboratory work. Also, the student should be well versed in the sequence (order) of the work.

Targeted test questions:

1. What is the physical essence of conductive resistance?

A) electrons are attracted to positive ions located in the nodes of the crystal lattice at the moment of movement of the hook, that is, trieradi during movement; C) elementary electric charges interact with particles of matter at the moment of movement of the hook and give them part of their kinetic energy, that is, they slow down; S) resistance

2. What size does the resistance of the conductor depend on?

A) to the length of the conductor, transverse surface, conductive material, current and voltage; C) to the length of the conductor, transverse surface, conductive material; C) to the length of the conductor, transverse surface, conductive material, temperature; D) to the length of the conductor, transverse surface, conductive material.-cutting surface, conductive material to the medium of the location of the conductor; E) to the temperature, to the current, voltage, to the medium in which the conductor

3. How is the Wheatstone bridge arranged?

A) from a DC source, two resistors, a galvanometer and a switch;

C) from a DC source, unknown resistance, reoxord, galvanometer and switch; C) from a DC source, four resistors, galvanometer and switch; D) from two resistors, reoxord, galvanometer and switch;

E) DC power supply, unknown resistance, from reoxord and switch.

4. Explain the equilibrium state of the bridge.

A) Resistances R_0 and R_x potentials at points B) E and D are not equal to points ($\varphi_E \neq \varphi_0$); C) E and D are equal to potentials at points E are equal to each other ($\varphi_E = \varphi_0$); D) l_1 and l_2 shoulder lengths are mutually equal.

The knowledge and skills acquired in the process of performing laboratory work will be as follows: independent assembly of the electric chain according to the scheme given; the current flows from the point with a large potential to the point with a small potential to the side; the equilibrium condition of the invariable current (Uitston) bridge; the proportional change in the length of the; draw graphs based on functional connections between tables and sizes; drawing results and calculating errors; analyzing and summarizing.

Laboratory assignments aimed at strengthening the theoretical knowledge of students on the subject and their practical application, as well as the formation of experimental skills were developed. In particular, we indicate the method of carrying out the assignment on the subject of this laboratory work.

Knowledge and skills acquired in the process of performing a laboratory task, such as the above:

-understanding the function of the power supply in the chain;

- methods of connecting power sources;

-taking into account the directions of the vine and EYUK when writing equations;

-to make sure that the algebraic sum of the Met current in the node is equal to zero;

-in a large resistance conductor, when the current strength is the same, the divergent power will also be greater;

-the power of the current source in the chain can be either "positive" or "negative", depending on how it is located in relation to the direction of its current strength;

-understands the difference between the voltage with the difference in potentials and the conditions under which they are identical;

- the total strength of the chain will be equal to the sum of the dissociated forces in its resistance parts (without taking into account the waste of energy).

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