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EFFECTIVENESS OF ORGANIZING PHYSICS LABORATORY LESSONS AND DEMONSTRATION OF EXPERIMENTS

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ABSTRACT

Scientific information has always been verified and based on practice and experience. Physics, on the other hand, expresses information about phenomena in the material world through experience. Therefore, the most effective way to check theoretical information is conducting experiments and laboratory training. In the article, special attention is paid to the main methodological approaches to the effective organization of laboratory classes, the fact that experimental demonstrations are based on scientific innovations, as well as the role of laboratory work in the formation of scientific research and practical skills in students.

KEYWORDS

Experience, demonstration, laboratory, experiment, calculation, error, method, method, research, equipment, equipment, concept, virtual laboratory, theoretical physics, experimental physics.

INTRODUCTION

Physics is a science that studies nature and existence. Physical events and processes are always happening in our environment, in our lives, and they give us information about the laws of nature. Physical phenomena are studied in two ways: theoretical and experimental. In the first case (theoretical physics), using mathematical apparatus and based on previously known laws of physics, new relationships are derived.

The main weapons are paper and pencil. In the second case (experimental physics), new connections between phenomena are determined using physical measurements. A lot of tools - gauges, tools, experimental devices will help in this.

Naturally, these two research methods require different ways of thinking and different skills.

Conducting experiments and laboratories in physics involves the following:

- Helping students to fully master basic physical laws and phenomena;
- To teach a creative approach to scientific investigations, to measure the values of physical quantities and to check them using physical formulas;
- Introducing the development of measurement results with modern mathematical methods.

This general goal is planned and implemented in different ways, depending on the level of knowledge of students and the level of experience with equipment.

The main goal of conducting experiments and laboratory work is to teach a certain measurement method and the correct analysis of measurement results. This is done by calculating experimental errors.

In general education schools, physics is taught not as a new subject, but as a continuing subject based on basic knowledge. In other words, students form their interest in nature by reading and studying "Natural Sciences" from the primary grade, and gain knowledge about the causes and methods of occurrence of every phenomenon and process that occurs in existence and in our environment. and begin to gain knowledge. Therefore, physics is not a problem for them to understand and enter science as a continuing science.

In the teaching of physics, each educational institution tries to conduct demonstration experiments based on its own conditions. Based on the current modern educational conditions, educational institutions are

provided with material and technical bases in turn. Even in the absence of such conditions, the use of simple, demonstrative experiments in explaining the essence of science to students makes it possible for the science to be interesting and effective. For example, explaining the subject of "Diffusion Phenomena", which is interesting in physics and is encountered in every field, in life, at every step, does not cause difficulties for both the teacher and the student. Also, the level of understanding of the subject will increase through the experiments conducted on this topic and the given examples.

Experimentation not only gives students the opportunity to put scientific theory into practice, but also develops them as scientific observers, problem solvers, and conclusions based on experience. Through hands-on experiences, students understand the basic laws and formulas of physics, as well as how these laws can be applied in everyday life.

In the organization of laboratory classes, attention is also paid to scientific innovations, the degree of relevance of the subject and, of course, the conditions. The organization of laboratory classes forms the practical importance of theoretical knowledge in students and expands the scope of understanding.

In order to increase efficiency in the use of experiments and laboratories in physics lessons, the organization of the lesson based on interactive, modern innovative methods also gives high results and the intended goal is achieved. For example, the group is divided into teams and tasks are given:

Group 1: Explains the theoretical part of the topic with the help of examples and formulas.

Group 2: Introduces necessary tools and equipment for conducting laboratory work or experimental demonstration and provides information about their functions.

Group 3: Explains the sequence of performing the laboratory work or demonstration to the rest of the team.

Group 4: Does the work and gets the results.

Group 5: The above teams make a conclusion based on the information they gave and the work they did.

By dividing into such groups, it leads to the formation of students' skills to concentrate, strengthen memory, listen carefully to others and, of course, to support each other in a team. Experiments are carried out in collective work, which shows an effective result.

Students will have the opportunity to experiment, solve problems and share the learned knowledge by working in a group. It helps the teacher to assess the level of knowledge of the students and explain the problems.

In another method, the teams are given a common task, and the team receives the results of the agreed laboratories and experiments and prepares a separate report.

Passing and organizing the experimental process and laboratory classes through interactive methods increases the interest of students. For example, allowing students to perform experiments themselves, involving them in planning how to implement an experiment, asking how to scientifically justify this experiment increases student engagement.



Fig. 1. Equipment of the physics laboratory

In some educational institutions, there is a lack of laboratory equipment, but every educational institution has at least a few modern computers and equipment. Therefore, in such cases, students can form their understanding by showing virtual laboratories in order to help them understand and understand the essence of the subject. Through virtual labs and computer simulations, students will be able to safely and effectively perform physics experiments and perform lab work on the subject.

Physics is based on both theory and practice. That is, some abstract concepts (energy, work, power, force, etc.) are explained to students in a theoretical state, problem solving skills are formed through formulas. But for students to understand the true nature of these concepts, experiments and demonstrations will help.

The above-mentioned points have been explained in general terms. However, the teaching methodology and organizational process of each subject is carried out in different ways depending on the level of knowledge of the students and the level of provision of equipment for experiments and laboratory works. The main goal of organizing laboratory classes is to teach a certain measurement method and the correct analysis of measurement results. This is done by calculating experimental errors. It is an important issue to choose the one that correctly reveals the physical essence of a specific experiment from a number of methods of error calculation, which requires a certain experimental accuracy and logical analysis skills from the teacher and the student.

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