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PROBLEMS OF ORGANIZING LABORATORY WORK IN PHYSICS LESSONS AND THEIR SOLUTIONS

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ABSTRACT

The article discusses methodological approaches to conducting laboratory work in physics lessons, the role of physical science in choosing the future professional approach of students. The technique of performing laboratory work in physics with research elements of teaching based on a differentiated approach is described. Examples of laboratory work of varying degrees of complexity are given, the effectiveness of which has been debated.

Keywords: laboratory work, differentiated education, small squares method, educational process, quality of Education.

INTRODUCTION

It is necessary that the student transfers the logical and scientific thinking skills acquired during the laboratory work to the types of activities in production. When a student receives intellectual pleasure from a scientific approach to laboratory work, he realizes the need for the material being studied in the educational process, seeks to apply the acquired knowledge and skills. One of the most effective ways to achieve this goal is to organize laboratory work enriched with scientific research elements[1-2]. In modern education, laboratory work is one of the forms of Organization of the educational process. Laboratory work is a necessary component of educational programs in all educational areas in academic lyceums. Proper organization of laboratory work, proper use of laboratory equipment can lead to an increase in the effectiveness of Classes[3].

In this work, we have proposed several methodological approaches to conducting laboratory work on physics FA developed and effectively used by teachers of the Department of physics of the academic Lyceum at the Tashkent University of Information Technology named after Muhammad al-Khwarazmi. These approaches to conducting laboratory training can be used in a general sense in the study of not only the physics course, but also other subjects, including such subjects as chemistry, biology[4].

The methodology of our analytical work consists in the deductive generalization of personal experience in the use of scientific literature information in understanding the process of carrying out laboratory work and the implementation of a differentiated approach to educating students. Analysis of scientific literature has shown that improving the teaching of physics, which is the basis of Sciences based on the study of nature, is one of the pressing problems of modern engineering education. The necessary abilities for students are the process of consistent and logical thinking, planning and organizing work, working with devices and

techniques, applying skills in future labor activities. Psychological studies have shown that the role of mativotia in this is very important[5].

Professional skills (development and calculation of projects of electrical circuits, measurement of physical magnitudes using electrical measuring instruments, techniques for correctly returning results, etc.) develop very easily. After the completion of laboratory training, the indicator of mastering the teaching material increases significantly. Therefore, laboratory work allows the reader to understand the essence of the phenomenon under study, to understand it more deeply and remember it. Having carried out the necessary research in the process of performing laboratory work, the student acquires the skills of conducting an experiment, working with instruments or using any research method in accordance with the goals and objectives set by the teacher, using them in professional activities and production.

In the process of performing laboratory work, the formation of skills and competencies, as well as knowing that they will be necessary for mastering the specialist subjects in further courses at the university, is a complex and requires additional effort from the teacher. We must provide students with the opportunity to do these things with pleasure, in addition to having the knowledge and skills necessary for future professional activities when performing laboratory work or other educational work[6].

When the reader is inspired by a scientific idea or is interested in philosophical questions that arise in obtaining knowledge, he deeply feels the need for science and enjoys using an experimental method of laboratory work. Important results of strengthening the student's theoretical acquired knowledge in the form of laboratory training are the ability to do a certain part of scientific work with their own hands and form the skills of working in laboratory conditions and appreciate the work of scientists working in these conditions. Examples of such laboratory work are given below.

First: measuring the Resistance of the conductor by means of the Whitson bridge when performing laboratory work, the student will be able to know the meaning of physical magnitudes such as current strength, current density, voltage; know and apply the differential and integral representation of Om, Joule-Lens laws; will be able to apply Kirchgof rules for a chain consisting of parallel and At the same time, readers will get acquainted with the following:

• With the classic method of extinguishing resistances using the Whitson bridge;

• Using the Whitson bridge construction with separate measurements of the resistors connected in two different forms;

• By finding the total resistance for cases where these resistors are connected in parallel and in series;

• To carry out theoretical calculations on formulas for calculating the total resistance of parallel and sequentially connected resistors of measurement results, compare and draw appropriate conclusions.

During the performance of this laboratory work, most teachers can give assignments for students to perform individual work, but we suggest doing this work in a different way. At the beginning of the lesson, the teacher puts a scientific problem in front of the students on the topic. He talks about resistances and their connection, Om's law and Kirchgoff's rules, and offers to confirm his peculiarities with the help of laboratory equipment. Around us, berk

exchanges ideas from the entire audience about the presence of complex chains, about which the current strength and voltage passing through these complex chains can be measured using a special ammeter and voltmeter, in addition to the calculation. Students are divided into four subgroups, each of which experiments on the respective devices. A report on the work done complements and draws conclusions. Small group leaders report the results of the work to the whole group, and mixed coupling of resistances, Om's law and Kirchgoff's rules

Second: determination of Ampere force and magnetic field induction the laboratory will know the student Ampere's law when performing the work; can determine the magnetic field induction of a permanent magnet using Ampere's law, be able to induce Bio-Savar-Laplace's law for different currents. At the same time, readers will get acquainted with the following:

- With the structure of the laboratory device.
- By finding the value of the Ampere force from the results of the experiment.
- With the calculation of the module of magnetic field induction.

On the basis of these works, it is possible to organize a scientific study on the topic of magnetic field induction, Bio-Savar-Laplace's law. The teacher explains to the students that the calculation of the magnetic field for different currents must use the Bio-Savar-Laplace law. Readers must find evidence from the required literature on the derivation of the magnetic field calculation formula for these different currents and name any experiments. The students are then divided into 4 subgroups, which perform experiments for the right vine, the circular Vine, the solenoid, and the taroid. For different currents, the magnetic field induction is calculated and a general conclusion is drawn.

Carrying out laboratory work with scientific research elements is more profitable than in ordinary laboratory work. But scientific research should be carried out in the last part of the course. Because at the beginning of the course, students should learn to identify the goals of laboratory work, draw reports, work with tools, master research methods, make accurate measurements and identify their errors, draw conclusions, etc. Such tasks are not such a global problem as the formation of knowledge and skills discussed earlier in this article, but they are necessary for their solution, successful completion of the course and mastering special subjects at the University.

We always meet students with a different level of general knowledge of physics. Often we try to equate low-grading students with moderate-grading students in their knowledge. At the same time excellent learners end the program faster than intermediate learners and become cognitively equivalent to intermediate learners, who will need to be given stratified additional tools to gain more knowledge and skills[9]. A stratified approach in laboratory classes in physics can be carried out using the following methods:

1) work in a scientific circle with students;
2) Creating laboratory work of different difficulty;
3) development of methods for processing measurement results of different complexity;
4) implementation of the frontal implementation of the work.

To implement a differentiated approach, we have developed the following programs. Frontal performance of laboratory work-the whole group performs one work under the guidance of a teacher. In the first introductory lesson, students get acquainted with the procedure for performing work, obtaining measurement results, writing the results on a schedule, drawing

up a graph and performing calculations. To induvidualize the work performed frontally, we propose the following works: determination of Ampere force and magnetic field induction to perform laboratory work, at different values of the current force, in the correct and reverse connection of the current, in the case of Horseshoe magnets with different magnetic field induction.

Methods for processing measurement results provide great opportunities for the implementation of differentiated education in laboratory classes in physics. Using methods for processing measurement results, students carry out the following two large-scale work. The first is the procedure for calculating the random measurement error. A simple option is to calculate the average arithmetic error. Calculation of the calculation of the random measurement error using the styling method. The second is to analyze the results in the method of least squares of a straight line [10].

Many readers use the graphical method of placing experimental dots on the graph when a straight line needs to be approached and drawing a straight line along the drawing through them. This is an easy and somewhat simpler way. Now students with good results are offered to individually familiarize themselves with the method of Least Squares, perform calculations using spreadsheets, write a theoretical line formula and solve the problem posed by it in laboratory work. This can be applied when performing any laboratory work that is linear using the methods under study.

CONCLUSION

The number of laboratory work and their size largely depend on the availability of laboratory equipment of the educational institution. Exactly which of the existing laboratory work the student will perform, the work performed will be relevant in the production results of the teaching, organized taking into account the audience of students with varying degrees of knowledge, conducting laboratory work containing elements of scientific research, performing the results of measurements through processing methods, will be more effective work than in an ordinary laboratory. If the teacher has not developed a methodology for conducting laboratory work and has not thought about it enough, then it will be possible to waste time, teaching efficiency, even when performing the most necessary laboratory work.

REFERENCES

1. Kh.N.Karimov. // Methods of self-education in teaching students physics using ict-information and computer technologies // “Galaxy international Interdisciplinary Research Journal”, 11(2), -P. 471–475. (https://giirj.com/index.php/giirj/article/view/4889).

2. X.N.Karimov. // Fizika fanini o‘qitishda virtual laboratoriya ishidan foydalanish // “Yosh olimlar, doktarantlar va tadqiqotchilarning onlayn ilmiy-forumi” materiallar to‘plami. –P. 102-104
(https://scholar.google.com/citations?view_op=view_citation&hl=ru&user=i5SoNTcAAAAJ&pagesize=80&citation_for_view=i5SoNTcAAAAJ:qxL8FJ1GzNcC).

3. S.S.Khalilov. // Evaluation of students using frame model in teaching physics in distance education // Galaxy International Interdisciplinary Research Journal. Vol 11, -P. 291-295 (https://giirj.com/index.php/giirj/article/view/5188).

4. Axmadov M. // Pedagogik dasturiy vositalar yordamida fizika fanini o ‘qitish //Центральноазиатский журнал образования и инноваций. – 2023. – Т. 2. – №. 10. – С. 90-92.
5. Asfandiyorov M. M. O‘. Muqobil energiya manbalaridan foydalanish istiqbollari //Academic research in educational sciences. – 2022. – Т. 3. – №. 1. – С. 322-325.
6. B.B.Turdiqulov, O‘S.Nazirov, Yu.N.Karimov. // Atom va molekulalarning yorug’likni yutishi va nurlanishi // UIF = 8.1 | SJIF = 5.685. 2022. –C. 1252-1258. (https://scholar.google.com/citations?view_op=view_citation&hl=ru&user=HF__xJoAAAAJ&citation_for_view=HF__xJoAAAAJ:u5HHmVD_uO8C)
7. X.Sh.Asadova, Yu.N.Karimov. // Effective organization of the educational process based on new modern technologies // “Science and innovation” international scientific journal. Volume 1 Issue 7. 2022. -S. 230-233. (https://scholar.google.com/citations?view_op=view_citation&hl=ru&user=HF__xJoAAAAJ&citation_for_view=HF__xJoAAAAJ:2osOgNQ5qMEC).
8. X.N.Karimov, A.E.Imamov, E.Z.Imamov, //Development of creative thinking in higher education// Science and innovation» international scientific journal. (https://zenodo.org/doi/10.5281/zenodo.7650805)
9. Axmadov M. // Pedagogik dasturiy vositalar yordamida fizika fanini o ‘qitish //Центральноазиатский журнал образования и инноваций. – 2023. – Т. 2. – №. 10. – С. 90-92.
(https://scholar.google.com/citations?view_op=view_citation&hl=ru&user=Tl5hqLkAAAAJ&citation_for_view=Tl5hqLkAAAAJ:dhpJJ7xvgBgC).
10. X.N.Karimov, M.M.Asfandiyorov, M.A.Axmadov. // Zamonaviy yondashuvlar asosida fizika o‘qitishni rivojlantirish // “Yosh olimlar, doktarantlar va tadqiqotchilarning onlayn ilmiy-forumi” materiallar to‘plami. 2023. –P. 113-115.