

Principles Of Selecting Materials For Problem Based Training In The Section Electrodynamics Physics

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Abstract-

The article presents ways to use the problem method of teaching physics at the Department of electrodynamics, the selection of materials that support the problem method of teaching. In order for students to become profoundly proficient in physics, it is better to solve more questions and select individual materials for laboratory work. The article presents a wide application of problem-based teaching methods in teaching electrodynamics and found its confirmation in the results obtained.

INTRODUCTION

The conducted pedagogical experimental and testing works have shown that at present electrodynamics is widely used in all spheres of everyday life. Therefore, students should receive basic knowledge of electrodynamics from the school. It is important for the teacher to know how to purposefully select problem materials according to their content and essence, justifying the importance of scientific direction and educational materials that are goal-oriented, methodically based, and have a clear idea. Therefore, the teacher should not only collect the necessary information about the program, but also systematize it, search for the necessary methods to introduce them to students in classes and extracurricular activities.

From our observation and teaching experience it is known that the choice of materials in problem-based learning, electrodynamics must serve the following terms:

1. During problem-based learning electrodynamics material should not only tell us about the nature of the subject, but also to Express the specific characteristics of the subject.
2. in the case of problematic teaching of electrodynamics, the selected material should serve not only as a visual tool, but also as a tool of methodological assistance to the teacher in deepening theoretical knowledge.
3. in the case of problematic teaching of electrodynamics, the selected material should allow students to understand scientific problems and help them in their study, form an interest.
4. the Study of materials related to problem-based training in electrodynamics should be specific to each subject.
5. when teaching electrodynamics problems, it is necessary that the materials reflect the prospects for the development of modern science and technology.

6. Before the problem study of materials on electrodynamics, we found that it is appropriate to focus on the concept of "problem situation".

METHODS

A problem situation is an objective contradiction that requires active thinking on the part of the reader. The problem situation forces the reader to return previously studied materials, along with the fact that new material requires study. The choice of materials for problem-based learning should meet the following requirements:

1. in the process of studying the selected material, when the reader is faced with a problem situation, let him believe in its solution, combined with a sense of a certain difficulty.
2. The selected material must contain information that is news to the reader. This, in turn, will increase the reader's interest in the search.
3. when composing a material with a problematic content from electrodynamics, it is necessary to take into account the purpose of training.

If in the process of obtaining knowledge of electrodynamics students independently master the material, they can get independent knowledge.

Getting independent knowledge means that, first, he can analyze the material being studied; second, he can look for ways to solve problems in the material being studied.

In our opinion, one of the problematic aspects of organizing problem-based learning is that the teacher can correctly select materials during the lesson. Questions about the selected material should be structured in such a way that the reader can fully study the material while answering questions.

The pedagogical skill of the student is the ability to see the problem situation from the selected material and correctly put it before the students. To do this, the teacher, first of all, needs to study this material thoroughly and thoroughly.

Based on the characteristics of the teacher, the choice of material in problem learning can be divided into the following levels:

1. The problem in the selected material in problem learning is solved by the teacher himself. During the explanation of the selected material, the problem is solved by the teacher. In this case, the teacher will be active.
2. the Problem in the selected material in problem learning is determined by the teacher, the solution of which is mainly taken by the student. It is convenient for the description of more new materials. This increases the activity of the student while maintaining the activity of the teacher.
3. Problem in the selected material in problem-based learning determined by the teacher and solved by the student independently. This increases the activity of the student, and the teacher only helps to analyze the problem.
4. in problem learning, the problem on the selected material is determined by the student himself, looking for a solution on his own. This means that the reader is given complete freedom.

RESULTS AND DISCUSSION

Based on the conducted pedagogical experimental and testing works, we have determined the essence of the problematic use of electrodynamics in teaching. It consists of, i.e. based on the materials of the problem content, we have summarized the data obtained and the materials studied in the following direction, so that it is easy to choose materials for problem-based teaching of electrodynamics topics:

1. Problem study of materials on the history of electrodynamics development.

2. Problematic study of practical application of electrodynamics.
3. Problem study of educational tasks in electrodynamics.

All collected materials of problematic content were selected taking into account educational tasks and forms, principles of didactics in teaching electrodynamics, given above, are brought into a complete system.

If there is a lot of material in the problematic teaching of electrodynamics, then one of them is chosen that can fully meet the requirements of the secondary school program. Taking into account this requirement, the material of the chosen problem content should not only distract the reader from the main material, but also strengthen and deepen the subject under study, increase interest in acquiring knowledge, and reveal the connection between electrodynamics and practice.

The content of the selected problem should arouse the reader's interest in the material being studied, and contribute to an in-depth study of program materials.

Successful application of electrodynamics is possible in problem-based learning, if the task is able to acquaint students with the basics of new modern technology and technology directly enough from a scientific point of view, to develop their interest in solving the problem. This is one of the important selection criteria arising from the current requirements for the content of the General secondary school course. The use of materials of this content in teaching electrodynamics is expressed in the following:

1. Allows you to determine the place of electrodynamics in modern production.
2. it equips students with the necessary knowledge so that in the future they can get a specialty in the field of energy and conduct research.

One of the criteria for choosing the material in problem-based teaching of electrodynamics is the overall level of development of the student, the possibility of its assimilation. Also, do not overload the reader.

The selected materials on electrodynamics are important in the implementation of Polytechnic education. In case of problematic training in electrodynamics, you should choose such materials that, in turn, will provide significant assistance in the study of the physical foundations of electrification of the national economy, the use of computer equipment and technologies.

We used the following principles of greater didactics in problem-based learning of electrodynamics.

1. in the case of problematic teaching of electrodynamics, the selected material must first of all be coordinated with the study of issues in the program, allowing to perform educational tasks facing the physics courses of secondary schools.
2. the Problem posed in the problematic teaching of electrodynamics is more practical, more precisely, in the principle of connection with life.
3. The chosen problem will help to implement economic and Polytechnic education.
4. The material selected for the problem-based learning elektrodinamike must be scientifically sound, educational objectives. The problems posed in problem-based teaching of electrodynamics can only be used if the reader has a clear idea of the practical necessity. The problem posed for this purpose must be carefully considered and convincing.
5. when teaching electrodynamics problems, it is necessary to take into account the age characteristics and theoretical training of the student of the selected material. The content, volume, and role of the material studying the problem is determined based on the overall development of the reader.

6. the Material selected for the problem teaching of electrodynamics is the basis for independent and research activities of the student.

The problem material under study should not only stand out from the materials of the program, but also be harmoniously combined with it. In case of problematic teaching of electrodynamics, examples and proofs of the selected material should be provided so that there is no overload for students. There should be no unnecessary details in the problem under consideration.

Materials selected for problem-based learning in lessons and extracurricular classes on electrodynamics, as well as methods for solving problems and performing laboratories, must be scientifically sound and appropriate from a pedagogical point of view. In addition, it is necessary to use such principles of didactics as consistency, consistency, and visibility in the learning process.

Problem-based learning in teaching the section "Electrodynamics", as well as teaching other sections of physics in secondary schools, increases the effectiveness of the educational process and the student's activity and interest in science. If in the course of the lesson it is appropriate to use questions, questions, tasks of problematic content, then it is sure to awaken the reader's interest in the discovery of scientific innovations. The reader independently searches for an answer to the problem, tries to solve the difficulties encountered in solving the question. The use of questions, tasks, questions in the problem content in physics lessons leads to an understanding of the essence of physical processes.

In the section "Electrodynamics" of physics, in which we conduct research, the choice and solution of the problem content is of particular importance. Choosing and solving issues of problematic content from electrodynamics increases the reader's ability to think, helps to learn more deeply and strengthen the listed topics.

In the research work of many methodologists-physicists, much attention was paid to the use of problem content in the educational process. For example: L. I. Reznikov, V. G. Razumovsky, R. I. it is Proved that maoafeevs do well with research work. R. I. Malafeev points out that problematic questions from physics are directly related to questions of a creative type.

What do you need to understand when it comes to problematic issues? In our opinion, problematic issues should meet certain requirements. To select and resolve a problematic issue, one aspect of legality will not be disclosed. This flaw in the question makes it a direct problem. Only questions in this direction help the student to get deep knowledge, develop thinking skills.

The conducted pedagogical experimental and testing work confirms these conclusions. In the course of pedagogical experimental work, the knowledge of students of the VIII class on such topics as "current strength", "voltage", "resistance of the conductor" is checked. After students have mastered the above topics well, they are asked questions of problematic content that need to be creatively approached.

During the physics lessons, students' independent laboratory work, demonstration experiments, front-end laboratories and practical work were presented.

Problem laboratory work on electrodynamics is one of the main methods of teaching that connects the student with practice. In our research work, we used a problem-based learning method when performing problem laboratory work in electrodynamics classes.

As you know, laboratory work performed on electrodynamics for certain indications, leave little chance for independent activity of the student. However, in such laboratory work, not all students are in the same situation and their individual capabilities are not taken into account. The teacher faces

many difficulties in evaluating the student. At some point, the teacher evaluates the student depending on the laboratory work performed. If the student solves the problem from experience, the teacher's assessment becomes easier.

It is doubtful that a teacher who has not conducted a problematic laboratory work on electrodynamics will be able to conduct it. In most cases, they have the following questions " " how to work with a reader who can not solve the problem quickly?", "do I Need a problem laboratory work on electrodynamics, since the lesson is designed for 45 minutes?". Based on the evidence collected so far, we can say that from electrodynamics it is necessary to conduct problematic laboratory work. Laboratory work with such content can be successful, as if they were methodically correctly organized. Every schoolchild is working at full capacity. In this process, each student's work will look creative.

We offer the reader problematic laboratory work with varying degrees of complexity from electrodynamics. In some cases, the reader is given one General and several auxiliary tasks.

The assistance that the teacher provides to the student must have an individual description. When evaluating a student, first of all, their independent performance of problematic laboratory work and the amount of work is taken into account.

In General, problematic laboratory work on electrodynamics can be organized as follows:

- search for the General idea of the problematic execution of laboratory works on electrodynamics;
- drawing up a plan for creating a problem situation;
- creating a problem situation;
- the decision of a problem situation;
- processing of the obtained results using mathematical and statistical methods;
- make scientific conclusions, give practical recommendations.

Consider, for example, the topic " determining the strength and internal resistance of an electric power source drive".

Laboratory work on electrodynamics is disclosed in the textbook in such a way that the reader does not need to think independently.

Before starting work, put the following necessary equipment on the pupil table: batteries, rheostat, ammeter, voltmeter, switch. On the Board is written the topic of laboratory work. "Determine the internal resistance of the battery". The following two additional tasks are written in large letters on the paper, which hang next to the Board:

1. If the external resistance of the conductor is equal to R , then the current in the circuit will be equal to I : check the result on experience. If the result does not match the experience, then explain the reason for it.

2. How to determine the internal resistance of the source, if you only have an ammeter and a rheostat? Does the internal resistance correspond to the first experience? If it doesn't fit, explain why.

When a teacher performs their first lab work, "three "marks," four "marks when performing the first and second work, "five" marks when performing the entire work. It is worth noting that the evaluation of the work depends on its independent performance. If a Reader asks for help or looks at a reader sitting at another party, the price goes down. After that, the teacher writes:

1. Make a written plan for performing laboratory work.
2. Draw a diagram of the electrical circuit and make it.

If there are students who can't complete a problematic laboratory work in electrodynamics, they are given a card that will help them complete the work. When evaluating this work, of course, it is taken into account. It may contain the following content:

1. Write the formula of the Ohm's Law for the complete chain.
2. Remember how the source of the EQ is determined.
3. Once again recall the method of determining the internal resistance.

Other benefits are provided both individually and orally. After the work plan is verified by the teacher, the connecting wires will be passed to the students.

When can a problematic laboratory work from electrodynamics be problematic? If a task related to the job has a problem description, the problem task may be associated with a non-problem task.

The first additional task in the work under consideration is not problematic, since it is not intended for independent work of the student, that is, it does not require new methods of execution. These tasks have the characteristics of test exercises. The second additional problem requires a new solution method.

Electrodynamics can be used when performing problematic laboratory work, depending on their nature, training time, and other circumstances. In some cases, the problem can only be used when the main idea of the work is revealed by staging. In most cases, the work can not be completed in full is problematic. For example, "determine the electrochemical equivalence of copper". When performing problematic laboratory work of this content, the reader does not see the essential aspects of the work. The reader should know that during electrolysis, it is necessary to constantly reduce the current strength and introduce the rheostat into the circuit for its uniform storage, the copper layer on the cathode should be solid, as soon as a certain current density, sufficient time is needed to perform the experiment.

Therefore, it is desirable to perform laboratory work of this content according to the instructions. But in order to determine the General idea and important properties of the work, you can give the reader problematic tasks. For example, look for an experimental method for determining the electrochemical equivalence of copper. Make a plan to complete the work. These tasks can be given at the end of the lesson before a problematic lab session as homework. Readers write their thoughts on a sheet of paper.

At the beginning of a problem laboratory session on electrodynamics, the sheets are collected and the ideas put forward are discussed with the class. At the same time, electrodynamics pays attention to the correctness of performance and the result of problematic laboratory work. In practice, we have seen that the organization of work on electrodynamics in the form of a problem laboratory will help the reader understand the idea of the experiment and study its important aspects.

Pedagogical experimental tests have shown that problematic laboratory work from electrodynamics will be more effective if it is carried out in conjunction with laboratory work performed as directed. Because not every work can be organized as a problem lab, this is not practical, even if it is possible. It is impractical to organize laboratory work on electrodynamics is problematic in the following cases:

1. When it is difficult for the reader to find the idea of research work on their own. For example, the laboratory work on the content "determine the electrochemical equivalence of copper".
2. At a time when students could not independently understand important aspects of laboratory work.

3. When the purpose of the problem laboratory work on electrodynamics coincides with the formation of the student's initial practical skills and abilities or observation of the phenomenon.
4. With insufficient assimilation of the theoretical knowledge required to perform problem laboratory works on electrodynamics.

At other times, it should be borne in mind that problematic laboratory work on electrodynamics is suitable for most students in the class. If it is convincing, that is, most of the students in the class can not do at least part of the work on their own, then it is not advisable to conduct problematic laboratory work on electrodynamics.

CONCLUSIONS

1. in the process of problem-based learning of electrodynamics, students formed theoretical knowledge, practical skills and abilities for better assimilation.
2. the Absence of a problematic system of teaching electrodynamics in secondary schools hindered the independent acquisition of knowledge by students, creative study of materials on subjects.
3. Currently, in secondary schools low level problem of teaching of electrodynamics, the problem is theoretically and practically worked out, methodical handbooks for teachers, textbooks for students are almost there.
4. it is Advisable and important to use problem-based teaching of electrodynamics in the classroom, extracurricular and elective classes. Because, expanding the scientific Outlook of students, materials on electrodynamics allowed us to apply the theoretical knowledge in practice in the classroom.
5. the course papers Developed by the researcher on problem-based teaching of electrodynamics allowed to increase the efficiency of use during lessons and extracurricular activities and to develop positive abilities of students.

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