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THE ADVANTAGES OF USING INNOVATIVE AND INFORMATION TECHNOLOGIES IN TEACHING THE SECTION OF PHYSICS "ELECTROMAGNETISM" IN A SECONDARY SCHOOL

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ABSTRACT: This article highlights the benefits of teaching electromagnetism using innovative and information technologies, as well as the ways and importance of improving the quality of education. Also, this article reflects the results of the application of innovative information technologies in the educational process, as well as comments and suggestions on a new approach to the educational process in educational institutions.
KEY WORDS: Innovation, modern educational technologies, information technology, interactive, individual.

ПРЕИМУЩЕСТВА ИСПОЛЬЗОВАНИЯ ИННОВАЦИОННЫХ И ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В ПРЕПОДАВАНИИ РАЗДЕЛА ФИЗИКИ «ЭЛЕКТРОМАГНЕТИЗМ» В ОБЩЕОБРАЗОВАТЕЛЬНОЙ ШКОЛЕ

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АННОТАЦИЯ:
В данной статье освещаются преимущества обучения электромагнетизму с использованием инновационных и информационных технологий, а также пути и важность повышения качества образования. Также в данной статье отражены результаты применения инновационных информационных технологий в образовательном процессе, а также замечания и предложения по новому подходу к образовательному процессу в общеобразовательных учреждениях.

КЛЮЧЕВЫЕ СЛОВА: Инновации, современные образовательные технологии, информационные технологии, интерактивный, индивидуальный.

INTRODUCTION

Today it is important to improve the quality of teaching physics in educational institutions, introduce modern teaching methods into the educational process, select talented students, prepare competitive specialists for the labor market, develop scientific research and innovation, and focus on practical results.

At the same time, a number of unresolved issues in the field indicate the need to implement measures aimed at improving the quality of education and the effectiveness of scientific research in the field of physics.

In the following years, the laws on education that are being implemented in the Republic of Uzbekistan set the task of reforming the educational system, providing modernity, humanism, the scope of knowledge given to all educational institutions with vital processes, for which such requirements as the widespread use of modern information technologies of teaching are imposed. Currently, intensive application of innovative pedagogical and information technologies in physics education has become a pedagogical and methodological idea. The introduction of information technologies into the educational system has led to the creation of new types of activities (acquaintance with physical models, computer experiments, solving experimental problems, conducting research, creative tasks), especially in the teaching of physics. Among them, one of the main problems in teaching physics is the creation of virtual stands of laboratories, modeling of physical processes is one of the urgent problems of today.

RESEARCH MATERIALS AND METHODOLOGY

In the future, the creation of electronic textbooks is underway to further improve teaching. Teachers can use it well. It is very convenient for both the student and the teacher, you can learn the desired topic on the computer and get answers to the necessary questions. Bu elektron darsliklarning eng qulay tomoni olisdan turib boshqarishga imkon beradi. The methodology of visual teaching of physics is a teaching about the structural forms and methods of organization of the lesson, as well as the laws of the development of the theory of physics teaching and the principles of implementation of its results. [1].

In each period, the ability to correctly guide students in the process of teaching subjects is considered one of the most important tasks, and this process changes depending on the period. The education expected of a student today is completely different from that of young people 10-15 years ago. Modern pedagogical technologies, interactive methods and innovative information technology tools should be used in teaching. It allows active transition of educational programs from passive education to active education through innovative and information technologies. Including physics is an experimental science, which is always taught together with a visual experiment [2-4].

The student spends a lot of time studying the laboratory in the traditional way of studying physics in secondary schools. This leads to a departure from the regularity of the allotted time, the result of which is the reason that the laboratory exercise is not fully understood. Laboratory training is important in learning physics. Today, as technologies are developing at a rapid pace, laboratories and equipment for practical training require annual renewal. Therefore, it is necessary to use modern information technologies. Creating electronic manuals and using textbooks through the use of innovative and information technologies in general education schools helps to eliminate a number of shortcomings of the traditional teaching method. [5-9].

RESEARCH RESULTS

For this reason, we can take the website www.vascak.cz/physicsanimations as an example for conducting virtual laboratories using innovative and information technologies in teaching the subject of physics and electromagnetism in secondary schools.

In this virtual laboratory, the latest methodology is used, and all the features of education are covered step by step, based on modern innovative and information technologies.

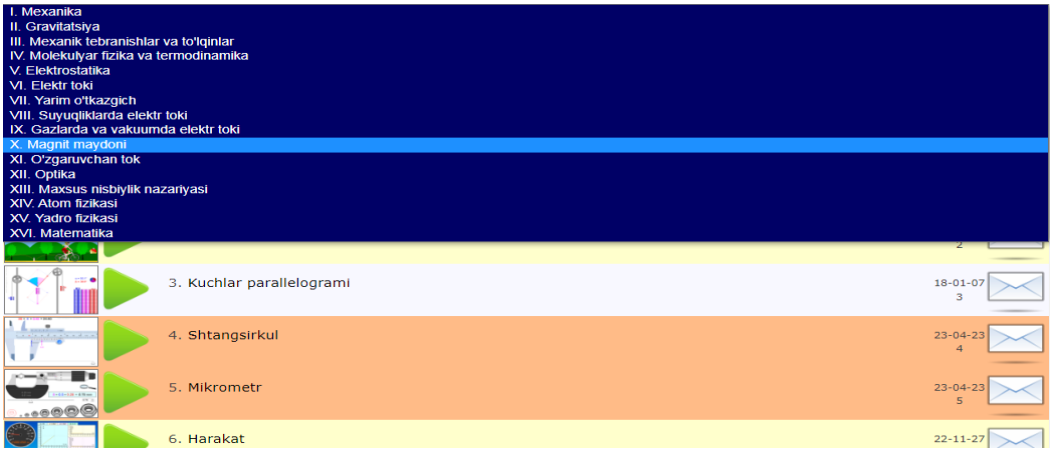

Figure 1. Performing laboratory work using information technologies.

We visit the indicated electronic site, on the electronic site more than 250 virtual labaratorias are concentrated in the sequence of topics.

Figure 2. Virtual laboratoriyalar to'plamiga ega sayt.

We will choose a virtual laboratory session on the topic of science. Virtual laboratory work will be presented to us in the new platform window that opens.

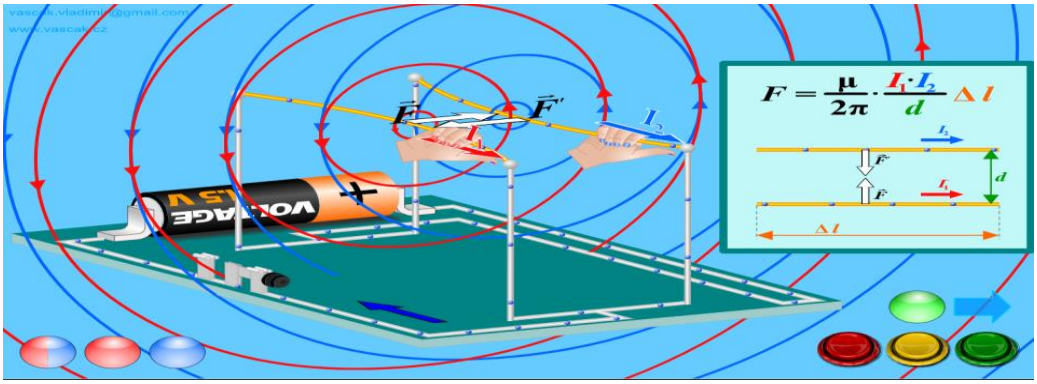

Figure 3. Study of the interaction of current conductors.

First, we will participate as an observer in the presented virtual laboratory related to the chapter of electromagnetism, and then we will independently complete this virtual laboratory and perform the physical or mathematical operations introduced. The most interesting process is that if the result obtained through the virtual laboratory on electromagnetism is correct, the device will work, on the contrary, if there is a defect, it will indicate that the device is broken or burnt. [10].

In order to determine the modern knowledge potential of students of secondary schools in Physics, traditional laboratory and virtual laboratory trainings were held. Analysis of the obtained results in total percentages:

The mastery rate of students who completed traditional laboratory work is 78%;

The mastery rate of students who completed virtual laboratory work is 96%.

Differences between virtual laboratory work and traditional laboratory work:

Preventing an unexpected accident during the virtual laboratory exercise;

Inability to repeat the process in a traditional laboratory;

Inability to fully observe the phenomenon in a traditional laboratory;

Making mistakes in calculations in a traditional laboratory;

Availability of the possibility to perform laboratory work of all subjects in the physics textbook in the virtual laboratory, etc..

As we live in the age of science and technology, most of the processes around us are closely related to physics. As an example, we can take the electromagnetism chapter of physics:

1. The working principle of an electric car is based on the law of electromagnetic induction.
2. The principle of operation of a smartphone is based on an electromagnetic wave, which includes a resistor, a rheostat, and capacitors.
3. The autopilot has the feature of automatic analysis of given signals.
4. The electromagnetic relay has the property of increasing and holding the signal.
5. A power plant has the ability to convert mechanical energy into electrical energy. Hundreds of such examples can be cited.

Today, there are some difficulties in studying the electromagnetism department in general education schools. Disadvantages of the recommended physics textbook for general secondary schools in the teaching of electromagnetism.

1. The number of pages is limited
2. Insufficient information
3. Failure to update information
4. Failure to observe the ongoing process
5. Education at a certain time.

We can make some progress by using innovative and information technologies to overcome the shortcomings in the teaching of modern electromagnetism department in general education schools.

1. The number of pages is not limited
2. Sufficient information
3. Information Update
4. Monitoring the process
5. Continuing education.

DISCUSSION

Let's compare the above two methods: "Induction current generator" science topic. Induction current explains the principle of operation of the generator based on Michael Faraday's law of electromagnetic induction. Since this law is hypothetical, it is difficult to understand theoretically, so it is more complicated for students to understand. In most schools, it is appropriate to use information technology tools because the laboratory equipment is not suitable or sufficient. When the topic of induction current generator is passed, as we know, the recommended physics textbook for general secondary schools has the above-mentioned shortcomings. Scientific gaps arise in the study of science for students on this topic. The use of innovative and information technologies in the teaching of electromagnetism is much more effective than the recommended physics textbook for secondary schools.

CONCLUSION

Since physics is the basis of natural sciences, their basis is physics. The teaching of physics in secondary schools using innovative and information technologies serves to increase students' interest in science. As a result of teachers' active use of innovative and information technologies, students' interest in science and their independent work are increasing. The use of innovative and information technologies in the teaching of physics significantly increases the quality of students' knowledge, which serves to raise the educational process to a new level. Studying physics through innovative and information technologies will help students find their way in the future.

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