

Information and Communication Technologies in Physics Lessons

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Abstract— *The organization of physics education based on information and communication technologies helps to create conditions for the effective manifestation of patterns of thinking, to excite the cognitive process. The factor that allows this to be done is the visualization of basic mathematical and physical concepts, processes and phenomena using a computer.*

Index Terms— *Information and communication technology, physics, teaching, lesson, computer*

I. INTRODUCTION

Information technologies increase the informativeness of the lesson, the effectiveness of teaching, give the lesson dynamism and expressiveness, give the opportunity to emotionally and figuratively present the material, saves time in the lesson. The purpose of using information and communication technologies in physics lessons is as follows: To make the lesson modern, to educate students in the process of activity a positive attitude to science in general and to physics in particular; to develop interest in physical knowledge, popular scientific articles, life problems.

Solved tasks when using information and communication technologies:

- Instilling the skills of research work through the organization of research activities using a variety of methods and forms of independent cognitive and practical activities.
- Development of the ability to extract information from a variety of sources, process it using computer technology.
- Formation of the ability to briefly and clearly formulate your point of view.
- Education of skills of cooperation in the process of joint work.

Today it is especially important to develop the cognitive activity of students, to form an interest in the process of cognition, in ways of searching, assimilation, processing and application of information, which would allow schoolchildren to be the subject of learning, easily navigate in today's rapidly changing world. New technologies are being created, new teaching methods are being developed, non-standard forms of lessons, variable programs and textbooks appear, etc. Success largely depends on the skill of the teacher. However, the desired result may not be achieved if the individual characteristics of the child are not taken into account.

Modern teaching at school faces the problem of reducing students' interest in studying subjects. Such a school subject

as physics has long been classified by society as the most difficult. The teacher's task is to arouse interest, not to scare off children with the complexity of the subject, especially at the initial stage of studying the physics course.

There are computers in our school, there is access to the Internet, more and more computers are being purchased in the families of students. This contributes to the introduction of new pedagogical technologies in the educational process.

I am expanding my educational and educational activities, using information and communication technologies in educational and extracurricular activities.

Computer technology in physics lessons involves:

- the use of multimedia technologies in the study of educational material;
- intensive use of computers as a tool of daily educational work of students and teachers;
- changing the content of physics education;
- implementation of interdisciplinary connections of physics with other academic subjects;
- development of methods of independent search and research work of students during the implementation of educational telecommunication projects;
- teaching students by the method of collective problem solving;
- search and processing of information within the framework of the studied material using the Internet;
- using spreadsheets to solve problems;
- conducting virtual workshops and laboratory work;
- preparing teachers to work with new content, new methods and organizational forms of education.

Computer communication allows access to virtually unlimited amounts of information stored in centralized data banks. This makes it possible to rely on the entire stock of knowledge available to the inhabitant of the "information society" when organizing the educational process.

Thanks to the use of information technologies, it is possible to show fragments of video films, rare photographs, graphs, formulas, animation of the studied processes and

phenomena, the operation of technical devices and experimental installations, listen to music and speech, and turn to interactive lectures.

With the help of a computer, you can show such phenomena and experiments that are inaccessible to direct observation, for example, the evolution of stars, nuclear transformations, quantization of electronic orbits, etc. Using models from a virtual laboratory created in the project environment "Living Physics", you can simulate the processes occurring in a cyclotron, mass spectrometer, show the movement of electrons in a magnetic field. Demonstration of experiments, micro-processes that cannot be done at school, is possible without showing real experiments.

No less practical was the use of photographs of posters taken with a digital camera. In electronic form, these posters are more clearly visible to everyone in the classroom, especially since you can enlarge the necessary part of the poster.

It becomes possible to perform work in a virtual laboratory by selecting various initial parameters.

Many of my students who have a computer at home use training programs to perform creative homework, the results of which are presented in class. This allows me to conduct individual work with students, expand their educational environment.

To conduct thematic and final control of students' knowledge, I have compiled and used computer tests in the lessons.

When using information technologies in teaching electrostatics, the main software of the discipline can be electronic reference books, tabular processors (Excel), special programs (Mathcad, Maple, etc. computer programs) [1; 2].

The use of information technologies in teaching electrostatics contributes to the improvement of students' knowledge of the subject, a conscious understanding of the methods of cognition of this field of science, the ability to work with information flows from various sources. With the help of computer programs, students solve problems in electrostatics using a given system of relations and connections. Solving problems with the help of programs consists mainly of four stages: analysis of the problem condition; choice of the order of the problem statement; construction of a system of equations describing the phenomenon under consideration; transformation of the resulting system of equations and calculation of the required quantities.

When teaching electrostatics using information technology, the following informative material can be presented:

1. computational experiment. The role of experiment in the cognition of electrostatic phenomena. The role of computer technology in conducting research and experiments. Software tools for conducting virtual experiments. The

Electronic Workbench application.

2. Software tools used for mathematical modeling of electrostatic phenomena (tabular processors, programming systems, Mathcad mathematical package) [3].

3. Quantitative and qualitative physical problems on the topic of Electrostatics. Various ways of making a report. The scheme of the report output. Computer software for solving problems (tabular processors, programming systems, the Eureka mathematical package).

4. processing of research results. Plotting diagrams. Working with tabular data. Introduction of multimedia objects.

The following advantages of using new information and computer technologies can be noted [4]:

- the presence of a clear and interesting interface;
- multimedia capabilities;
- creating conditions for independent work of students;
- the student develops the skills of educational work;
- changing attitude to knowledge, allows you to think quickly;
- gets used to solving persistent problems;
- conditions are being created for the student's self-development;
- the intellectual qualities of the student are developing;
- the student independently performs homework, actively participates in the assimilation of exercises and knowledge.

In addition, the following benefits are provided to teachers in the teaching process:

- contributes to a more interesting organization of the educational process;
- allows you to effectively and effectively present the training material;
- use electronic textbooks, electronic textbooks, etc.;
- allows you to maintain electronic documentation.

During the implementation of these goals, there is a need to use new methods in the formation of students' information culture.

The basis of computerization of learning as a social process consists of two directions: computerization of knowledge and computerization of learning.

Computerization of learning covers only that area of computer application that is directly related to learning. In this context, the most voluminous is the computer usage space (training sessions, student testing, knowledge control, game classes, etc.).

The fascination and clarity of the lesson directly depends on the skill and curiosity of the teacher. Working on the Internet also opens up limitless opportunities for our students to learn about the achievements of world education and science. Without information and computer technologies worthy of the requirements of modern development, it is impossible to solve the above.

II. CONCLUSION

The use of modern computer technologies in school meets the goals and objectives of a modern school. My accumulated experience, partially reflected in this work, shows that the use of information technology in physics lessons expands the creative possibilities of both teachers and students, increases interest in the subject. Thanks to information computer technologies, which are used not only in physics lessons, but also in school in general, the teacher develops imaginative and creative thinking of students. The applied innovative teaching methods focus on the individual cognitive needs of the individual, foster cognitive interest, communication skills of students in the exchange and processing of joint computer projects.

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