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TEACHING SOFTWARE TOOLS AND VIRTUAL LABORATORIES IN TEACHING PHYSICS

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Abstract
This article discusses software tools and virtual labs in teaching physics.

Keywords: physics, virtual laboratory, experiment, computer, software, intellectual potential.

Introduction

At present, technical direction virtual physical experiments in higher educational institutions is a relatively new direction both in scientific research and in the educational process due to the implementation of physical models with the help of computer technologies. The development of physical science and the study of physical science are inextricably linked with the construction and study of models of various physical phenomena. Therefore, one of the urgent problems is the creation of science-based approaches to the study of simplified equivalent models of physical laws by intelligence.

In the educational process, the most urgent problem is to discover a new teaching method for each subject of physics. This is directly related to the reform of the teaching process, that is, it will consist of introducing a new teaching method that corresponds to the possibilities of students' real knowledge of the studied subject based on an innovative approach to educational materials. In the teaching of physics on the basis of pedagogical software tools, scientific-methodological researches aimed at the development of students' intellectual potential are the most important current problems, and students' thinking is developed through computer technology models of physical phenomena.

Currently, the technical direction of making models of physical phenomena, virtual physical experiments with the help of information communication technologies has a practical effect on the development of the intellectual potential of students of higher educational institutions. Computer models of many physical phenomena are very easy to explain the physical phenomenon and serve to develop students' cognitive abilities

and imagination. Examples include material point, ideal gas, model of Rutherford's experiment, charged particles.

The technical direction of physical models is also widely used in higher education institutions. Educational computer models in the form of virtual physical experiments have a high role in teaching physics.

In addition to the visual representation of standard laboratory work in physics, virtual physics experiments can also demonstrate various physical phenomena that cannot be performed in the classroom. Based on the fact that this is the basis for the development of students' mental thinking, it should become one of our main goals to establish the teaching of physics using pedagogical software tools and to conduct scientific methodical studies of the development of students' intellectual potential. Physics cannot be studied without an experimental part.

A lot can be said about the need to move to new standards of education, the need to introduce information technologies into the educational process. Currently, more attention is paid to virtual laboratory work on various topics. They should only be supplemented without completely changing the actual laboratory work being given. In addition, virtual lab training should only be used in training after the student has become familiar with real devices. Laboratory work in physics is divided into the main sections of the program. There are 3D options for lab work. A virtual laboratory is a hardware and software complex that allows you to conduct experiments without direct contact with a real installation or in its complete absence. In this case, the concepts of "virtual laboratory" and "virtual remote laboratory" should be distinguished. The basis of the virtual laboratory is a computer program or a set of related programs that perform computer modeling of certain processes. A remote virtual laboratory is a group organizational structure of several scientists belonging to different scientific centers and connected by mutually beneficial cooperation relations through the Internet. Compared to traditional laboratory work, virtual laboratory work has several advantages. First, it is impossible to buy expensive equipment and dangerous radioactive materials. For example, laboratory work in quantum or atomic or nuclear physics requires specially equipped laboratories. Virtual laboratory work allows to study phenomena such as photoelectric effect, crystal lattice detection by electron scattering, study of gas laws, nuclear reactors and others. Second, it is possible to simulate processes that do not exist in the laboratory. In particular, most of the classical laboratory works in molecular physics and thermodynamics are closed systems, at the output of which certain electrical quantities are measured, from which the required quantities are calculated using the equations of electrodynamics and thermodynamics.

In the process of performing virtual laboratory work in these areas of physics, students can use animated models to observe dynamic pictures of the studied physicochemical phenomena and processes that cannot be observed in real experiments, and at the same time, they can observe the corresponding graphical structure of physical quantities along with the experiment. Third, virtual laboratory work can visualize physical or chemical processes more visually than traditional laboratory work.

For example, physical processes such as the movement of charged particles that create electricity can be studied in greater detail and precision. You can also access processes that last seconds or several years, for example, studying the motion of the planets in the gravitational field of the central body. Another advantage of virtual labs over traditional labs is security. In particular, it is appropriate to use virtual laboratory work in situations where you work with high voltage or hazardous chemicals.

However, virtual labs also have their drawbacks. The main thing is the lack of direct contact with the object of study, tools, equipment. It is absolutely impossible to train a specialist who only sees a technical object on a computer screen. There may be those who wish to refer to a surgeon who previously only trained on the computer. Therefore, the most reasonable solution is to combine the introduction of traditional and virtual laboratory work into the educational process, taking into account their advantages and disadvantages.

The use of virtual laboratory work is important in the study of physics in technical higher education institutions. A deep understanding of physics comes in handy in virtual laboratories to study theory and solve various computational, qualitative and experimental problems. If the student gets acquainted with theoretical questions in lectures, then the theory is applied in laboratory exercises, and in addition, practical skills are formed in conducting physical measurements, processing and presenting results. Without independent preparation for laboratory work, it is impossible to successfully defend the results of laboratory work by students. In the process of preparing for the next lesson, first of all, it is necessary to study the description of the work performed in this manual. Therefore, for each work in the textbook, it is necessary to read the material corresponding to the topic of the work. It is impossible to start work without mastering its main theoretical principles, without being aware of the logic of the measurement procedure, without using the measurement tools related to this work.

The environment of pedagogical software tools used in the departments of physics, informational learning environment, intellectual teaching systems, multimedia lessons, case laboratories, and the orientation of students to scientific research work

in the field of creating a computer model of a physical phenomenon and creating software is of great practical importance.

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