

SOME ASPECTS OF USING ELECTRONIC LITERATURE IN TEACHING PHYSICS

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Abstract

This article analyzes the need to improve the methodology for using electronic textbooks in teaching physics, the organization and implementation of virtual laboratory classes in the process of teaching physics in military educational institutions, and demonstrates the procedure and advantages of conducting virtual laboratory classes.

Keywords: Physics, learning process, electronic educational literature, educational environment, learning experience, physical phenomena, physical instruments, computer modeling of a traditional laboratory, virtual laboratory, scientific process.

Introduction

The development of an investment climate in our republic, its rise to a qualitatively new level, and the modernization of production lead to the need to rethink the goals and objectives of higher education institutions, as well as improve the content and methods of teaching, and introduce new subjects and courses. At the same time, it is necessary to ensure that the level of graduate training meets the needs and demands of employers. This, in turn, requires the use of non-traditional teaching methods in the higher education system[1].

Based on the Resolution of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev dated March 19, 2021 No. PP-5032 "On measures to improve the quality of education and develop scientific research in the field of physics " The idea of accelerated implementation of information technologies and computers in the life of society, people's everyday life, the educational process of comprehensive schools, secondary specialized, professional and higher educational institutions, in the educational process and its improvement has been put forward [2]. Promising areas of application of information and computer technologies in physics education are, mainly, the creation of electronic educational literature (electronic textbooks, electronic teaching aids) and computer modeling of physical processes and experiments.

Electronic educational literature is intended to broaden the horizons of students, develop and deepen their initial knowledge, provide additional information, and is created for subjects studied in depth. With the development of science and technology in the system of continuous education, there is a growing need for the preparation of electronic educational literature on general and specialized subjects with dynamically changing content, in-depth teaching, and small print runs.

Electronic educational literature is a resource that has the capabilities of interactive collection, description, updating, storage of information, presentation and control of knowledge based on modern information technologies. The most important of these is an electronic textbook, designed for the use of a teaching method based on computer technology, independent education, effective assimilation of scientific and educational materials and scientific information in all aspects and including[3]: educational and scientific materials in verbal (text) form only; educational materials in verbal (text) and two-dimensional graphic form; multimedia (multiinformation) applications, i.e. information presented in three-dimensional graphic form, with sound, video, animation and partly in verbal (text) form; tactile (touchable, inhalable) capabilities that create the illusion of entering the real world, presented in a stereoscopic copy in the “screen world”, and moving relative to objects in it.

Electronic educational literature can be used as a means of distance learning. Computer models enhance traditional and non-traditional learning processes and significantly facilitate the teacher's work, Simplify physical processes, create greater opportunities for storing effects, demonstrating them to students on a monitor (screen), and repeating them multiple times. In computer-based learning, modeling allows for a wide range of time scales, parameter selection, and experimental conditions, as well as demonstrating situations impossible in an experiment. In some cases, this expands the capabilities of displaying graphs of the time dependence of the quantities characterizing the experiment on the screen. These graphs appear on the screen simultaneously with the experiment, giving it particular clarity and facilitating understanding of the general pattern of the process being studied[7].

Nowadays, graphical representation of non-traditional learning outcomes using computers makes it easier to learn large amounts of information.

In international experience, distance learning tools include: electronic textbooks, electronic teaching aids, electronic teaching aids; teaching aids (paper and electronic versions of curricula, teaching aids, recommendations, bibliography, glossaries, test questions, and learning assessment tools); audio and video materials for educational, methodological and informational support; computer training programs, multimedia applications; virtual laboratory work; electronic simulators; electronic libraries and media libraries; electronic educational resources and addresses; virtual modeling environments; test programs; paper textbooks and teaching aids, etc.

Discussion of the Results

Experience shows that regardless of the form of instruction used in distance learning, students should be given the opportunity to study independently, rely less on additional literature, and consult regularly with the teacher. In particular, some sources emphasize the following when developing electronic materials for distance learning: the completeness of the information necessary for the formation of knowledge, skills and abilities presented in electronic textbooks, and that it is presented in such a way that it minimizes the need for students to search for additional educational information; that the electronic educational materials are designed for use on a modular basis; that they provide detailed instructions for studying the course materials and organizing independent work; that the course materials include mandatory elements such



as tests, explanatory dictionaries, self-assessment questions, and various other educational tasks.

Electronic textbooks differ significantly from traditional textbooks in the form of presentation of hypertexts, which, in turn, helps to increase the motivation of students. The development of student communities and group assignments organized on websites created to individualize distance learning in higher education through digital technologies also depends on the competent organization of the educational process and the motivation of qualified specialists. In the course of our research, we propose the following recommendations: digitization of library collections and their placement in a virtual library; creation of a national collection of electronic literature; electronic translation of lecture and seminar materials of disciplines; development of virtual laboratories; creation of electronic interactive multimedia educational materials; development and implementation of online training courses in the format of massive open online courses for both students and teachers; development of electronic textbooks and teaching aids, as well as interactive educational resources; improvement of the electronic information and educational environment of educational institutions[7].

Teaching methods are currently being refined. With the rapid development of information technology, a new type of problem-based learning has emerged: computer-based problem-based learning. The use of information technology in the educational process, like other teaching methods, raises a number of challenges related to pedagogical and psychological conditions. Analyzing scientific knowledge allows us to systematize and differentiate technical and pedagogical programs, as well as the didactic functions of computers for learning.

In this regard, the task of pedagogy is to define and effectively ensure the achievement of the above-mentioned functions. The feasibility of using information technology in the educational process, as applied to the content, forms, and methods of teaching today, can be summarized as follows[4]: time saving; the level of student engagement in the learning process; implementation of an individual approach to students; the level of mechanization of teaching methods.

Non-traditional education using information technology improves the content, forms and methods of teaching, allows for the use of fast, high-quality, active and advanced teaching methods, including information technology, creates a scientific and methodological basis for increasing the ability to master the natural sciences, develops students' knowledge and skills through educational technologies. Therefore, it is advisable to implement modern teaching technologies and utilize non-traditional educational resources. The computer user, by changing the initial conditions of the experiment, conducts the necessary physical experiments and has the ability to draw conclusions based on the results obtained. In addition to displaying individual phenomena on the screen during an experiment, it allows for viewing a diagram of the relationships between physical quantities. Video presentations of experiments help make the lesson especially lively and engaging. It should be noted that the use of this educational complex has a number of advantages in explaining physical laws observed in physical phenomena and processes.

In the system of higher military education, it is necessary to equip cadets with the necessary physical knowledge so that they can conduct experiments on the military-practical application



of physical laws, re-analyze the results of experiments and draw conclusions, understand the essence of physical processes occurring in nature and military equipment, study their application in military equipment and weapons.

The importance of academic experience in developing students' practical knowledge, skills, and abilities in physics is incomparable. Laboratory work is the foundation of this learning experience. However, currently, there are insufficient resources to organize and conduct all laboratory classes at the required level. There are a number of obstacles to this. In particular, some laboratory work cannot be carried out in traditional physics labs; work that cannot be observed with the naked eye, such as angstrom-sized atoms; physical phenomena and processes that are dangerous to human life and health; the need to use expensive substances, physical instruments and devices to conduct experiments[6].

The presence of the above-mentioned factors does not mean that such laboratory work cannot be performed at all. On the contrary, measures must be sought to eliminate the impeding factors. One such measure is the possibility of conducting physical processes through real computer modeling, that is, in the form of virtual laboratory work [5-7]. Therefore, to take advantage of this opportunity, it is necessary to create a virtual electronic form of the required physics laboratory work that cannot be completed in traditional laboratories.

To create a virtual electronic form of laboratory work in physics, you can use S#, Autodesk 3DS/MAX8, Corel Draw12 and other related programs[6-7].

Conclusions

In conclusion, it can be said that textbooks, teaching aids, and a number of scientific studies that can be used in teaching physics (in the field of exact and natural sciences) were analyzed, and it was determined that improving the teaching of physics based on information technology is one of the important factors.

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