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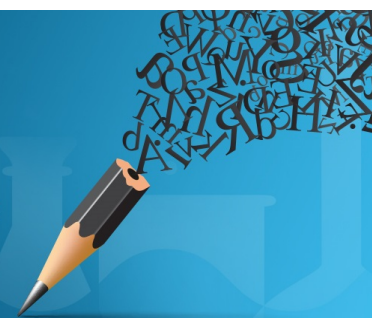


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Electronic Learning Complex in Physics and Introduction of the Section "Vibrations and Waves"

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Abstract. This article describes the need for the development of a modern e-learning complex, its goals, objectives, capabilities and its achievements in teaching physics "Vibration and Waves".

Keywords: e-learning complex, software, model, animation, multimedia, virtual, vibration, waves.

INTRODUCTION

The concept of e-learning complex is the introduction of more effective methods of implementing the principles of teaching using computer technology in modern teaching methods.

E-learning complex (EE) is an e-learning publication that corresponds to the subject, partially or completely replaces (complements) the main textbook. It is a set of graphic, text, audio, music, video, photo, information and user print documents. The modern e-learning complex is an integrated didactic system based on the use of computer technology and Internet tools. Its main goal is not only to teach students an individual and optimal curriculum, but also to shape students' worldview and thinking skills through the use of sound dynamic color images from movies, videos, models, animated films in the management of the educational process [1].

METHODS

The curriculum is a completely new form of learning material that should reflect all the materials that are known and well-founded, understandable to master, creating a wide range of opportunities for the student to structure knowledge, skills and organize the individual learning process. The e-learning complex systematizes science materials and consists of textbooks, chrestomathy, dictionary, elements of mastering control. It uses control questions, assessment tests and practical assignments. Based on the results of the student's answers, the level of knowledge is determined, the wrong answers are explained, instructions are given on the study material to be studied in the next stages of education. [5,6].

Today, the use of information technology in education makes it possible to overcome the difficulties encountered in education. This makes it possible to animate invisible, fast or slow processes, the physical mechanisms of complex events. It is possible to imitate an animated model using a multimedia projector system when tracking different models. Such programs are an important pedagogical tool with the ability to adapt to state educational standards and the literature used in educational institutions.

It is difficult for students to visualize and remember the processes in the Physics Vibration and Waves section. Therefore, the created e-learning complexes provide effective use of time in the field of virtual laboratory and demonstration work in the departments of physics "Mechanical and electromagnetic vibrations and waves", to teach students self-control, increase interest in learning, facilitate independent learning, develop practical skills, and increase the effectiveness of education by raising their level of knowledge. The following factors should be considered in the development of e-learning complexes. The task of e-learning complexes is to develop, create and introduce into educational teaching software tools for animation, multimedia, demonstration experiments and virtual laboratory work on virtual learning "Mechanical vibrations and waves" and "Electromagnetic vibrations and waves". [2].

Mechanical vibrations, mechanical waves, sound phenomena, electromagnetic oscillations, using pedagogical software tools for animated teaching of electromagnetic waves, theoretical data, animated demonstrations of topics, virtual laboratory work and animated lessons. listed. In addition, the experimental animated models and procedures and experimental tasks on virtual laboratory work, guidelines for the use of EOM, independent experimental tasks using electronic manuals, methods of reporting and consolidation of theoretical knowledge, control for self-monitoring questions, test assignments, and crossword puzzles are provided [3].

Features of the e-learning complex: entering information about the student to enter the program, registration (educational institution, group and username), acquaintance with the content of the topic, contact with the authors (via modular chats), language of instruction (Uz, Ru) and color allows you to change the image, create demonstration animations, graphic data on the subject, as well as visual training of basic parameters and the law of conservation of energy, automatic calculation of results of virtual laboratory work, evaluation and storage of results, analysis and processing of stored results and data [3,4].

The internal capabilities of the e-learning complex program, the program implements the experimental results through numerical integration. This increases the accuracy of the experimental results. They can be used as a virtual laboratory or in the observation of experimental problem elements and in conducting laboratory work. EO'Ma's existing application models serve to depict physical phenomena in vivid and natural form, to demonstrate processes that are difficult to observe, to use them as a research object, to repeat a physical phenomenon several times, to increase students' interest in physics, research activities and their creative abilities.

A new series of lessons in the teaching of physics can be introduced through the models in the complex programs available in the complex. For example: virtual lab work, demonstration experiments, research experiments, problem writing, problem analysis, and so on. Coverage of topics in the e-learning complex: topic selection, methodical information on teaching the subject, virtual laboratory work, acquaintance with the demonstration model, theoretical information, laboratory work procedure, equipment department, methodical instructions department, assignments department, results calculation table and graphic images, demonstration animation window, results evaluation section.

CONCLUSION

Using the simulation models provided in the e-learning complex, the lessons can be used in the classroom or in independent teaching of the topic. Organizing lectures in an interactive way leads to a better understanding of physical processes in students and increases their interest. The developed e-learning package in the software package allows the learner to stop, reverse the physical process at any time, and directly "interfere" in the process by changing the initial parameters. In doing so, the student feels as if he is a participant in a physical process. The teaching of a physical process is, of course, based on a certain physical model, that is, an abstract, simplified image of that process. In creating an imitation computer model of a real physical process, it is important to take into account the most important elements of this model, based on a specific physical model. Through the use of multimedia tools, including animation and video materials, in the educational process, it is possible to organize lessons in an interactive way on the basis of modern information and pedagogical technologies. Multimedia tools cover the entire course or parts of it that are difficult to master. Through the use of these technical tools, it is possible to shape the management and organization of students' effective learning activities.

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