

The Role of Multimedia Technology in Teaching Physics in Technical Universities

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ABSTRACT

The results of using multimedia technology in the educational process of physics course at technical higher educational institutions are given in the article. Visibility, visualization degree, rationality and flexibility of the presentation of the materials of multimedia teaching technology, which is reflected in the set of multimedia developments of the authors, are especially noted.

The course of physics is an integral part of the educational program of technical universities. The importance of the physics course is indisputable for the development of erudition and the "physical" style of thinking among future specialists in the technical field. Therefore, the role of physics in the formation of professional qualities of specialists of technical universities should be very significant. On the other hand, physics is also a theoretical basis of most general technical and engineering disciplines.

At the same time, the number of classroom hours devoted to the study of physics is significantly lower at technical universities, and the use of traditional forms of presentation of lecture material is very difficult. This aspect dictates the necessity of transition to more intensive training of technical specialists using the latest advances in technology and technique.

Among the information technologies used in education, multimedia technologies (MMT) play a particularly important role, replacing almost all traditional technical means of education and assuming a comprehensive form of presentation of the information provided for study. The multimedia product combines two-dimensional and three-dimensional images, sound, music, animation, video, text and numerical information, etc., and all kinds of information forms a single whole [1, 2].

The organization of the educational process with the use of multimedia technologies not only opens up new opportunities for mastering the presented materials, but also develops the creative abilities of students. The effectiveness of the introduction of multimedia technology is provided by the preparation of the methodological and information base.

The word "multimedia" has become popular since the 90s of the 20th century. Multimedia is a multi-component medium that allows the use of text, graphics, video and animation. "Multimedia" means the ability to work with information in various forms, and not only in digital form, as in conventional computers. Multimedia computers allow you to play audio (music, speech, etc.) as well as video information (videos, animated films, etc.). Video effects can be represented by the display of alternating computer slides, animation, video clips, moving images and texts, changing the color and scale of the image, its flickering and gradual disappearance, etc.

Multimedia technology provides such a presentation of information, in which a person perceives it simultaneously by several senses in parallel, rather than sequentially, as it is done in conventional education. With a combined impact on the student through the sight and hearing and involving him in active actions, the percentage of learning material can be 75% [3]. Learning multimedia programs are used for frontal, group and individual learning in the classroom, as well as for independent work at home, at the same time, this type of training package program is flexible in application. They offer the user a lot of options for individual adjustment: student, mastering training material, sets the speed of learning, the amount of material and degree of difficulty.

The most common way to create multimedia presentations is to use Microsoft Office Power Point. This software is very popular and widely spread among the users. Its advantages, of course, include ease of use and the ability to create a multimedia presentation of any degree of complexity. In the educational process, multimedia presentations allow you to conduct a lesson more efficiently. It should be noted that with the advent of presentations, the teacher has reduced the time to prepare for the lesson, since there is no need to prepare visual aids.

Lectures on physics, as a rule, are explanatory and illustrative in nature, determined by the specifics of the discipline being studied, and the presentation of physical information is accompanied by the recording of physical formulas, as well as the creation of graphic objects, for example, from the section "Dynamics". Students receive basic information at a traditional lecture due to the verbal component, but 70-80% of people perceive it better through visual centers, so the use of visual representation of information has a stronger emotional impact on students [4].

Based on our experience of introducing multimedia presentations into the educational process, we believe that this pedagogical technology can be in demand in the presentation of new material, its consolidation and activation, greatly facilitating the perception and memorization through visual illustrations of language phenomena. It promotes deepening of knowledge, realization of the personal-oriented approach in teaching physics and development of creative abilities of students.

We have developed multimedia presentations on the topics "Elements of Kinematics", "Laws of Dynamics", "Work and Energy", "Mechanics of a Solid Body", "Elements of Fluid Mechanics", "Elements of Special Relativity Theory", "Molecular and Kinetic Theory of Ideal Gases", "Fundamentals of Thermodynamics", "Real Gases", "Electrostatics", "Direct Electric Current", "Electric Currents in Metals, Vacuum and Gases", which are determined by the program for consideration in semesters I and II.

Presentations are designed for each lecture of the entire course of general physics:

Part 1. Mechanics. Molecular Physics.

Part 2. Electrodynamics. Magnetic phenomena.

Part 3. Optics. Quantum physics.

Each presentation consists of a sequence of slides reflecting a complete fragment of the lecture. By printing out the presentation slides, you can get handouts for students - a kind of reference notes.

Animation is used for dynamic visual effects, contributing to the virtual transformation of spatial configurations of complexes and visualization of physical processes. Each item of the fundamental slides has hyperlinks, and they carry out the interaction of information blocks, so that the presented material is visually dynamic and easily perceived.

We have developed a set of multimedia presentations that has been tested on practical classes, and the effectiveness of the use of presentations with the interactive teaching model has been proved. This set of multimedia presentations is posted on the website <https://baymuratov.uz>, which is designed for students of technical universities.

During the study we concluded that the presentation in the form of multimedia presentations of educational material makes it possible to organize the lesson more efficiently, enhance perception and memorization of educational material, increase student interest in the study of physics course. Our point of view is confirmed by the results of the survey. When asked about the feasibility of using presentations in the learning process, 67% of students say that this pedagogical technology effectively visualizes information and promotes the development of collective and independent learning activities.

The researchers note [5] that the characteristic features of a set of presentation materials for multimedia lectures are the following:

- The gradualness (sequence) of the presented educational material regulated by the teacher — only the information that is being discussed at the moment is visible on the screen. The demonstration of each slide ("frame", a fragment of a lecture) usually takes from one to five minutes, which allows students to fully comprehend its content;
- The visualization of the phenomena and processes studied through animation, video fragments, diagrams and pictures, as well as visualization of logical reasoning through diagrams;
- A large number of questions and research assignments allow organizing a debate, discussion of the studied educational material;
- The variability (in terms of hours and complexity) of the teaching material. The set is designed to accompany lectures on the course of general physics, which can contain a varying number of classroom hours (from 18 to 90 and above). The variability in the number of hours is carried out due to the variety of demonstrated material, the depth and speed of its discussion, and the level of preparedness of the students. Initially, presentations for each lecture contain obviously more educational material than required for a 2-hour lecture; the material is structured in such a way that allows, depending on different conditions, to use its short or full version;
- The evidence, replenishment of the presentations for each lecture can be upgraded, supplemented with new material, new slides and references can be easily added, the sequence of the presentations of the educational material can be changed.

The use of multimedia presentations undoubtedly has many advantages, but one should not forget about their expediency and timeliness. The presented information cannot be entirely in visual form. When presenting the material, dosage of the used methods is necessary. Simply reading the information from the screen is not effective for perception, does not give an

understanding of the main thing. The effective use of multimedia technologies is possible with the systematic nature of their application, high-quality selection of material, proper presentation and the possibility of practical use of the acquired materials.

Thus, the obvious advantages of using multimedia technologies in the organization of the learning process are beyond doubt. The use of such technologies significantly activates educational information, makes it more visual for perception and easier to digest.

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