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MULTIMEDIA TOOLS AND THEIR DIDACTIC POTENTIAL

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Abstract: This article analyzes the role and didactic potential of using multimedia, multimedia products, multimedia technologies, and multimedia tools in teaching physics concepts such as electric current and Faraday's laws in various learning environments. The study examines the didactic opportunities provided by the use of electronic textbooks, virtual laboratory stands, 3D animations, and educational simulators in the organization of educational activities.

Keywords: Multimedia, multimedia products, multimedia technologies, multimedia tools, electronic textbook, educational simulators, virtual laboratory stands, 3D animations.

Multimedia is a field related to the use of information in various physical forms such as text, graphics, images, 3D animations, audio, and other data carriers through computer technologies. Multimedia provides excellent opportunities for users to create virtual (simulated) environments, where the user is not merely a passive observer but actively participates in ongoing processes. Communication in such systems is conducted through familiar user interfaces, primarily through audio and visual representations.

Multimedia refers to working with different types of information on a computer: color graphics, text, dynamic graphic effects, sound outputs, synthesized music, animations, software applications, as well as complete video clips and even full-length films [1].

Multimedia technology presents information simultaneously in various forms understandable to humans (including speech, images, diagrams, visuals, music, numbers, and letters) in a combined and integrated format. This technology allows information to be searched, copied, and transferred to other computers in the required format and enables the creation of any desired combination of these formats [4].



In developed countries, multimedia systems are currently widely used in the field of education. Practical experience shows that teaching students using multimedia tools can be twice as



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efficient and time-saving. The use of multimedia in the learning process can save up to 30% of instructional time, while the knowledge gained tends to be retained in long-term memory. If students receive educational materials primarily through visual means, information retention in memory increases by 25-30%. Furthermore, when learning materials are presented in an integrated form combining audio, video, and graphics, retention can increase by up to 75% [5].

A multimedia product is an interactive, computer-based product that may include music, video clips, animations, images, slide galleries, various databases, and other components.

Multimedia tools are a set of hardware and software that allow a person to interact with a computer using various environments that are natural to them: sound, video, graphics, text, animation, and more [1].

Advantages and Specific Features of Multimedia Technologies:

- The ability to store large amounts of diverse information in one disk (multi-chapter texts, thousands of high-quality images, several hours of films and videos, as well as audio information);
- The possibility to divide images on the screen into parts without losing quality or to enlarge the most interesting and necessary parts;

• The ability to comparatively analyze graphics, images, and pictures, to calculate their indicators, and to process them using software tools for scientific or educational purposes;

• The ability to extract key words or necessary parts of the text and other displayed information for the purpose of obtaining and explaining specific information;

• The possibility of continuously providing background music or other audio content for static or dynamic images;

- The ability to use the "stop-frame" mode to pause and analyze video frames;
- The ability to connect to the global Internet and use its resources and users;

• The ability to work with personal application programs that can process graphics, audio, cartographic information, and texts.

The emergence of multimedia systems has driven the development of information technologies and their wide application in science, education, commerce (business), and medicine.

In addition, the practical application of multimedia tools in the educational process creates opportunities for building databases and animation-based presentations for future educational needs.

Advantages of Multimedia-Based Learning:

- The ability to learn the provided material more deeply and thoroughly;
- Increased interest and motivation to explore new areas of education;
- The ability to save time by shortening the learning process;

• The acquired knowledge remains in memory for a long time and can be applied in practice when needed.

In multimedia-based teaching, it is possible to fully teach specific subjects using computers, to edit lecture texts, to improve the lecture delivery style based on the analysis of students' submitted assessments, and to enable students to see, hear, and discuss animated elements during lessons through multimedia tools.

There are various technological methods aimed at developing high-quality multimedia applications.

Types of Multimedia Applications:



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Presentations – A form of information delivery using audiovisual tools. Presentations combine computer animations, graphics, videos, music, and sound into a single source. Typically, a presentation is structured with a storyline, scenario, and clear organization for convenient information delivery.

Animated Clips – Animation is the sequential display of images to create the illusion of movement. The animation effect is achieved when more than 16 frames per second are shown.

Video Applications – Technologies for creating and displaying moving images. Video applications include software for playing and managing video files.

Multimedia Galleries - Collections of moving images accompanied by sound.

Audio Applications – Programs that work with audio files using digital sound technologies. Digital sound refers to the representation of electrical signal amplitudes using discrete numbers.

Web Applications – Independent web pages, their components (menus, navigation, etc.), applications for data transmission, multi-channel applications, chats, and more.

Globally, computer graphics and design have developed significantly and are widely used in practice. However, most of the software, clips, and designs being created are for movies, cartoons, and websites. There is a noticeable shortage of multimedia-based educational resources specifically tailored to scientific subjects, and the available ones often fail to fully cover the topics. This indicates the need to pay more attention to the educational sector.

Nevertheless, the creation of video clips and the inclusion of modern graphics into electronic textbooks that combine text, images, and animations increase the interest in related websites and educational resources.

The use of multimedia in lessons provides significant advantages for teachers. Voice-based programs, illustrated materials, animated texts (presentations), films, and animations specifically created for particular subjects not only offer innovation for the teacher but also capture students' attention and enhance their learning experience.

For example, in physics classes, multimedia scenarios that demonstrate scientific experiments related to the flow of electric current in various environments can increase the effectiveness of learning and help universities adopt more efficient teaching technologies in physics.

Electric current behaves differently in different environments, and the formation and movement of current vary in each medium. The main environments include:

- Electric current in metals
- Electric current in liquids
- Electric current in gases
- Electric current in vacuum
- Electric current in semiconductors

It is worth mentioning that using multimedia tools to teach topics like electric current in various environments in physics makes learning from textbooks much more convenient and accessible. **References**

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