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MULTIMEDIA DASTURLARI ASOSIDA O‘QUVCHILARNING FIZIK BILIMLARINI OSHIRISH METODIKASI

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Farg‘ona viloyati pedagogik mahorat markazi o‘qituvchisi

Annotatsiya. Maqolada multimedia dasturlari asosida o‘quvchilarning fizikaga oid dunyoqarashini kengaytirish bilan amaliy faoliyatlarini bog‘lagan holda fizikadan bilimlarni hayotga tatbiq eta olish salohiyatini shakllantirish va rivojlantirish uslublari tavsiya qilingan.
Tayanch so‘zlar: virtual o‘quv laboratoriya, multimedia dasturlari, grafik, nutq, musiqa, video, foto-axborot, kompyuter modeli va vizuallashtirish.

МЕТОДИКА ПОВЫШЕНИЯ ЗНАНИЙ УЧАЩИКСЯ ПО ФИЗИКЕ НА ОСНОВЕ МУЛЬТИМЕДИЙНЫХ ПРОГРАММ

Аннотация. В государствах рекомендуются методы формирования и развития потенциала применения знаний по физике в связи с расширением мировоззрения студентов на основе мультимедийных программ
Ключевые слова: виртуальная учебная лаборатория, мультимедийные программы, графика, речь, музыка, видео, фотоинформация, компьютерное моделирование и визуализация.

METHODOLOGY OF INCREASING THE KNOWLEDGE OF PHYSICS AMONG STUDENTS ON THE BASIS OF MULTIMEDIA PROGRAMS

Annotation. The article recommends methods for the formation and development of the potential for the application of physical knowledge in connection with the expansion of the students' outlook for physics on the basis of multimedia programs implementation.
Key words: virtual educational laboratory, multimedia programs, graphics, speech, music, video, photo information, computer modeling and visualization.

Introduction

Today, there is a need in the world to improve the field of physics education, widely introduce modern teaching methods, including information and communication technologies, radically improve the quality of education in physics, train highly qualified teachers and researchers, provide educational institutions with modern laboratories, textbooks and other educational equipment, develop the capacity of scientific organizations, and effectively organize their activities.

In particular, the times themselves demand that sufficient attention be paid to increasing students' interest in physics, that educational programs focus on the formation and development of independent, creative thinking in students, that the work being carried out to ensure the quality of education meet the requirements of the time, that attention be paid to the creation of modern textbooks in physics, manuals for laboratory work, and multimedia programs.

The effective use of modern equipment in educational and scientific laboratories, the development of technology for conducting physical experiments based on virtual educational laboratories, and the

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effective use of modern information technologies in the educational process are of great importance in the mastery of physics by secondary school students.

Political, social and economic changes in the life of our republic are also having an impact on the natural process of vocational education, which is carried out in accordance with the demand of society for highly qualified, solid and deeply educated, self-employed, capable personnel. Currently, the application of advanced pedagogical technologies in teaching processes in the education of the new generation is developing rapidly. The Concept for the Development of the Public Education System of the Republic of Uzbekistan until 2030 sets as a priority task "Preparation of new generations of didactic materials and multimedia products intended for in-depth study of foreign languages, computer science, mathematics, physics, chemistry, biology."

The creation of a multimedia electronic textbook on physics for secondary schools is very relevant today. Our government has also developed a number of resolutions in this regard. In particular, the Resolution of the Republic of Uzbekistan No. PQ-5032 dated March 19, 2021 “On measures to improve the quality of education and develop scientific research in the field of physics” will serve as the legal basis for solving this problem.

It aims to form general competencies in observing and analyzing physical processes and phenomena, and studying physical phenomena in secondary school students based on multimedia programs.

Literature analysis on the topic.

Today, the use of modern information technologies in teaching physics plays an important role in the formation of general competencies in physics among students, expanding their worldview regarding the physical landscape of the universe, and developing the ability to apply physical knowledge in practice, while proving their practical activities. One of the main factors in this is that, firstly, the technical support of the computer is considered as a construction based on physical knowledge, and secondly, it is considered as a means of teaching physical phenomena. In this case, computer models allow students to increase their physical knowledge by consciously observing not a specific physical object, but physical processes and phenomena. In the study of physical processes and phenomena, special simulators, animations and videos, virtual laboratory work, and software that allow modeling physical processes are available today. These include simulator (numerical modeling) programs such as Crocodile Physics, Interactive physics, Electronics Workbench, and Phun physics. They are characterized by the fact that a computer program is used when it is impossible to conduct a physics experiment or when the experiment is performed in an unobservable manner.

Through the joint efforts of educators, scientists, programmers, developers of multimedia educational tools and teachers-practitioners, a new information and educational environment has been created, in which the integration of educational and information approaches to the content of education, teaching methods and technologies has become crucial. One of the main elements of the new information and educational environment is multimedia technology. Multimedia technologies are one of the most promising and popular directions in the field. They are aimed at creating a product that includes" images, texts and data sets, together with sound, video, animation and other visual effects (simulation), including an interactive interface and other control mechanisms." This definition was formulated in 1988 by the largest European Commission, which is currently dealing with the problems of introducing and using new technologies .

If we consider the emergence of multimedia technology, the concept of organizing the memory "MEMEX", proposed by the American scientist Vanniver Bush in 1945, became the basis. This assumes that multimedia technology is represented in the form of a hypertext system (a system for

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VOLUME-5, ISSUE-5

working with a combination of text materials) and the operations performed by the user are taken into account.

The surge of interest in programming in the late 1980 s is undoubtedly due to the name of Bill Gates, a well-known American entrepreneur in the computer industry, who had the idea of creating and successfully implementing multimedia (commercial) products in the field of multimedia technologies in the humanities.

The scientific content of the article.

One of the leading trends in the informatization of society is the development of multimedia technologies, their penetration into various spheres of social life, including: production, business, science, education and mass consumer culture. Providing a wealth of content and form, combining a variety of text, graphic, speech, music, video, photo information and a variety of methods for obtaining them, these technologies form a multimedia perception of the world.

Opens up new opportunities for organizing the educational process, as well as for developing the creative abilities of students. For the effective implementation of active teaching methods, significant and serious work is required to equip schools with a sufficient number of computer equipment, as well as to prepare a methodological and information base for organizing the educational process. This will ensure the implementation of active teaching methods in improving the quality of training specialists, taking into account the demands and requirements of market conditions.

Today, multimedia technologies are one of the fastest growing areas of new information technologies in the educational process.

The first task is to express the things that are characteristic of logical thinking and the images that flow from this with figurative thinking. The second task is to create such models of knowledge presentation that allow the presentation of monotonous means. This is a visualization of human knowledge, for which textual descriptions cannot be selected. The third is to look for ways to move from the images of the observed images to the formulation of some hypotheses about the mechanisms and processes hidden behind the dynamics of the observed images.

Thus, multimedia technologies (fast access to information, connecting audio and visual materials, etc.) are used in organizing the educational process. The use of, of course, has clear advantages. The use of such technologies significantly activates educational information, making it easier to perceive and assimilate.

The object of research.

The object of this scientific research is the process of representing physical processes and phenomena in digital models and multimedia programs.

Digital modeling in educational processes using the capabilities of multimedia programs is effective. In particular, it allows you to conduct physical experiments that are not possible or that are difficult to conduct in traditional ways. It allows us to observe and analyze an uncontrollably chaotic physical process.

Results and practical examples.

Currently, there is a need for multimedia programs that allow students of secondary schools to study expanded basic concepts, processes, phenomena, physical quantities and their units, laws, and connection formulas in physics, including mechanics, molecular physics and the basics of thermodynamics, electrodynamics, vibrations and waves, optics, and the basics of atomic and nuclear physics. For example, we can see the random movement of molecules in the phenomenon of diffusion and Brownian motion. If a drop of bromine is dropped onto the bottom of a glass container, after a

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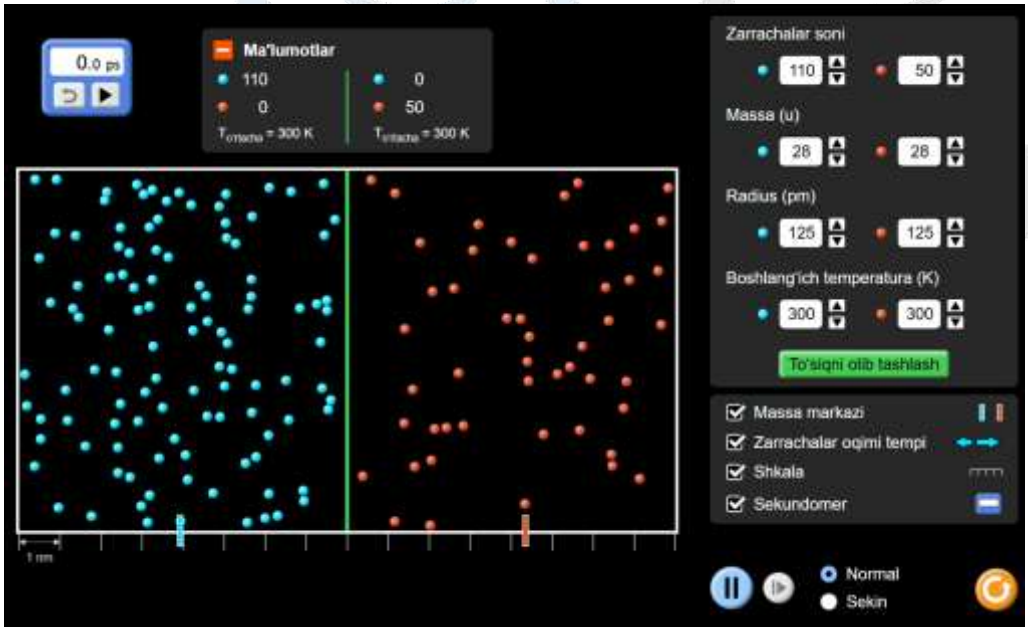
VOLUME-5, ISSUE-5

few seconds, fluffy brown bromine vapors will form at the bottom of the container. This vapor rises to the top and begins to mix with air, that is, the diffusion process is observed. Diffusion of air and bromine molecules occurs due to the random thermal motion of their molecules.

In 1827, the English naturalist Brown made an important discovery that confirmed the molecular-kinetic theory. In his experiment, he observed that pollen particles suspended in a liquid constantly moved in a chaotic manner, and as a result, their states for a certain period of time took the form of complex lines. Figure 1 shows the states of a Brownian particle for 30 seconds. The particles in a liquid move in this way because they are hit by liquid molecules from different directions. A particle can be hit by several molecules of a liquid at the same time. But if many molecules hit it from one side, the particle moves in the direction of those molecules, then as a result of the impact of many molecules from another side, the direction of movement changes again, and this process continues continuously. Such a complex motion of a particle in a liquid is called Brownian motion.

We can describe the motion of a computer model of particles in a plane or three-dimensional coordinate system. To do this, within a given time interval, the particle moves in a random direction, invisible to the observer, so that its displacements along the coordinate axes obey a normal distribution with a variance determined in the formulas.

The random motion of particles to students in an understandable way, it is possible to use the Macromedia Flash program, which is one of the multimedia programs. Using the active elements of this program, we can see the random motion of molecules in the form of diffusion phenomena and Brownian motion in the form of electronic animation. For this, we will get acquainted with the process of viewing a model showing the motion of molecules in Brownian motion in the Macromedia Flash program .



1.

Launch Macromedia Flash. Create a new document using the program's file menu. In the upper left corner of the new document window, create a "particle" icon. (Figure 1.)

We create a motion layer that guides the object using the "Add Motion Guide" command from the program's "Timeline" section.

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VOLUME-5, ISSUE-5

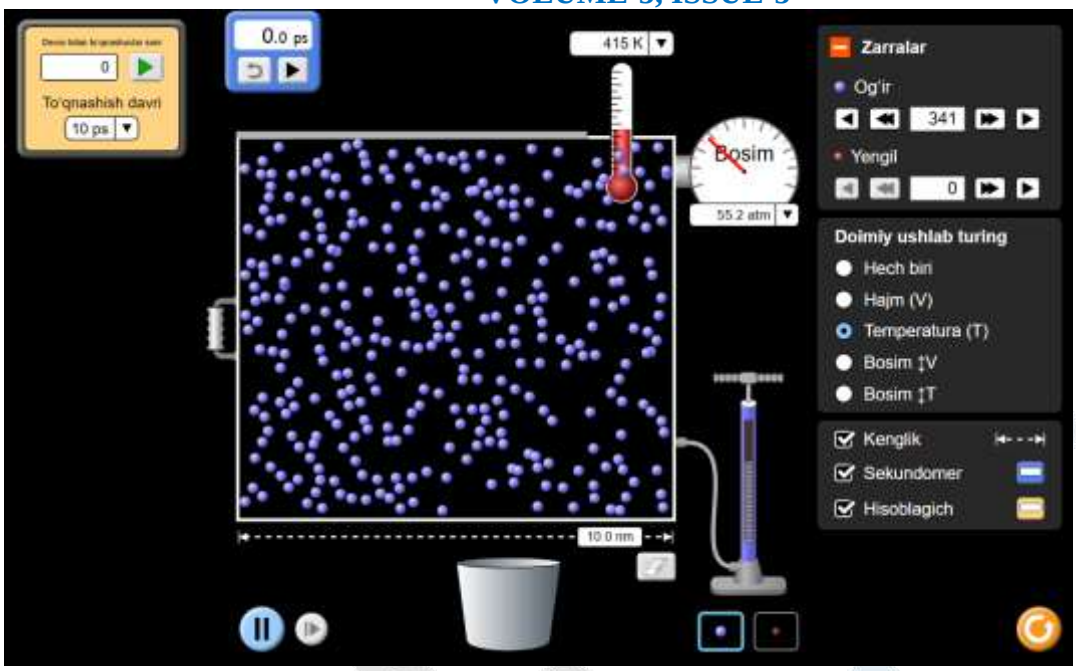

Figure 2.

On the created layer, we draw the direction of movement, i.e., the arbitrary direction of movement, using the pen tool. We activate the "Create Motion Tween" command from the context menu for the selected object. As a result, the object on the screen automatically moves to the starting point of the tween, i.e., it moves in an animated way along the direction of movement previously set by the user. We select the last frame of the animation scene and set a keyframe from the context menu . In the last frame, we remove the object from the selected part and move it to the end of the tween, i.e., to the end of the trajectory we drew. This process is repeated several times and is prepared in separate layers. As a result, we can depict the chaotic motion of particles, Brownian motion, in the Macromedia Flash program environment (Figure 2).

Conclusion and practical suggestions.

It is worth noting that in some cases, teachers had to describe and demonstrate physical phenomena to students on the blackboard or orally without the necessary equipment. However, the development of modern information technologies has changed this situation. Teachers have been able to independently create educational resources in physics and demonstrate them to students without much difficulty, as well as providing many options for preparing high-quality educational resources.

Macromedia Flash is a very easy- to-learn and easy- to-use software tool for teachers. It is easy to use and has a wide range of capabilities. Its use raises the level of demand for various projects created, including digital educational resources.

In general, the use of multimedia programs allows to improve the quality of the educational process. The following can be recommended:

Visual presentation to students when learning a new topic (complex theoretical concepts, formulas, diagrams, etc.);

• in developing cases (solving practical examples through mastering theoretical topics);

• learning through presentations, lectures and practical exercises;

observe students mastering topics independently.

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2024-6.875 ResearchBib IF: 9.948 / 2024

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VOLUME-5, ISSUE-5

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