

Methodology for organizing and conducting laboratory sessions in physics with the help of digital technologies

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Abstract: This research discusses the role of digital technologies in training future physics teachers at higher education institutions and the importance of virtual laboratories in conducting laboratory work.

Keywords: physics, real virtual laboratory, virtual laboratory, student, digital technology

Currently, several measures are being implemented in the education system to apply digital technologies and use them effectively in the educational and training process. In particular, the Presidential Decree 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," specifically includes the issue of "broadly introducing modern teaching methods, including information and communication technologies, into the educational process".

To organize laboratory sessions in physics classes in higher education institutions in line with modern requirements, classrooms are equipped with modern devices, and this work is currently being carried out on a large scale. Researchers and pedagogical staff need to create and improve modern educational tools and visualized developments in organizing the effective use of these devices.

In studying physics, concepts such as theoretical knowledge, problem-solving skills, and performing laboratory exercises are closely related to each other and complement each other. Therefore, in addition to the formation of concepts such as the explanation of physics, the application of theory in each subject, and the use of virtual laboratories in practical training, the formation of concepts such as analysis, observation, concluding, and creativity, interests in inventions in science and technology are also formed.

The modern content delivered to students does not include the development of science knowledge, such as the development of competencies corresponding to modern knowledge practice. This content should be presented in the form of well-structured and multimedia educational materials transmitted using modern digital technologies and communication tools. Modern methods of teaching are not only

based on passive perception of the material, but also active methods of formation of competencies based on mutual relations of students and their involvement in the educational process.

It is an important task to form the skills of independent self-education in a modern student. By actively introducing various forms and devices of ICT-information and computer technology into the educational process of modern higher education, the independent activity of the student outside the audience has been fundamentally introduced as a new form of education. Currently, a new form of developing the mastery of a large number of topics without losing the volume and importance of independent work done by students at home is being implemented by increasing the role and role of digital technology devices.

In conducting laboratory work in physics using modern methods, several efforts are being made to increase the effectiveness of education by utilizing the advancements of 21st-century technology. One of the significant impacts of applying digital technologies in science and education today is the use of virtual laboratories.

The use of modern information technologies in education has now become not just an innovation but a reality of today's world for the entire civilized society. Currently, digital technologies have firmly entered the field of education. They make it possible to change the quality of the educational process, and make the lesson modern, interesting, and effective. Virtual education also includes an ethical component - computer technology will never replace communication between students. It can only support the potential for collaborative discovery of new resources and is suitable for use in a variety of learning situations where students engage in dialogue with their peers and teachers about the material being studied as they study the subject.

When conducting a lesson using virtual tools, the main principle of didactics is observed - a view that ensures optimal mastering of the material by students, increases emotional perception, and develops all types of thinking in students. The use of digital technologies in the process of teaching physics, the demonstration of physical phenomena and processes that are technically very difficult or completely impossible to fully demonstrate in laboratory conditions, expanding the possibilities of conducting high-quality laboratory training, and simulating various processes and phenomena allow us to do so.

Interactive work in physics should be conducted in the form of practical exercises either when explaining new concepts or when concluding the study of a specific topic. Another option is to perform the work independently during optional or individual lessons. Virtual physics is a new and unique direction in the educational system. It is no secret that 90% of the information reaches our brain through the eyes and the nervous system. A person cannot fully understand the essence of certain

phenomena until they see them. Therefore, the learning process must be supplemented with visual materials, allowing not only the observation of static images depicting phenomena but also the ability to see these phenomena in motion.

Conclusion and Suggestions:

Organizing the educational process using digital technologies and virtual laboratory complexes in teaching physics has several advantages:

- Students develop and increase their interest and motivation toward the subject of physics.

- Students strengthen and develop their theoretical knowledge.

In this work, scientific-pedagogical literature on the use of virtual tools in the modern education system was analyzed. Based on this, the particular significance of using virtual laboratories in the educational process was highlighted. The article discusses the use of digital technologies in the educational process, the virtualization of education, and the opportunities and advantages of virtual laboratory work in studying processes and phenomena that are difficult to examine in real conditions. The experiments conducted demonstrated that organizing lessons using this method leads to an improvement in the quality and effectiveness of the lesson.

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