International Journal of Pedagogics
(ISSN – 2771-2281)
VOLUME 04 ISSUE 07 PAGES: 40-46
OCLC – 1121105677

Publisher: Oscar Publishing Services

Journal Website: https://theusajournals.com/index.php/ijp

Research Article

THE METHODOLOGY OF IMPROVING LABORATORY WORK IN PHYSICS IN GENERAL EDUCATION AND SPECIALIZED SCHOOLS BASED ON PEDAGOGICAL SOFTWARE TOOLS

Submission Date: July 10, 2024, Accepted Date: July 15, 2024,
Published Date: July 20, 2024
Crossref doi: https://doi.org/10.37547/ijp/Volume04Issue07-07

Qo'ziboyev Sherali Tursunaliyevich
Fergana State University, teacher of physics department, Uzbekistan

ABSTRACT

The article is aimed at improving laboratory training in physics in specialized and general schools. This article provides instructions for organizing laboratory sessions using a number of software tools and the LabPhsics program. Based on these instructions, the effectiveness of teachers and students will increase significantly.

KEYWORDS

Lab Physics software, First Person, Unity, JavaScript, Educational visual software tools, Uniy Editor.

INTRODUCTION

Performing laboratory work plays an important role in learning physics. The problem of improving the efficiency of laboratory training in the educational process is complex and multifaceted. Especially in general secondary education and specialized schools, we face problems in performing laboratory work in physics. The solution to this problem can be solved by using teaching pedagogical software tools, in particular by using "First Person" technology.

Today, various educational software tools are widely used in the educational systems of developed countries. Educational visual software tools are created using proprietary software. The use of such

International Journal of Pedagogics
(ISSN – 2771-2281)
VOLUME 04 ISSUE 07 PAGES: 40-46
OCLC – 1121105677
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

programs in the educational process leads to high results, because the student simultaneously hears, sees and assimilates information about the knowledge transmitted in the classroom and performs tasks. The teacher is a software tool designed for partial or complete automation of the educational process with the help of visual aids-computer technologies. They are considered one of the promising forms of improving the effectiveness of the educational process, and are used as teaching tools of modern technologies.

There are a number of positive factors that confirm their superiority over traditional tools in order to implement the technology of creating educational visual software tools. These factors are divided into didactic, psychological, economic, physiological groups. The didactic requirements for educational visual software tools include: scientific, understandable, strict and systematic description (the main principles of pedagogy, psychology, informatics, ergonomics , taking into account the fundamental principles of modern science, ensuring the possibility of building the content of educational activities), continuity and integrity (it is considered a logical consequence and complement of previously learned knowledge), consistency, problematic, demonstration, activation (teaching the independence of teaching and the presence of the characteristic of activity), the consistency of mastering the results of teaching, the interactivity of communication, the unity of teaching, education, development and practice. Educational visual software tools as a means of organizing electronic education significantly increase the motivation of students to learn science. In addition, each student is given the opportunity to work at a pace convenient for him, which allows him to get rid of psychological stress. In addition, he brings positive emotions to the classroom during training sessions. Working with virtual laboratory work created through educational visual software tools creates a situation for students to achieve success. The task of the teacher includes the unbiased achievement of the goal, which is to motivate and interest the student to master the compulsory program in science, as well as to help the child to develop his or her own skills.

One such program is designed to organize laboratory work in physics in secondary schools in a virtual state, and effectively conduct laboratory exercises using 3D models of obsolete and expensive equipment in schools. Also, the fact that each exercise is performed individually by each student during the lesson, skills are formed according to the rules of technical safety, and special test tasks are formed to strengthen the completed laboratory exercises, which ensures the effectiveness of the work.

Equipping physics laboratories requires a lot of money. At the same time, it takes a long time to replace the equipment that has fallen into disrepair. Based on this, it was decided to develop a virtual laboratory work. The creation of virtual laboratory work helps to solve the above problems.

All educational institutions in the republic will be provided with sufficient laboratory equipment without additional financial costs

Equipment safety is guaranteed during laboratory work.

- With the help of LabPhysics software, physics lessons for schoolchildren are conducted in a modern way;

- instead of outdated laboratory equipment, classes will be held using their 3D model;

International Journal of Pedagogics
(ISSN – 2771-2281)
VOLUME 04 ISSUE 07 PAGES: 40-46
OCLC – 1121105677
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

- assignments set by the teacher within the subject are performed individually by each student;

- it will be possible to study processes and bodies that are difficult to observe on a large scale.

The LabPhysics program was created based on the topics of the National Curriculum. Unity programming environment, Oculus software, Autodesk 3DS Max software, Blender software and C# programming languages were used in the creation of the program. Using this program, the student can see the equipment in 3D, which is very similar to the equipment in real life. The Unity programming environment has a lot of capabilities, and this environment has the following main features:

• Unity includes several tools to facilitate the game development process. These tools include Uniy Editor (Unity editor), a number of additional environments for editing game graphics and features, animations, sound integration, file management, components and other options.

• Unity provides multiplayer gaming and other networking capabilities. With this, you can play games over the Internet, conduct scientific sports events and perform other similar tasks.

• Unity, optimized for developing games and applications on multiple platforms. You can create apps for iOS, Android, Windows, macOS, Linux, web, consoles (PlayStation, Xbox, Nintendo, etc.), VR (Virtual Reality) devices

• Supports Unity, C#, JavaScript, BooLabs and other programming languages. Unity allows you to use these languages to create applications, write game logic, redesign graphics, and perform other tasks.

• The Unity Asset Store, which includes many free and commercial assets for download. It allows you to get and use game graphics, animations, code snippets, dashboards and much more.

Unity is a combat environment where you can learn and experience creating games and apps. The Unity team provides additional support and interaction with the open source section of this platform

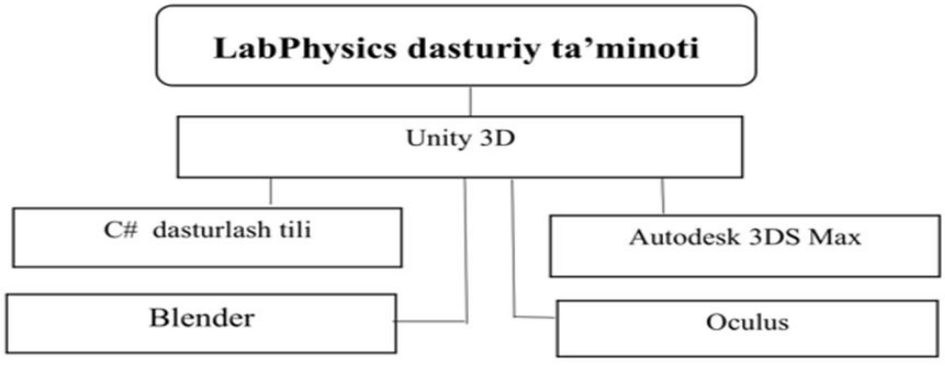

Figure 1. The composition of the software

International Journal of Pedagogics
(ISSN – 2771-2281)
VOLUME 04 ISSUE 07 PAGES: 40-46
OCLC – 1121105677
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

The function of the LabPhysics program is that its use allows to activate the student's work in mastering a certain topic. The student will need to enter the selected room to perform the laboratory exercise using the program. Special clothing is required to enter the room. This also serves to remind the student that special clothes should be worn when training in laboratory rooms in real life.

Figure 2. A special coat in the lab room

Entering the room, the student approaches the computer. The color of the desktop changes when you get closer to a certain distance.

Figure 3. Computer desk

When the reader clicks the left mouse cursor, the screen opens. The student can get acquainted with the theoretical part of the task given by the teacher and perform test task

International Journal of Pedagogics
(ISSN – 2771-2281)
VOLUME 04 ISSUE 07 PAGES: 40-46
OCLC – 1121105677
Publisher: Oscar Publishing Services

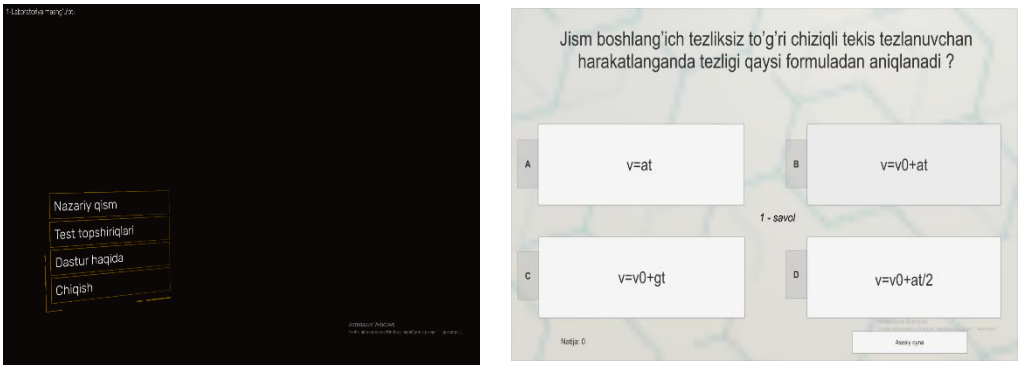

Figure 4. Computer window

Theoretical part on the screen. Test tasks, about the program, exit windows are visible. The student first gets acquainted with the theoretical part of the training. Having familiarized himself with the theoretical part, the student enters the test task window to test his knowledge and answers the test questions by marking the answers A, B, C, D. After finding out how many questions the student has answered correctly, he will press the exit button and return to the room.

Returning to the room, the student goes to the experimental table and writes down the results of the theoretical part and the instructions in the work order in his notebook. Using the recorded results, the absolute and relative errors are calculated using the necessary formulas. The conclusion is written.

The program fulfills its teaching function and gives the student the opportunity to solve a task of the same type or the same level of complexity.

The program created within the framework of the research is an important pedagogical tool as it corresponds to the state educational standards and the literature taught in general secondary and specialized educational institutions.

Certain conditions are necessary for the organization of classes using modern information technologies in the educational process.

First, there should be information resources.

to these,

- Personal computer
- Projector
- Multimedia tools
- Scanner (for transferring complex schemes and drawings, images on negative film to a computer)
- Digital camera
- Video camera (for video conferencing and other purposes)
- Printer, copier (printing and duplicating handouts, and other uses) and other resources.

International Journal of Pedagogics
(ISSN – 2771-2281)
VOLUME 04 ISSUE 07 PAGES: 40-46
OCLC – 1121105677
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

The second is special software. In the educational system, special programs are necessary for creating multimedia electronic educational literature, lectures, virtual laboratory work, various animation programs and other works.

The use of computer models in the educational process, using the opportunity of information technology, is effective. The principles of using computer models in educational processes are as follows:

1. The computer program should be used when it is impossible to conduct the experiment or when the experiment is moving to an unobservable level.

2. The computer program should help to identify the detail being studied or to illustrate the problem being solved.

3. As a result of the work, students should be able to see both qualitative and quantitative connections of quantities characterizing events with the help of a model.

4. When working with the program, the task of students is to work on tasks of different difficulty, as this allows them to work independently.

Today, the use of modern information technologies, which differs from the traditional way of teaching, provides an opportunity to achieve high efficiency. In terms of teaching physics, it is important to develop effective methods of forming the imagination of the model of theories in the minds of students, introducing them to phenomena and processes.

The development and implementation of pedagogical technology involves special research as a scientific problem. First of all, it is necessary to determine the following:

✓ to determine the existence of socio-pedagogical bases for the scientific development and implementation of educational technologies;

defining what education means as a system and what components it consists of;

✓ to determine what the functional system of educational technology consists of as a process;

✓ to indicate the extent to which educational technologies correspond to the goals of the National Personnel Training Program and the evaluation criteria;

✓ development of their guidelines, taking into account their compatibility with the basic laws of the theory of pedagogical technology systems.

The process of computerization is going so fast that after a few years the physics rooms of every school will be equipped with computers. Therefore, it is necessary to develop methodological and educational manuals for the use of computers in educational processes. First of all, it is necessary to develop electronic manual programs. Teachers should use programs that correspond to the school curriculum to students, show the convenient and understandable side of electronic textbooks and tasks. All science pedagogues are tasked with using the electronic textbook in their classes and using it to pass lessons.

Physical knowledge is widely used in information technology for computer modeling of physical processes. Computer classes are more convenient than traditional classes. Also, the unique important aspects of modeling are that it does not require the

International Journal of Pedagogics
(ISSN – 2771-2281)
VOLUME 04 ISSUE 07 PAGES: 40-46
OCLC – 1121105677
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

preparation of various physical devices and tools, it is possible to describe phenomena in a vivid and natural way, to repeat the experience any time in a short period of time, and it is difficult to observe and can be observed at all. there is a possibility to show non-existent processes as well. It allows the teacher to show many physical effects on a computer monitor, as well as with the help of a multimedia projector, and to improve a new non-traditional type of teaching. Today, the use of information technologies makes it possible to animate the physical mechanisms of invisible, fast or slow processes, complex phenomena. This animation model can be simulated using a multimedia-projector system.

The improved content of virtual laboratory work created in physics serves to increase students' interest in science and increase the efficiency of learning.

REFERENCES

1. Decree of the President of the Republic of Uzbekistan No. PF-79 of May 26, 2023 on approval of the national program for the development of school education in 2022-2026 05/31/2023, 06/23 No. /79/0302
2. Begmatova D.A. Didactic basis of quantitative assessment of physics practicum works. Ped.fan.nom...diss.authorref. – Tashkent- 2004. - 22 p.
3. K.A.Tursunmetov, V.S.Khamidov, S. Sheraliev Methodology of performing virtual laboratory and demonstration works from the department "Mechanical and electromagnetic vibrations and waves". Tashkent-2010.