USE OF VERNIER DIGITAL LABORATORY IN LESSONS AND LESSON ACTIVITIES

Yusupov Fahriddin Tajimamat o'g'li
Fergana Polytechnic Institute
yusupov.fizika@gmail.com , ORCID:0000-0001-8937-7944
Rakhmonov Tohirbek Imomalievich
Fergana Polytechnic Institute
radiofizik2014@gmail.com, ORCID:0000-0002-6080-6159
Tolaboyev Dilmuhammad Xayitali o'g'li
Fergana Polytechnic Institute
dilmuhammad00056@gmail.com, ORCID:0000-0001-6248-845X
Xidirov Dadaxon Sherqo'ziyevich
Fergana Polytechnic Institute
dadaxon89@gmail.com, ORSID: 0000-0003-1391-4250

ABSTRACT

The new task of the school was to form a system among school students, a universal movement, as well as experimental, research, organizational independent work experience and personal responsibility of students, to make learning goals personally important, education powers that define new content. The purpose of the article is to explore the possibilities of using Vernier digital laboratory to develop school students research skills. The research activity involves several steps, ranging from defining the goals and objectives of the research, proposing a hypothesis, conducting the experiment, and presenting it.

Keywords: *Vernier digital laboratory, assessment, optimal combination, digital laboratory mobility, special software, digital microscope*

АННОТАЦИЯ

Новой задачей школы было формирование системы среди школьников, универсального движения, а также экспериментального, исследовательского, организационного независимого опыта работы и личной ответственности учащихся, чтобы сделать цели обучения лично важными, образовательные силы, определяющие новое содержание. Цель статьи - изучить возможности использования цифровой лаборатории Вернье для развития исследовательских навыков школьников. Исследовательская деятельность включает в себя несколько шагов, начиная от определения целей и задач исследования, предложения гипотезы, проведения эксперимента и его представления.

Ключевые слова: *цифровая лаборатория Вернье, оценка, оптимальная комбинация, мобильность цифровой лаборатории, специальное программное обеспечение, цифровой микроскоп.*

INTRODUCTION

Physics is called experimental science. Many laws of physics are discovered through the observation of natural phenomena or special stage experiments. Experience confirms or refutes physical theories. The sooner a person learns to conduct physical experiments, the more he can hope to become an experienced physicist.

The teaching of physics is a conducive environment for the application of a systematic activity approach, starting with a physics course, based on the specific features of the science. high school includes sections, and learning and understanding them requires advanced imaginative thinking, analysis, and comparison skills.

Particularly effective methods are the use of new information technologies, experimental and project activities, problem-based learning, such as modern elements educational technologies. These technologies allow the adaptive learning process to create the preconditions for the child's participation in the regulation of their learning activities, depending on the individual characteristics of students, the content of education of varying complexity. Only by engaging in the process of scientific knowledge in the field of educational physics can a student’s level of motivation be increased. Experiments are one of the most important ways to motivate students, because the ability to experiment is the most important skill. This is the pinnacle of physical education.[1]

The experience of physics allows the practical and theoretical problems of the course to be combined into one whole. As they listen to the learning material, school children begin to get tired and lose interest in the story. Physical experience, especially independent experience, alleviates the inhibitory state of the brain in children. During the internship, students are actively involved in the work. It helps to develop students ’skills of observation, comparison, generalization, analysis, and inference. The student physics experiment is a method of general education and polytechnic preparation of schoolchildren. It should be short-lived, easy to set up, and clearly focused on mastering and applying the training material.

METHODOLOGY

The experience allows students to organize independent activities, as well as develop practical skills and competencies. My methodical piggy bank includes 43 frontal experimental assignments for seventh grade only, excluding software lab work.

During an entire lesson, the absolute majority of students will be able to complete and complete only one experimental task. So I chose the smaller experimental tasks they do not take more than 5-10 minutes.

Experience has shown that conducting frontal laboratory work, solving experimental problems, performing short-term physical experiments is several times more effective than answering questions or working on textbook exercises.

But, unfortunately, it is not possible to show many phenomena in a school physics classroom setting. For example, these are micro world events or fast-moving processes or experiments with non-laboratory instruments. As a result, students have difficulty learning because they cannot mentally imagine.

In this case, the computer comes to the rescue, which can not only create a model of such events, but also allow. The modern educational process cannot be imagined without the search for new, more effective technologies that contribute to the formation of self-development and self-education skills. Project activities fully meet these requirements. The purpose of teaching project work is to develop students' independent activities aimed at learning new experiences. It is the involvement of children in the research process that activates their cognitive activity.

Qualitative verification of phenomena and laws is an important feature of the study of physics. It is no secret that not everyone is capable of mathematical thinking. When a child is first introduced to a new physical concept as a result of mathematical changes, then the search for it appears physical meaning, many children have a simple misunderstanding and a strange "worldview" that actually has formulas and events are only needed to describe them. [3] Experimental physics is the study of the world of physical phenomena, the observation of events, the acquisition of experimental data for the analysis of observations, the connection between this phenomenon and a previously studied phenomenon, the introduction of physical quantities and their measurement. allows

Research can be both short-term and long-term. In any case, its implementation mobilizes a number of skills in students and allows the formation and development of the following universal educational activities:

• systematize and generalize the experience of using ICT in the learning process;

• assessment (measurement) of the impact of individual factors on the results of activities;

• planning - determining the sequence of intermediate goals, taking into account the end result

• control in the form of a method of action to deviate from the standard and identify differences and compare its results with the given standard;

• Adherence to safety rules, optimal combination of forms and methods of activity.

• ability to communicate in a team;

• ability to present the results of their activities to the audience;

• Development of algorithmic thinking necessary for professional activity in modern society.

Vernier digital laboratories are equipment for large-scale research, demonstrations, laboratory work for physics, biology and chemistry, design and laboratory work. research activities students. The laboratory includes:

• Distance sensor Vernier Go! Motion

• Vernier Go temperature sensor! Temperature

• Adapter Vernier Go! Link

• Heart rate sensor (manual heart rate monitor)

• Light sensor Vernier TI / TI light probe

• A set of teaching materials

• CosView interactive USB microscopes.

Using Logger Lite 1.6.1, you can:

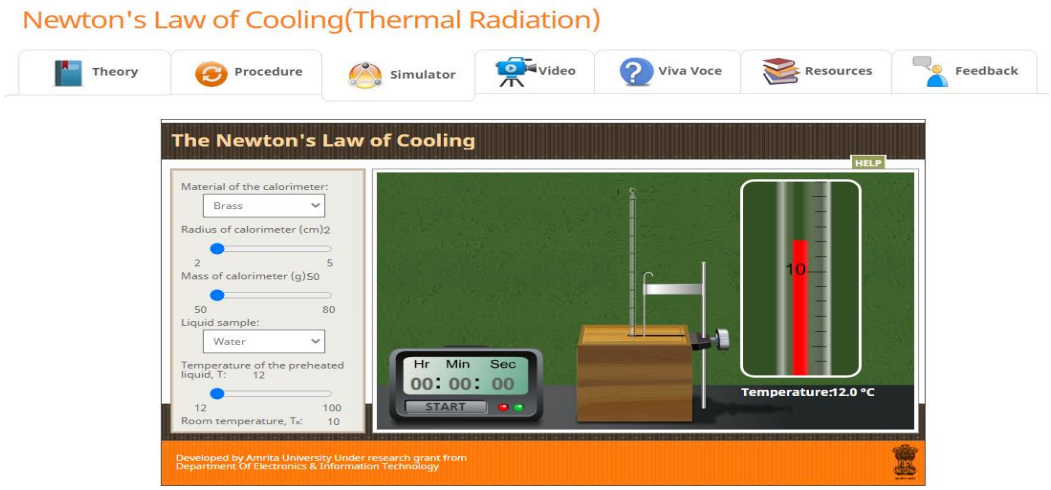
• Collect and display data during the experiment

• Show data in different ways of choice - in the form of graphs, tables, displays of measuring instruments

• data processing and analysis

• Import / export data in text format.

• Watch videos of pre-recorded experiments.



1-picture. Study of Newton's cooling law using a virtual laboratory with the Vernier digital laboratory

2-picture. Study of Newton's cooling law using a videolesson with the Vernier digital laboratory

The lab has a number of advantages: it allows data to be obtained that are not available in traditional learning experiments, and allows the results to be easily processed. Digital laboratory mobility allows for research beyond the scope of the classroom ... The use of the laboratory allows for the implementation of a systematic-activity approach in lessons and classes. Experiments with the Vernier digital lab are visual and effective, allowing students to gain a deeper understanding of the topic.

By applying a research approach, it is possible to create conditions for students to acquire scientific experience and analytical skills. In addition, reading motivation increases active participation in the lesson or course process. Each student will have the opportunity to conduct their own experience, get results, and tell others about it.[6]

DISCUSSION

Thus, we can conclude that the use of Vernier digital laboratory in the classroom allows students to develop their research skills, which increases the effectiveness of teaching and helps to achieve modern educational goals.

List of components:

interface for data processing and recording;

special software on a CD-ROM for working with data on a computer;

special software on a CD for all laboratory equipment to work in Wi-Fi mode;

sensors for experiments;

additional accessories for sensors;

Laboratory purpose:

creation of conditions for in-depth study of physics, chemistry and biology with the help of modern technical means;

increase students' activity in cognitive activity and interest in the subjects studied;

creative development and personal qualities;

creating conditions with a limited budget for all students to work simultaneously on the subject under study using modern technical means; research and scientific work.

Laboratory facilities:

operation of all components of the proposed laboratory, interactive whiteboard, projector, document camera, personal tablets and mobile devices of students in one wireless network;

the ability to use different types of tablets operating systems;

conducting more than 200 experiments during primary and secondary schools;

create and demonstrate their experiences;

the ability to transfer data to test students Homework to the student's mobile device;

the ability to view any student's tablet on an interactive whiteboard to display the task completed;

ability to work separately with each of the laboratory components;

ability to collect data and conduct extracurricular experiments.

laboratory equipment for experiments with sensors;

experience for a detailed description teacher with instructions;

plastic containers for laboratory packaging and storage.

Digital labs are the next generation of school science labs. They give you the opportunity:

• reduce the time spent preparing and conducting a frontal or demonstration experiment;

• increase the visibility of the experiment and the visualization of its results, expand the list of experiments;

• field measurements;

• Modernize already familiar experiences.

• With the help of a digital microscope you can introduce each reader to a mysterious and wonderful world where they learn a lot of new and interesting things. Kids, using a microscope, better understand that all living things are very delicate, so

you have to be very careful with everything around you. The digital microscope is a bridge between the ordinary world and the microcosm, which is mysterious, extraordinary and therefore amazing. And everything attracts attention, affects the child's mind, develops creativity, love for the subject.[7] A digital microscope allows you to see a variety of objects magnified 10, 60 and 200 times. With its help, you can not only view the object of interest, but also take a digital photo of it. You can also record objects using a microscope and create short films.

RESULTS

The digital lab kit includes a set of sensors that I use to perform simple visual experiments and experiments (temperature sensor, CO2 sensor, light sensor, distance sensor, heart rate sensor). Students construct a hypothesis, collect data using sensors, and analyze the data obtained to determine the accuracy of the hypothesis. Use in conducting scientific experiments Computer and sensors in the classroom ensure the accuracy of measurements and allow continuous monitoring of the process, as well as storage, display, analysis and reproduction of data and the creation of graphs based on them. The use of Vernier sensors contributes to the safety of science lessons. A temperature sensor connected to a computer prevents students from using devices that could break mercury or other glass thermometers. I use the tools in physics, chemistry, biology, computer science classes, etc. while working on extracurricular projects. Students will master the following types of activities: cognitive, practical, organizational, assessment, and self-monitoring activities. The following positive effects are observed when using digital laboratories: increase the intellectual potential of schoolchildren; the percentage of students participating in various topics, creative competitions, design and research work will increase and their effectiveness will increase.

• The application of e-learning resources should be important to the impact of changes in the activities of the teacher, his professional and personal development, non-traditional models of start lessons and forms of interaction between teachers and students active independent activity of students based on the emergence of new models of education based on the spread of cooperation.

• This is in line with the main ideas of FGOS LLC, the methodological basis of which is a systematic activity approach, according to which "the development of the student's personality is based on universal assimilation learning activities, knowledge and mastery of the world - the goal and main outcome of education."

• The use of e-learning resources in the learning process provides great opportunities and prospects for students' independent creative and research activities.

• research work ESM allows not only to independently study the descriptions of objects, processes, events, but also to work with them in an interactive mode, to solve. connects problematic situations and acquired knowledge with life events.

CONCLUSION

The use of Werner's digital laboratory in the classroom involves the study and use of mathematical methods to demonstrate a variety of complex functions in different areas of science. Laboratories use advanced simulation technology to create a real-world laboratory environment. In-depth research and studies are conducted by researchers to better understand the experimental procedures. Actual laboratory scenarios are obtained through a live demonstration of the experiment to assimilate information about procedures and laboratory equipment. The visualization and development of graphic symbols is done on the basis of real situations and compared with the corresponding real equipment. The simulations are done interactively using a variety of authoring tools, thereby recreating and simulating a real laboratory environment.

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