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### FACTORS OF ORGANIZING PHYSICAL PRACTICUM BASED ON NON-TRADITIONAL TECHNOLOGIES

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**Annotation:** this article presents the factors of organizing a physical practice based on non-traditional technologies and the algorithms of virtual organization and implementation of some experiments related to the department of physics using electronic resources.

**Key words:** observation, experiment, technology, factors, electromagnetic vibrations, alternating current, vibration circuit, resonant frequency, electronic resource, sound propagation speed, standing wave, virtual laboratory.

Applying theoretical knowledge of students to practice and developing creativity are one of the urgent issues in the education system today .

Textbooks, training manuals and electronic pedagogical resources (electronic textbooks, methodological and training manuals) have been created and are being created for all levels of education in a new structure, based on new state educational standards and curricula.

Natural sciences are experimental sciences that are based on observation and experiments. Observation is the study of the nature of an event or process without affecting it. An experiment is a type of research, which is a method based on concrete facts and empirical research, which requires strict logical confirmation and is aimed at testing scientific and practical hypotheses .

In continuing education, conducting natural science laboratory classes in non-traditional methods, that is, organizing classes using electronic resources, teaching tasks and tasks using computer technology (electronic pedagogical resources), and events and processes that are impossible or difficult to see and observe in practice in students and students. in teaching,

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teaching without changing the curriculum plan, as well as students' independent learning and practical assignments allow them to be implemented.

The use of new pedagogical and information technologies is of great importance in the development of students' knowledge, skills and abilities in physics, increasing their interest in science, increasing their physical thinking and logical thinking. From this point of view, the use of electronic (pedagogical software) manuals has a positive effect on improving the effectiveness of the lesson.

It is important to be able to properly organize, perform and analyze the results of conducting physical experiments in the development of creative abilities of pupils and students. This is a guarantee of the efficiency of production, including the introduction of scientific and technical achievements in various branches of production.

Organization and execution of experiments is an important place in learning the laws and principles of physics. Organizing physical experiments on the basis of non-traditional technologies, the following factors are formed in the student:

- levels of physical knowledge increase;
- the received theoretical information is strengthened;
- learns to work with physical devices and measuring instruments;
- learns to develop and analyze the results of observations and experiments ;
- learns to work on measurement errors;
- achieves a deeper understanding and understanding of the basic concepts and laws of physics;
- the ability to perform experimental tasks develops;
- the student's competence and skills increase when conducting experiments.

Achievements and disadvantages of organizing physical experiments on the basis of non-traditional (with computer technology) technologies.

*Achievements:* the skills of students to work with computer technology are formed;

- achieve direct implementation of processes and experiments that are practically impossible to see or difficult to observe;
- saving time in performing experiments;
- the possibility of dynamic (animated) execution of experiments;
- the student's direct intervention in performing the experiment (temporarily stopping and continuing);
- achieve repetition of the experiment within the specified time;
- availability of automatic evaluation of the results of the work performed.

*Disadvantages:* students do not know how to use computer equipment ;

- lack of or improperly designed method of experiment;
- illogical or incomprehensible sequence of execution of the experiment;
- pupils and students work more than the specified time on computer equipment;
- the user's complete lack of understanding of the computing device .

As a result of the above-mentioned analysis, the following can be recognized. The difference between non-traditional classes and traditional classes is that in these classes an environment of freedom is created for students and they are given the opportunity to freely express their opinion.



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6. According to the measurement results  $\omega_{pe3} = 1/\sqrt{LC}$ , using the formula the resonance frequency is calculated and concluded.

7. After automatic calculations, the absolute and relative errors of the experiment are analyzed and concluded.

Non-traditional (computer - electronic pedagogical software) teaching technology is implemented mainly through electronic educational resources, and its characteristics are as follows:

- it is aimed at developing the student's independent thinking and creative abilities;
- the teacher participates in the educational process as a consultant;
- active integration of media and resources in the teaching process is ensured;
- teaching motivation increases;
- increases the speed and effectiveness of education;
- The student's independent work and research skills are formed.

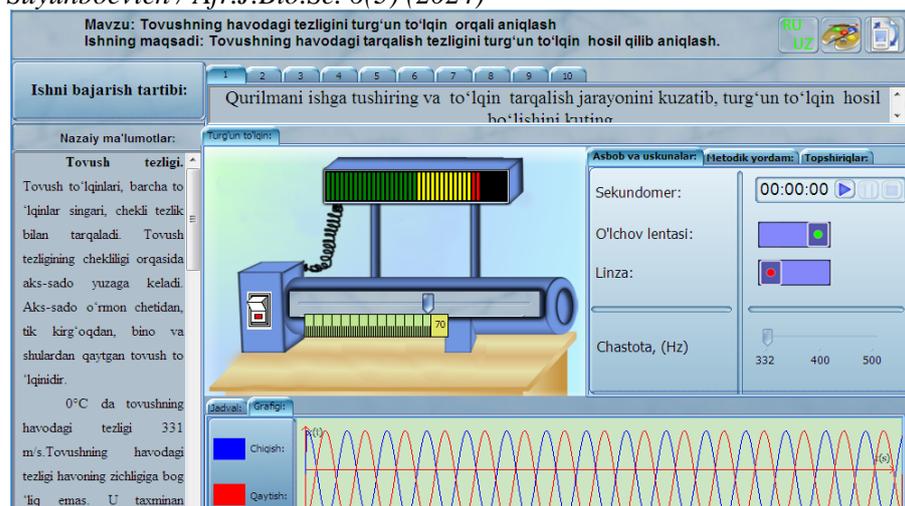
Assessment of students' knowledge in non-traditional (electronic pedagogical software) teaching technology is an important task. Since this technology is mainly aimed at independent education, it is appropriate to take into account not only experimental results, but also students' creative activity and independent work abilities in the process of evaluating students' knowledge.

#### **1. Possibilities of electronic resources:**

- to get acquainted with the subject, purpose, brief theory of laboratory work, sequence of work, necessary tools and equipment, methodical assistance and tasks, and methodical development of a standing wave generating device;
- contacting authors, choosing the language of work (Uzbek, Russian);
- use of one window when performing laboratory work;
- magnify small parts using a lens;
- automatic calculation of results quickly and with high accuracy;
- evaluate the result of the experiment and save it on the date of completion.

#### **2. Opportunities and features of the virtual laboratory work "Determining the speed of sound in air using a standing wave":**

- monitoring and determining the propagation of sound in the air at a certain temperature and frequency according to the operation of the device;
- monitoring and identification of standing wave nodes or nodes by sound (audio) or sign (image);
- observe and study the graphic (output and return) images of standing wave generation;
- directly enter and calculate the quantities (values) determined in the experiment in the table;
- automatic calculation and analysis of experimental results;
- enter information to enter the program (educational institution, group and username).



2 - picture. Method for determining the speed of sound in air using a standing wave.

N <sup>o</sup>	t, (°C)	v, (Hz)	L1 (m)	L2 (m)	ΔL (m)	u, (m/s)	Δu, (m/s)	ε, (%)
1	0	332	0,25	0,75	0,5	332,000	0,00	1,40
2	0	400	0,2	0,62	0,42	336,000	4,00	1,40
3	0	500	0,18	0,51	0,33	330,000	2,00	1,40
O'r.	0	410,67	0,21	0,62	0,41	336,700	4,70	1,40

3 - picture. A plan for analyzing the results of the work done.

Approximate time distribution of training using electronic pedagogical resources (in percentages).

- organizational part - 3%.
- control of knowledge - 15%.
- entrance and exhibition part – 10%.
- working with students with modern information technologies (doing tasks on a computer) - 65%.
- summarizing, giving homework, summarizing - 7%.

Organization of laboratory exercises in the educational process with the help of electronic pedagogical resources and the results achieved in their use:

the teacher, teaching the subject in a short time with an exhibition and evaluating many students at the same time with the help of computer technology, achieves the planned goals;

students achieve complete mastery of the subject. It develops their creative abilities and increases their practical activity. Learns to think logically. Learns to work individually and in a group. The ability to use computer technology develops and the ability to remember increases.

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He learns to control himself. A lot of information will be acquired in a short time, computer literacy will develop and a culture of using computer technology will be formed.

From our many years of pedagogical experience, we can say that the use of this electronic resource of physics in the educational process, whether in traditional or non-traditional classes increases students' interest in science and increases their level of knowledge.

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