

USE OF MULTIMEDIA PROGRAMS IN STUDENTS' EXTRACURRICULAR ACTIVITIES

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ABSTRACT

This article discusses the development of extracurricular activities for students in physics, ways and benefits of its virtual implementation. The introduction of STEAM technology in education, ways to use the Multisim program in teaching and research activities are described.

Keywords: STEAM education, virtual, software, research, electrical circuit.

Reforms in our society today require professionals not only to have knowledge, but also to have the ability to do research and exploration. Therefore, one of the most pressing issues is the involvement of students in teaching and research activities and the development of research skills in them.

The gradual introduction of STEAM technology in education is one of the solutions to this problem, which will increase the activity, initiative and curiosity of future professionals [1,2]. It is known that STEAM is a new technology of teaching schoolchildren, which is an alternative to the traditional system of education. It is based on a system of teaching children

simultaneously in Science, Technology, Engineering, Art, and Mathematics. In STEAM education, students are taught through practical and entertaining project activities. Information processing and practical application form the basis of the STEAM training program. STEAM educational technology is based on the design method and is based on cognitive and creative (as well as artistic) research. Such research is carried out in the process of acquiring knowledge in the process of practical activity, and then re-applying it in practice, that is, in the construction of structures in games, using elements of technical creativity. The STEAM-based approach allows students to explore the world in a systematic way, to observe the processes taking place around them logically, to understand the interrelationships between them, and to discover new, unusual, and interesting things for themselves. By waiting for something new, the student develops curiosity in young people, identifies a problem of interest to him, develops an algorithm for finding a solution, critically evaluates the results, forms the engineering aspects of thinking [4].

Involving students in research is important in this regard. By engaging students in research activities, they first develop inquisitive activity and independent research activities; secondly, this activity, formed in the student, serves as a basis for new successes in the future, that is, they are manifested in active research, rationalization, and later in inventive activity. There is a strong demand in our society for such personnel, and such personnel are considered competitive [5,6]. In schools, students' research activities are usually in the form of extracurricular activities. There are a number of challenges in engaging students in extracurricular activities. One of them is the lack of material and technical support in educational institutions, laboratory stands, lack of modern tools and equipment [4]. The second is that students are required to adhere to safety regulations when working with power tools. This, in turn, allows students to focus on certain areas, such as high voltages, high-power electromagnetic waves, and so on. in the field, restricting the ability to conduct free research as they wish.

Another important aspect that should not be overlooked is that distance learning is currently developing rapidly and distance learning is taking place online. This method of teaching

creates problems for self-study laboratory classes and extracurricular research. This problem can be solved with the help of training laboratories and virtual laboratories in the process of teaching and research activities. One such virtual laboratory program is the Multisim software package from National Instruments (NI). The presence of a large library of modern tools in the software package allows you to design, experiment and research electronic devices that range from simple to very complex [6,7]. Such a tool is ideal for teaching and research activities, as it is possible to remove any restrictions on elements and tools. This allows students to research their ideas on a large scale, to conduct research as much as they want without fear of the possibility of failure of electrical equipment due to errors, to build new ones without hesitation, to measure modern control. allows you to use as many devices as you want.

Another advantage of conducting research and development activities using the multisim software package is that there is no need to use laboratory rooms equipped with modern equipment. If the student has a computer, he / she will be able to install Multisim software and conduct research and study activities in a convenient place. This is especially important in today's world of online learning. The opportunities of this program can be used for demonstrations, laboratory classes and research on topics related to the "Electrical" section of physics.

As an example, we are conducting research and development activities using the Multisim electronic program to study the operation of a high-voltage step-down transformer. It is not possible to carry out this research in the laboratory, as a voltage of 10,000 V is used. To conduct this study, the Multisim program takes an alternating current source (10000V, 60Hz), a virtual transformer, a switch, an incandescent lamp from the instrument panel, places it in the work area of the program and connects using conductive wires (1- picture). After that, the measuring control devices (multimeters 2, oscilloscope) found for the study are taken from the instrument panel of the program, placed on the work surface and connected to the required places using conductive wires (Figure 1)).

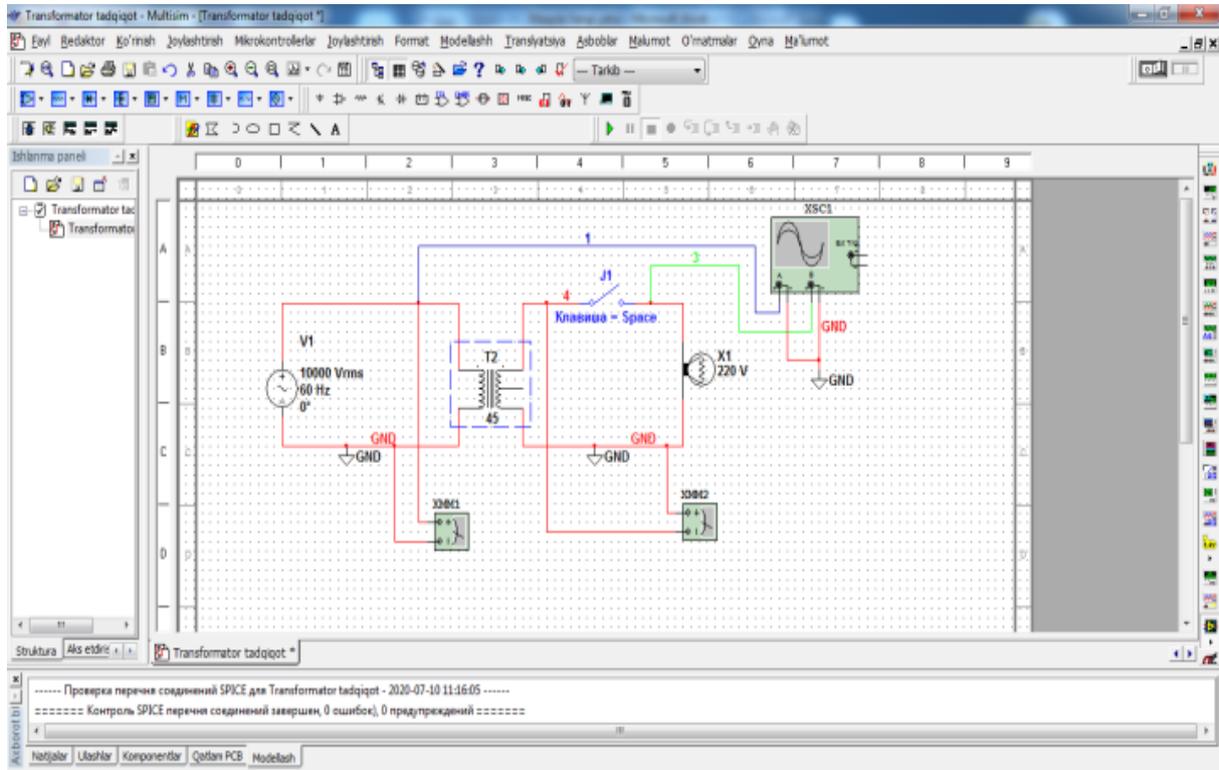


Figure 1. Placement of the research device diagram and measuring control devices in the Multisim program workspace.

The parameters of the virtual transformer are set (Figure 2).

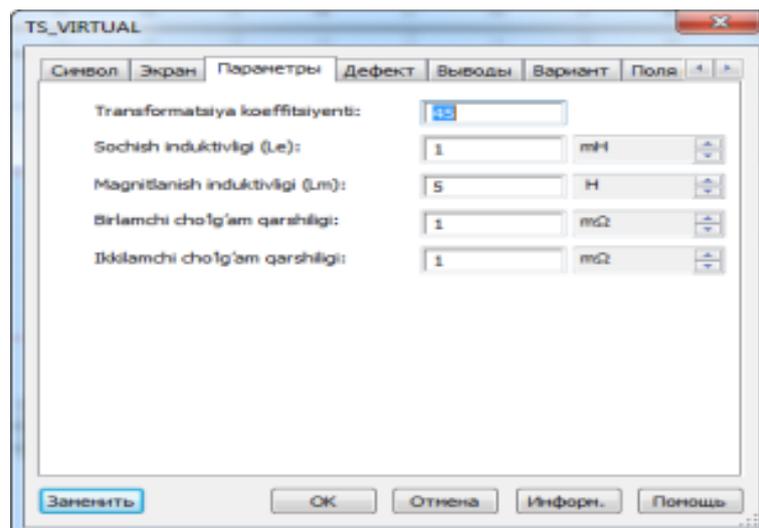


Figure 2. Setting the parameters of the virtual transformer.

The parameters of measuring instruments (multimeters, oscilloscope) are set according to the estimated values of the measured quantities (Figure 3.4).

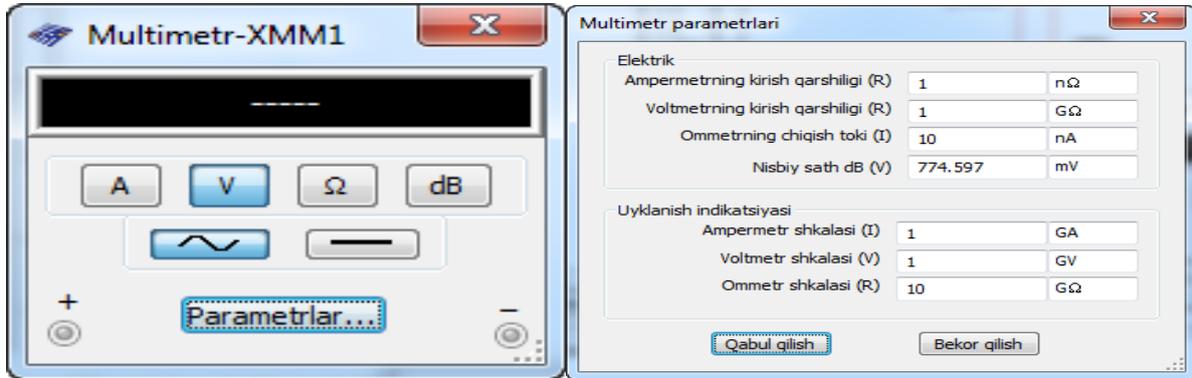


Figure 3. Adjusting multimeter settings

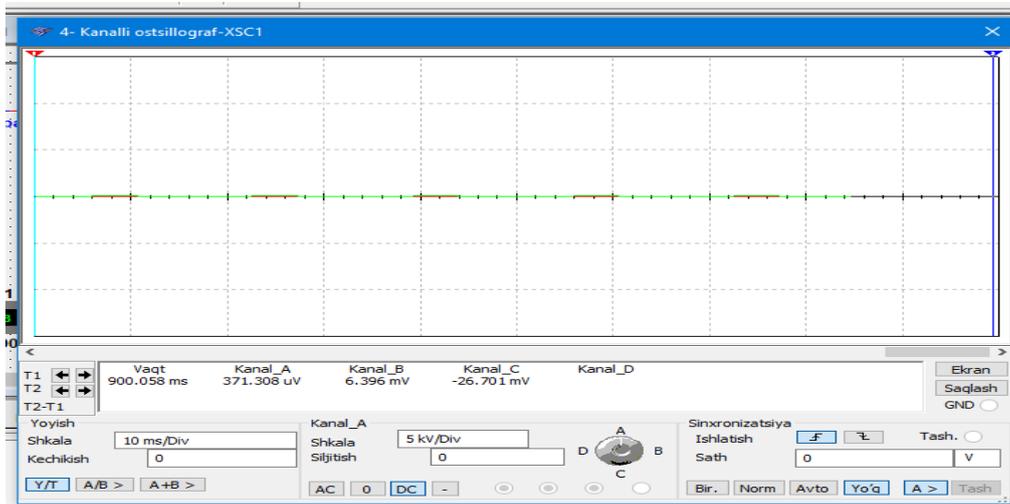


Figure 4. Adjusting the oscilloscope settings.

The simulation process is started . The switch is connected. The readings of the measuring instruments are recorded (Figure 5) and the simulation process is stopped.

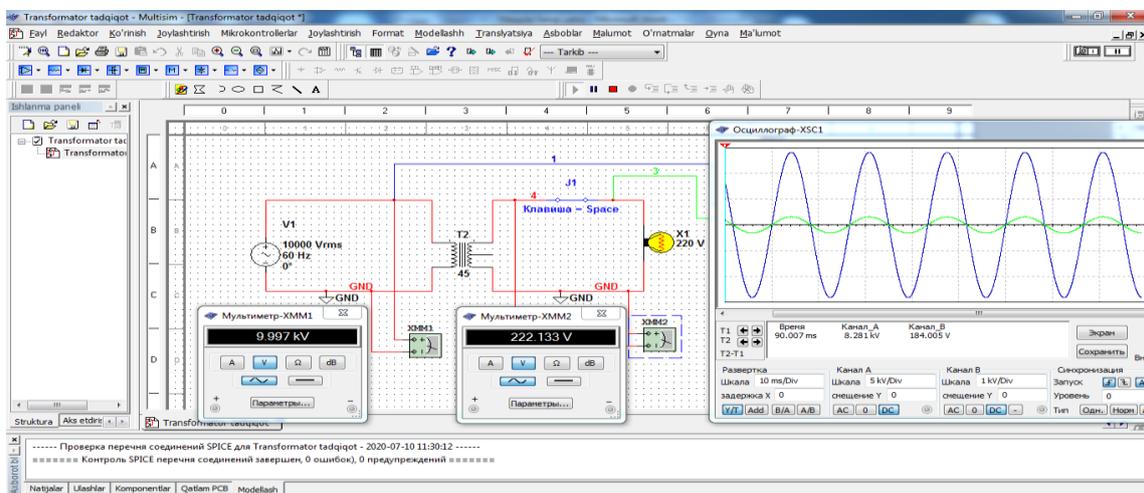


Figure 5. The process of conducting research and recording the results.

The parameters of the virtual transformer will be changed and research will continue.

In the course of this study, students will be able to select the object of study, the elements of the electrical circuit, their connection, the creation and design of the electrical circuit, select the necessary measuring instruments, adjust them, record the results and analyze them. Get acquainted with the methods of making. Based on the analysis of the obtained results, they make changes to the object of study, learn to determine the most optimal parameters of the object sought. As a result, planning research in the area of interest, selecting the object of research and identifying its main parameters, exploring these parameters and finding ways to make new changes to achieve the expected result, develops curiosity in students, the formation of practical competencies such as identifying a problem of interest to him, developing an algorithm for finding a solution, critically evaluating the results, thinking in terms of engineering, generating ideas and applying them to life.

In conclusion, the use of the Multisim program in extracurricular teaching and research activities allows students to implement their research ideas freely, absolutely safely, at any cost, at their own expense, and most importantly on their own. It allows you to learn from the mistakes you have made.

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