

# INFORMATION TECHNOLOGIES IN SCIENCE

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## Abstract

This article deals with the issues of teaching the basics of electrical engineering and electronics in higher military education on the basis of information and communication technologies. The article also discusses the role of the Project Board layout, its advantages, convenience, use, and interesting organization of practical and laboratory training with the help of this layout board. The layout of the Project Board shows the use of integrated circuits, which are the basis of radio electronics, as well as the advantages of this board over the universal laboratory stand and in conjunction with the program ARDUINO.

**Keywords:** integrated circuit (IMS), Project Board layout, universal laboratory stands (ULS), decoder, combination circuit, ARDUINO program.

## Introduction

The Law of the Republic of Uzbekistan "On Education" was adopted on September 23, 2020. Article 46 of the law stipulates obligations such as "Teachers: the use of information and communication technologies, advanced and innovative forms and methods of teaching and education ..." [1]. The law imposes very important responsibilities on professors and teachers of higher and secondary special education institutions of the republic.

In the process of carrying out these tasks, a new approach to teaching students requires teachers to be very demanding in their profession and students. It is possible to prepare educational materials in multimedia form and effectively organize laboratory and practical classes using computer networks. The widespread introduction of computer technology into the education system requires a review of all types of teaching materials. This gives us educators the task of organizing lessons and learning teaching technologies using computer technology from foreign educational institutions.

The use of information and communication technologies in the educational process is wide-ranging in the world practice and should be approached from pedagogical, psychological, didactic, organizational, economic, social, environmental and other points of view. The teaching process is a complex creative activity. Its effectiveness largely depends on the activity of students. To activate them, you need to spend more time on information technology, games, debates, conversations, competitions, travel, conferences, roundtables, role-playing games, working with books, computer training.

The use of modern information technology in the educational process can effectively increase the effectiveness of teaching methods, change the work of teachers, and improve their pedagogical skills, structural changes in pedagogical systems. This puts a special role in the organization and management of informatization of pedagogical processes.

Effective organization of pedagogical educational processes on the basis of modern information technologies:

- Team teachers, computer programmers, relevant specialists working together to create distance learning courses and electronic literature;
- Proper distribution of responsibilities among teachers;



- To improve the organization of the educational process and to monitor the effectiveness of pedagogical activities [2,206].

How to teach the basics of electrical engineering and electronics, what teaching methods and techniques should be used for this, to arouse students' interest in this subject are the main objectives of the methodology of teaching this subject.

## METHODS

Is there a need to create a theoretical basis for the introduction of information technology in education today and put it into practice? First of all, it should be noted that the teacher is becoming not only the organizer of the learning process, but also one of the sources of knowledge. Second, at the evolving stage of scientific and technological progress, the rapid increase of information and the limited time to use it in the teaching process, as well as the requirements for perfect preparation of students for professional activities require the introduction of modern technologies in education [2,220].

Various teaching methods and tools are used in the teaching of electronics to cadets of higher military educational institutions in order to introduce information and communication technologies and increase the effectiveness of education. Programs play an important role in improving the effectiveness of practical training. It helps to absorb information, gain a deeper understanding of the topic, and keep the learning material in memory for a long time.

## RESULTS

The virtual Bread Board program and its capabilities in teaching the subject "Fundamentals of Electrical Engineering and Electronics" serve to introduce information and communication technologies in teaching the subject to cadets of higher military educational institutions and increase the effectiveness of education.

This program allows you to study the properties of semiconductor devices, transistors, logic elements and the process of connecting them in the circuit. In this program, the trainee will not only be able to use a variety of elements in laboratory and practical exercises, such as assembling an arbitrary logic circuit, but will also be able to monitor the operation of the device [3].

An electronic version of this course allows you to:

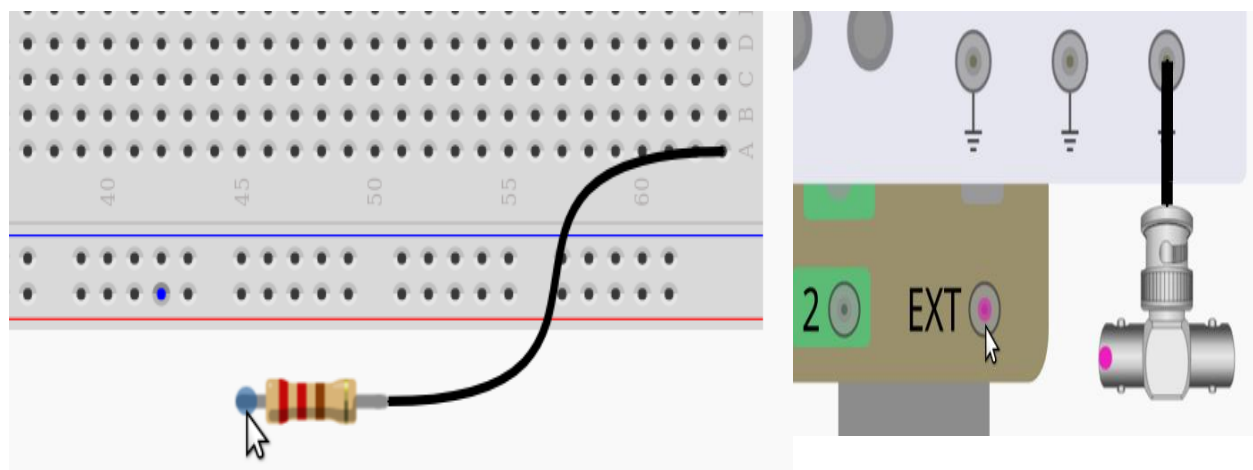
- ✓ increases the activity and independence of cadets in educational work;
- ✓ facilitates the reception of educational material in the form of multimedia;
- ✓ provides complete control over each student's mastery of the material;
- ✓ Cadets become accustomed to working independently with research materials, researching, and creatively using effective forms and methods of teaching.

A breadboard or Proto Board is a building base for prototyping electronics. Breadboard simulator is a virtual room equipped with an oscilloscope and a signal generator to simulate simple analog circuits. The package comes with two programs: an RLC demo and a Breadboard simulator.

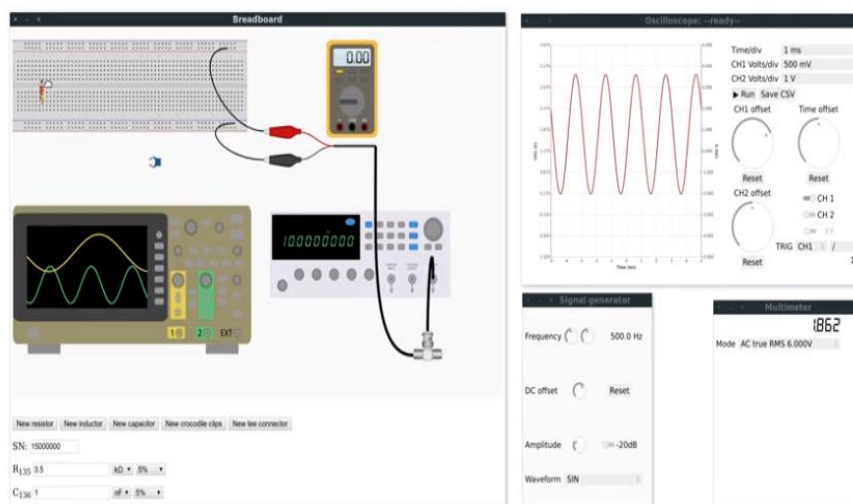
The breadboard simulator program has 4 windows: a plate, an oscilloscope, a signal generator and a multimeter. Figure-2.

In the breadboard window, you can set up your own circuit by connecting electronic elements with virtual wires. There are two types of wires: simple jumper wires and coax cables with BNC connectors (marked with a thicker line). To connect the two components, first disconnect one terminal of the first (a blue or purple dot will appear), then double-click on it, it will select the terminal. Do the same with the other component. Click on a space to select a terminal. Press one end of the wire twice to separate the two components. Figure 1.





**FIGURE 1.** You can connect the blue dots with jumper wires and the purple dots with coax cables.



**FIGURE 2.** BreadBoard simulator work window.

**CONCLUSION**

Today, most of all radio electronic devices in the world are based on digital logic integrated circuits (IMS). Chips vary in appearance, structure, principle of operation, and function [3]. Logical elements also have different names depending on the function they perform. 2AND-NOT logic element TTL7403 chip is selected in the program. According to the rules of connection, it is collected incorrectly and the truth table is checked by means of the program. In teaching the basics of electrical engineering and electronics, it is of great benefit to use both physical principles and learning models that can be constructed using software products such as MATLAB ELCVT or COMCOL MULTIFISICS. For example, in the study of the magnetic field of a power transformer or the electrostatic field of a capacitor, models of electric and magnetic fields using an iron scraper can be used as physical models of virtual computer models that allow seeing the landscape of electromagnetic fields in both statics and dynamics. The method of electrical measurement is one of the main methods of experimental study of processes in electrical engineering. As in any general science, sketches and drawings of devices are widely used in electrical engineering, without which it is difficult to study the design of machines, transformers and various devices. Studying the processes that take place in the

device under study requires the formulation of formulas, the use of graphical connections and vector diagrams, the use of layout schemes, and so on.

To increase the effectiveness of teaching the basics of electrical engineering and electronics, it is advisable to introduce a problem-based type of education instead of explanatory-demonstrative form of teaching. It strengthens the role of the student as a subject in the learning process, as well as the role of the teacher as an organizer of the student's independent learning activities.

In conclusion, it can be concluded that most teachers have difficulty in choosing teaching methods appropriate to the topic. Because the teaching method is organically related to the learning activity, the choice of teaching methods should be appropriate to the components of the activity structure (motivational, organizational-behavioral and control assessment). Only then will it be effective. The use of information and communication, Internet information and educational resources in education effectively helps students to maintain a high level of knowledge and allows them to develop into qualified professionals in the future.

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