



The Possibilities Of Using Robotics Elements In Physics Lessons In Science

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ABSTRACT

In this article, information will be given about the possibilities of using the elements of robotics as a learning tool in physical education, lectures and practical classes on the subjects taught in the circle of robotics in the 8th grade of physical education. Also Arduino "STARTER" in the development of students' practical skills in robotics. Using the 12+ learning sets, the data on the development of students' electronics and programming using the set are covered.

KEYWORDS

Robotics, physics, educational tool, integration, electronics, programming, compensation

INTRODUCTION

At present, on the basis of the concept of modernization of polytechnic education in secondary schools, it is necessary to fully disclose the possibilities of each subject in mastering the fundamentals of robotics for its implementation. The content, methodologies and technology of using robotics tools in the

educational process in ensuring the Polytechnic direction of teaching in this science implies research as a special pedagogical research. Today, scientific and methodological research on the direction of the use of robotics in the educational process

is at the initial stage in the process of teaching subjects.

As one of the directions of Polytechnic preparation in the field of physics, the acquisition of educational materials for robotics, serves to strengthen knowledge in science, the formation of practical skills and skills. Students will acquire modern knowledge. Robotics-science plays an important role in the implementation of integration. Robototechnics the knowledge obtained from technology, physics, informatics, mathematics, drawing and other sciences is remembered [1, b. 33]. This

knowledge plays an important role in understanding the principles of the operation of robots, as well as their independent design and fabrication by students. In the execution of many projects, the integration of knowledge from the subjects of mathematics, Informatics and technology occupies a special place.

In secondary school, physics is planned to be taught from 2 hours a week in 8th grades, and in total 68 hours are taught during the academic year [6, b. 4]. In the 8th grade, the division of the hours of physics by chapters is presented in Table 1.

1-Table

Nº	Chapter name	Separated hour
1	Electric charge. Electric field	9
2	Electric current	23
3	Electrical current operation and power	11
4	Electric current in different environments	10
5	Magnetic field	15
	Total	68

The level of teaching instructional materials on robotics to school students is determined by the extent to which they are basic, extended, deepened [4, b. 12]. These levels determine the effect of training to engage in robotics in the teaching of physics.

Taking into account the achievements of modern science and technology, it plays an important role in the increase of students ' interest in the mastering of Sciences in their acquisition of sufficient knowledge, skills and skills in robotics. The use of robotics as an

educational tool in physics lessons will serve the students to understand the application of the laws of physics to the technique, to increase their interest in the technical sphere, to choose a profession in the technical sphere, to increase the indicators of mastering science, to become a qualified specialist in the future.

Arduino "STARTER", intended for students of secondary schools in general. The use of 12+ training sets is widely established. The purpose of using this learning kit is to develop

students' competences in electronics and programming [2, p. 35].

The main purpose of the device is to provide the computer with interaction with physics outside the virtual world. With the help of Arduino-based devices, it consists in obtaining information about the environment with the help of various sensors, as well as establishing interaction with the help of executive and control devices. With this device, it is possible to establish some contacts.

The operation of the platform is based on physical processes such as voltage, current strength, resistance, data transmission and reception, storage. This is due to the fact that the kit consists of a set of resistors, capacitors, non-payvandable connecting boards, cables, sensors, svetodiod constructions. Using this kit, the student can acquire the initial skills of modeling, designing and programming various devices in the process of independent operation under the guidance of the teacher. Students who have attended the training for a year will fully master the basics of Statics (electrochemistry), the knowledge of the Electrical Department of physics, learn how to receive, store and process data, transmit, create and use commands for programming, possess the first skills related to the basics of programming.

At present, in our Republic, the classes on robotics for students are mainly set out as Circle classes in children's centers of "harmonious generation", as well as in various

non-state educational institutions outside the school. In these institutions, the fundamentals of robotics are based on the level of knowledge of the students, compiled by teachers in accordance with their age categories, conducted on educational programs and calendar-themed plans. Calendar-thematic plans are drawn up by specialist teachers who conduct training and approved by educational institutions in accordance with the established procedure [5, p. 47]. As a result of the study and analysis of the sections and topics of the robototechnics gang calendar-theme plan, there are opportunities for teaching on the basis of integration of Science with the subjects of physics taught in secondary schools in general. In Table 2, the corresponding subjects related to the subject taught in the 8th grade physics of the topics taught in the robototechnics circle are presented.

Taking into account the interest of readers, it is necessary to focus on the design and creation of models of robotic systems. Also, students should ensure that robots have different texture and functionalities: it is possible to carry out such functions as transposition of whole or some parts, "perception", "sense of smell", "vision", "hearing", "speech", "memory", "nervous system", modeling of artificial intelligence signs [3, b. 125]. In the process of conducting training in the lessons of physics, the choice of teaching methods in the explanation of instructional materials in the use of robotics tools is of paramount importance.

Table-2

Possibilities of teaching topics in the calendar-themed plan of the robotechnics circle in relation to science

Nº	Subject of assignment	Content of the training	Sciences related related related topics
1.	Introduction to robotics	Safety equipment and rules of conduct in the IT room robot technical. The main directions of robotics. Stages of making robots and their functions in the issues posed	8-th class "electrical safety measures", "household electrical chain couplings"
2.	Introduction to electrotechnics	Basic concepts of electrotechnics: electric current, its parameters, many common elements, their types, functions, connection schemes and basic methods of constructing an electronic circuit.	Grade 8 "mezzanine strength and measure it", "Assembling the electric chain and measuring the current strength and voltage in different parts of it"
3.	Study of the work of traffic lights	The concept of a Svetodiode, an explanation of its functions and performance. Calculation of the required nominal value of the resistor under the Ohm law. Methods for connecting svetodiodes to Arduino.	8-class" electrical resistance", "Ohm law for a part of the chain", "adjust the power of the current using the rheostat"
4.	Studying the process of operation of electrodrivators	Study their electrodrivator structure and process of operation. Study the main classifications of the engine. Methods of connecting the engine and its control.	8-th class "irreplaceable mezzanine electric engine"
5.	Learning the process of operating the engine using the driver	Concept and classification of motor driver micro-scheme. The function of the engine driver, its types and classifications. Connect to Arduino and manage it.	8-th class "study of the electric motor of alternating current (in the model)"

6.	Communication using Bluetooth	Familiarity with Bluetooth technology is the basic printing of information transmission through radio signals. Methods for connecting Bluetooth modules to Arduino, working with serial ports.	Class 8 "modern means of communication»
7.	Basic principles of robot design	The concept of the Robot structure, the basic printsips of the location of the components. Study and comparison of body structure. The details used and the methods of their preparation	8th grade "electromagnetic relay", " studying the performance of electro-magnetic relay”
8.	1-Practical Training. "Traffic lights".	From the three svetodiod to create a "traffic light" in Arduino, draw up a program and assemble an electronic scheme.	8-th class "assembly of the electric chain, measuring the current strength and voltage in its various parts”
9.	2-practical training. Random answer-generator of S»	Assembling the electrical scheme and drawing up the program. Learning to physically click on a Knop and select a random value.	8-th class " induction current generator”
10.	3-practical training. "Engines»	Assembling the electrical circuit as well as drawing up the program using new operators and logical structures.	8-th class " study of an invariable electric motor”

The content of the school curriculum in Bunda also varies in part. In this regard, it will be necessary to provide the necessary methodological and didactic materials for the introduction of materials in this science into the process of teaching subjects taught in schools through robotics. When designing and building new devices in robotics, it is difficult to implement quality alone. For this reason, taking into account the need for sciencelararo integration, it is important to organize performance as a team of students in two groups (hard skills and soft skills). This plays an important role in the development of a complex of personality traits in which the role

of robotics in students is defined as "soft skills" (soft skills, from English – "soft skills") [3, p. 25].

The organization of the elements of robotics to the students using project-oriented instructional techniques will serve as an effective tool that affects the entire set of personal qualities of the students. During the study of their subjects through the implementation of integrated science, it allows students to familiarize themselves with the physical foundations of robotics, design robots of various new structures, conscious and effective use of the base of robotics parts,

create robotic models for modern improvements.

As a direction of technical innovation, the study of the fundamentals of robotics should be included in the content of the curriculum of Physics, Computer Science, Mathematics, technology and other disciplines in general secondary schools, as well as in the calendar-themed plans of extracurricular activities. In each school, taking into account the material and technical base, as well as the personnel, a program should be developed on the introduction of robotics elements into the composition of Polytechnic preparation of those schoolchildren. The purpose of such a program is to help school graduates form a technical culture necessary for them to lead an effective life in the robotics environment in the near future.

The use of devices of robotic experiments in physics classes, the creation of their improved models, robotic observations and demonstration experiments on the application of physical achievements in the field of technology will contribute to an increase in the effectiveness of the lessons.

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