

## **THE USE OF ROBOTICS ELEMENTS IN THE DEVELOPMENT OF STUDENTS ' TECHNICAL CREATIVITY SKILLS**

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### **ABSTRACT**

In this article, in addition to teaching students the scientific foundations, structure, processes of their creation and operation of modern technologies, which are being used in various branches of our daily life and production in general secondary schools, the lesson from physics and deregulation of lessons, the possibilities of using the elements of robotics in the development of technical creativity skills of students. In the educational system, the stages of development of Science and technology, the penetration of robotic devices in connection with innovative production conditions, the evolution of their improvement, the conditions of use in the development of technical creativity skills of students in accordance with the subjects in the physical science program, as well as pedagogical opportunities were studied. The main stages of the development of robotics and the study of the field of scientific and technical knowledge, the essence of the concept of robotics, the role and role of robotics in the production and social sphere, the variety of device types, the opportunities for students to have competences on modern trends in the development of robotics are based on the pedagogical aspect. In the lessons and lessons from physics, the students were recommended to have knowledge on the importance of robots, the process of working on the basis of physical processes of robotic devices, the creation and modernization of robot models, sufficient knowledge about the near future provided with robotic systems, be able to analyze the educational materials corresponding to the subject, the methodology of teaching. In the process of extracurricular and extracurricular activities from physics, the teacher's instruction in the development of technical creativity skills of students, as well as ideas about the formation of Circle competents for the design and manufacture of various automatic devices independently are described.

**Keywords:** Technical creativity, physics, informatics, technology, robotics, competence, physical process, modern technology.

### **INTRODUCTION**

The use of robottechnical elements in secondary schools as a component of Polytechnic preparation, the development of robotics that will enhance students ' interest in physics and technology in the development of their technical creativity skills, the development of robottechnical in line with the achievements of Physical Science, the elements of robottechnics perform certain functions as a means of educating students in the organization

Decree of the president of the Republic of Uzbekistan on measures to ensure more effective organization of the process of acquisition of rights over land parcels and other immovable property as part of the South Caucasus pipeline expansion project more ... , This article will serve to increase the effectiveness of the PP measures on September 30, 2019 in the system of public education to a certain extent, the implementation of the tasks set forth in the resolution "on the organization of extracurricular activities-pp measures on the radical increase in the effectiveness of PP measures on education", as well as 4 measures on the measures.

The use of elements of robotics in the development of technical creativity of students, the development of motivation of educational activities, the increase of interest in robotic devices as a new direction of innovation of modern technical development, the formation of their imagination on modern methods and technologies of Physical Research in the development of robotics, the development of the necessary technical and technological

From the above points of view, the use of the elements of robotics in the development of students' technical creativity skills is aimed at the design and creation of various types of robotic system models, the quality of the means of Teaching, Development and training of students in the process of teaching physics, which prohibits the need to carry out a number of tasks.

### **LITERATURE REVIEW**

In secondary schools of General Education, wide attention is paid to the quality of teaching from the elements of robotics in the lessons and extracurricular activities from physics. One of the urgent tasks is to draw attention to the teaching methodology using the elements of robotics in physics lessons, information, communicative, educational and cognitive competences on the types of activities of students on the basis of modern forms and methods of teaching.

In the decree of the president of the Republic of Uzbekistan "on approval of the concept of development of the public education system of the Republic of Uzbekistan until 2030" dated April 29, 2019, PF-5712, as well as five initiatives aimed at creating additional conditions for the education and training of young people, including measures aimed at practical implementation.

Currently, in the development of technical creativity skills of students in secondary schools of general education, the use of robotics tools in the teaching of Sciences, their directions, methods and techniques, taking into account the peculiarities of robotic devices as a new object of the modern technological environment, is of great importance.

Proceeding from the tasks described above, it is necessary to understand that the use of robotic technical elements in the development of students' technical creativity skills, prohibits the formation of students' engineering thinking, the development of their interest in technical creativity, the choice of engineering professions and specialties.

E.I. Written by Yurevich, "Osnovi robototekhniki" is an educational project, in which from the creation of "Mechanical Man", one of the important directions of Science and technology, information about the period of development is described to this day. Robotic devices and similar robotic devices, software of robots, intelligent robotic devices, research on the creation of robotic devices on the basis of modern design requirements, the use of robotic devices in various areas of human activity, the achievements of rapidly developing robotics, including micro-robotics, the creation of artificial intelligence-based robots and others is calculated from the sentence Shular [7, b. 5]. Although the materials described above give the students the opportunity to get acquainted with the information on the devices of the robot, they do not give the opportunity to fully demonstrate their skills in modeling and constructing such devices in the development of their technical creativity skills.

S.Q. Kahhorov, M.R. Nazarov, H.O. Jo'raev, A.S. The issue of automation of processes in the drying unit, which works on the account of renewable energy sources in the device of the Kahhorovs "Combined solar dryer", has been studied. In the course of the research, a device

with a reserve dryer was created. The processes going inside the device are controlled in automatic mode. In summer, the maximum temperature inside the camera is 620 C. In the recirculation mode, the temperature difference by the height of the camera will be equal to 4-60 C. In this case, it was determined that the speed of the heat carrier is 1-1,5 meters per second, and the relative humidity of the air is 35%. From 1400 to 1600 hours, the temperature decreases to 30-340 C. Naturally, at low temperature, the speed of drying fruits also decreases. An additional heat source (ik-lamps) was used to keep the speed of fruit building in the chamber to a standard. When the temperature drops from 350-400S, the thermoregulator connects the ik lamps. If necessary, the caviar can be connected to the network even at any temperature not greater than 700 C with the help of a regulator. For continuous operation of the device, ik lamps are used [14]. The information on the achievements of Science and technology used in this invention does not provide an opportunity for students to realize their technical creativity skills.

### **METHODOLOGY**

On the basis of the method of analysis, textbooks, manuals, scientific and methodological literature on the use of robotic elements in the development of technical creativity skills of students were systematically analyzed and pedagogical experiences of teaching were studied, and important aspects in them were embodied.

On the basis of the observation method, the process of organizing and conducting classes and extracurricular activities in physics, informatics, mathematics, drawing and other subjects taught in secondary schools was observed.

On the basis of the method of comparison, the didactic opportunities of development of the motivation of educational activities using the elements of robotics in the development of technical creativity skills of students in the lessons from physics were compared.

On the basis of the experimental (experimental) method, the current normative documents on the organization of the educational process in general secondary schools and the experiences of teachers with advanced experience working in educational institutions have been studied, theoretical and practical training has been organized using presentation materials, various technical devices and technological objects prepared on the basis of computer programs in the process.

### **STATEMENT OF THE PROBLEM**

The rapid development of information and communication technologies paved the way for the emergence of many new areas [12, b. 10]. One of such areas is robotics. It includes various elements of engineering activity, which include, in addition, Computer Science, geometrics, which embodies the knowledge gained by physics. When assessing the degree to which the students understand the performance printing of a technical object, special attention is paid to the ability to know the basic phenomena and laws that form its basis, as well as the characteristics of the mechanism of performance, their interaction [10, b. 148], [11, p. 178], [13, p. 10]. The assembly of robots, which can perform any actions independently, is of great interest to children.

Robotechnics is an industry based on very deep knowledge, innovative manufacturing. The success in its development depends on the compatibility of technical knowledge with success in other fields, as well as achievements in basic sciences. Modern scientific and technological achievements have entrusted to specialists the task of speeding up the research, studying the interaction of robotic systems and humans, creating new built-in sensors and sensor networks,

developing new human-machine interfaces, including new methods of using gestures, as well as voice interfaces for the management of computer and robot systems, etc. People often witness the fact that regular news, discoveries are being made in these directions.

Although textbooks and manuals, which are currently being used in the educational system, can provide enough modern knowledge to students in such subjects as physics, informatics, technology, they can not provide information on the development of technical creativity skills in harmony with the achievements of modern science and technology.

In the educational system, methodological recommendations on the use of Integrated Science in explaining the content of instructional materials in Physics, Chemistry, Biology, Ecology subjects, the structure and operation of various devices in the teaching process have been given [ 5, p. 42 ], [ 6, p. 87 ], [ 8, p. 127 ], [ 9, p. 83 ]. As a result of the analysis of this research work, students ' technical creativity skills development in the process of teaching and extracurricular activities in physics subject will be given information on design and fabrication of instructional devices. And this plays an important role in the development of students ' initial skills in technical creativity. They themselves can independently draw technical drawings of various devices and independently, innovating and modifying some elements of the device, directly improving it.

## RESULTS

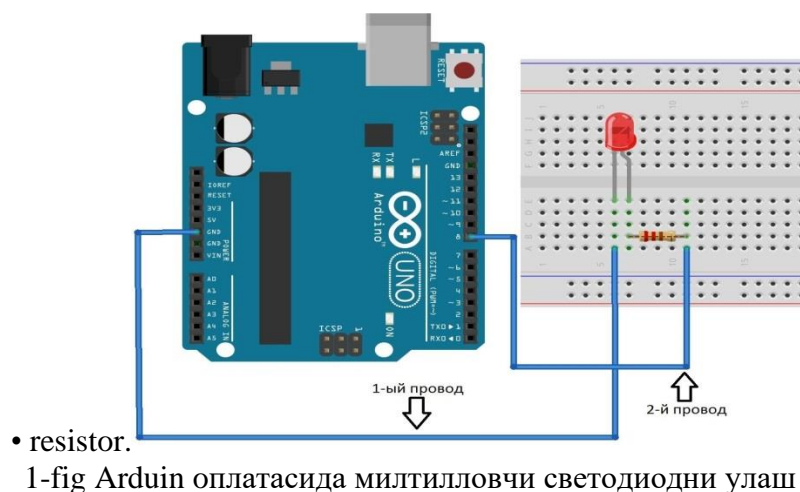
Today, there are LegoMindstorms, LegoWeDo, NIPA, Arduino, Matrix sets that are designed to introduce students from the elements of robotics. With the help of them, students of different age categories can acquire the initial knowledge of robotics. With the help of these kits it will be possible to create robots of different appearance, ranging from the design of simple automatic devices. One of the programs designed to develop initial skills in robotics is this "Arduino". With the help of this program you can learn much more elementary skills. Lessons can be conducted in two ways: in the form of text-graphics and video tutorials. This program includes the study of connecting different schemes, guidance and instruction and other information intended for students during training.

Arduino (Arduino) is a popular computing platform device, which consists of various devices and input and output components. With the help of the Arduino program, it is possible to create autonomous interactive objects, robots and connect them to computer programs. The working dock is made up of different analog and digital ports, to which it is possible to connect different devices: knopka, sensor, motor, screen.

With the help of the Arduino program, robotics can be used in the study of training and extracurricular activities. Plata became popular in the creation and production of " real " robots. This platoon occupies an important place in the creation of the first manifestations of many robots.

Learning to connect a flashing svetodiod in the Arduin oplat. To connect the scheme, we will need the following equipment(fig 1) :

- \* plata Arduino
- \* breadboard
- 2 provoda " pope-Pope»
- svetodiod



Such a compact, simple scheme that students can independently assemble on the basis of the relevant instructions of the teacher. It consists of simple elements, is the initial stage of learning how to connect a chain. With the formation of skills to connect different schemes in the students, they will be able to learn how to connect chain schemes that look more complicated to them, or learn how to connect various additional devices. This serves to develop students' technical creativity skills.

## CONCLUSIONS

In the course of the lesson, the necessary knowledge integration is provided in understanding the principles of the operation of various simple-looking devices, as well as in the independent design and construction of chains by students. The use of elements of robotics in the course of the lesson contributes to the improvement of students' perception, imagination, thinking, memory and speech, as well as the development of educational activity motivation.

The use of the elements of robotics in the development of technical creativity skills of students serves to improve the competence of modern tools used in everyday life and their structure, the process of performance.

As a result of the use of the elements of robotics, students acquire modern Polytechnic knowledge and skills, in which the necessary technical and technological competences for life activity are formed, the strengthening and deepening of knowledge in Physical Science, the formation of knowledge and practical skills are ensured.

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