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Interdisciplinary Connections of Educational Robotics

Nasriddinov Dadakhon Kamiljanovich
Academy of the Ministry of Emergency Situations of the Republic of Uzbekistan

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ABSTRACT

Consider the possibilities of implementing educational robotic technology as an interactive learning tool at different levels learning fees and subject areas. The social order of society dictates that the modern student should get acquainted with the surrounding world not only on the theoretical thirty level, but also to comprehend its secrets directly in practice. It is possible to combine theory and practice if we use educational knowledge of robotics (at the lessons of the world around, more than topics) in the primary grades, which will provide a significant impact on the development of students' speech and cognitive processes (sensory development, development of thinking, attention, memory, imagination), and as well as the emotional sphere and creative abilities. For example, in program Pleshakov A. A. "Green House" educational robotic technology will allow you to create dynamic schemes in the lessons that reflect cherishing certain phenomena, will make the demonstration of experiments vivid, colorful and more visual.

Primary and high school.

During the classes, students not only and not so much engage in robotics, how many gain experience in its use as some interactive element that allows you to more effectively consolidate theoretical knowledge in the course of practical activities. Moreover, in this way theoretical knowledge can be consolidated, as in exact sciences (physics, mathematics), and in natural sciences military science cycle (biology, chemistry, astronomy, ecology). Among the several sections that can be considered students using robotics can distinguish:

- ✓ Electrical systems and electronic circuits;
- ✓ Serial and parallel connections;
- ✓ Motors of direct and alternating current;
- ✓ Drives;
- ✓ Movement mechanics;
- ✓ Applied Physics;
- ✓ Mathematics;
- ✓ Programming;
- ✓ Analysis and development of algorithms, etc.

Manufacturers of robotics kits actively support are driving the development of educational robotics, so there are all new educational sets that meet such requests.

Computer science. Robotic educational constructs ry will allow more effective formation of key competencies students in classroom and extracurricular activities in informatics on such sections as: “Information bases of management processes ", "The idea of a system of objects", "The main stages of deletion", "The idea of the objects of the surrounding world", "Algorithms. Algorithm performer”, “Programming environment”, PC architecture.

Virtual 3D construction and design in program LEGO Digital Designer allows you to create and view three-dimensional models from building blocks "LEGO". Programming of all kinds of algorithmic structures. Using the LabVIEW programming environment. For programming robots LEGO EV3 uses a visual environment Lego MINDSTORMS Education EV3 ®.

Physics. At the lessons of physics, robotic designers can can be used for laboratory, practical work, for research projects carried out by students, for example, in such sections as: "Mechanical phenomena", "Thermal phenomena”, “Physical methods for studying nature”, “Electromagnetic Oscillations and Waves”, “Electrical and Magnetic Phenomena”.

Mathematics. Robot trajectory calculations are one of the most striking examples of how to reinforce school knowledge of mathematics. Calculation of the distance traveled by the wheeled robot distance calculation of the circumference of a given radius; approximate values of the number π where S is the distance traveled, R is wheel radius, k is the number of revolutions of the wheel (if necessary measured by a rotation sensor built into the servo). Payment rotation angle of the mobile robot. Depending on the age and level of knowledge of students for this can be used as a normal trial and error method, and knowledge of the properties of proportion, formulas for determining the area and circumference and even trigonometric functions.

Technology and physics. You can explain and reinforce the topics of Mechanic and mechanical transmissions (“Lever”, “Types of mechanical dachas") by students performing practical tasks on assembly of various types of gears using material Lego Wedo and Lego robotics resources Mind storms.

Great opportunities for the integration of robotics, and both intra-subject and inter-subject provides the project- schoolchildren’s activities, which have also been widely developed in technological preparation. This provides opportunities for interdisciplinary design and research activities. Here one more strikes statement by V.V. Tarapati: "Rob commodities can be collected on technology within the framework of manual labor, construction routing according to the scheme or technological map, programming on informatics lessons, but to use for experiments and laboratory both in physics lessons.

Extracurricular activities. Provides opportunities to organizations of project-oriented work of students with robotics cal constructor in both optional and independent (home) and distance learning.

At school, children can engage in circles, attend classes in organizations of additional education. Organizational forms of implementation of educational robotics can be very diverse: from general developmental circles for students primary and secondary level to design, research and scientific associations of high school students.

Organization of extracurricular activities in robotics contributes to the solution of a whole range of tasks from attracting children at risk and creating conditions for adolescents to express themselves, to creating situations of success for them. This is facilitated by the fact that robotics are a way of organizing the leisure of a young generations using attractive modern information technologies.

The use of educational kits also helps to identify gifted children, stimulate their interest and

development of practical skills for solving problems relevant to them education.

Methods that are used in the study of robotics, at the initial stage they are: explanatory-illustrative and reproductive, in the future the method of projects becomes the main method of teaching. This is a fundamental feature of the process of teaching robotics in educational organizations that use the method of educational design as the main one.

The essence of the educational project method in educational robotics is that students are confronted with a real problem that needs to be addressed during the course of the project. It should be a complete design of an autonomous robot that performs given functions with sufficient efficiency.

In the course of educational design, students themselves formulate tasks and the sequence of their solution. Independently allocate time between tasks. Perform the necessary training activities, including independently designing a robot, or under teacher guidance. They also study information materials, design, programming, mechanics, pneumatics, etc.

At the end of the design, they speak to their "colleagues" with a presentation of the work performed and an assessment of the degree of implementation design goals and the contribution of each team member to the implementation project (results reflection). The teacher acts as a tutor - an adviser, assistant, senior comrade for students in independent work on a training project.

As part of educational robotics, teachers play an important role that differs from the classical role in the teaching methods used. Here their work is defined by new responsibilities, which inherently have a different technological environment, for example:

- Creation of educational scenarios that allow to implement new technologies;
- Development of approaches to solving problems that allow creating allow for trial and error. This means that students are allowed to make mistakes in order to determine the reasons for their failures and draw collective conclusions from them;
- Encouraging learners to use their imagination to to come up with creative ideas that can be used to practice;
- Encourage continuous improvement of projects and designs by students, contributing to their growth and development;
- Using dialogue as a useful way to express bots of ideas and exchanging ideas with each other;
- Creation of conditions for independent learning with the help research and enjoyment of the work performed. Only with the help of this means will students be able to achieve their goals;
- Motivating all students to use technology for individual learning. This includes learning to how to deal with your problems together with others, such as like frustration, lack of information, resources, etc.

When a student enters the world of educational robotics, he takes on obligations that must subsequently become important to the community. He must know that he cannot to miss the opportunities that are presented to him to move forward. The difficulties that arise along the way should not cause doubts or disappointments, but rather should become challenges, with that they may encounter as a team.

During the development of various projects, students will face concepts and patterns from different sciences that may be new or forgotten for them, and their task will be to consult with the teacher or do some research on their own that will help them clear doubts. Attracting your

own ideas and theory to the construction of robots will become the foundation that will serve as the basis for the formation of a universal method for solving life problems.

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