

## **Universal methods of organizing "robototechnics" circles in the primary classes of the school with the help of virtual didactic means.**

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**Abstract:** today, the development of the digital economy is considered as the most important factor for the future. The use of robots in the production leads to very high financial efficiency and several times the acceleration of development. In this regard, it is very important to start the teaching of the elements of robotics from the elementary classes of general secondary schools. In this article, it is explained in detail that the use of virtual didactic tools in the organization of "robotics" circles in the primary classes of the general secondary school will give effective results.

**Keywords:** robotics, didactic tool, virtual didactic tool, virtual reality, software tool, power, robot, innovation perception, virtual model, virtual project.

### **Introduction**

The rapid development of modern information technologies, the improvement of global telecommunication technologies require a creative approach to the attitude of a person to work in the e-learning environment. The development of the ability to adapt to the innovations of the modern world, to prepare the younger generation for

the life of a constantly renewing society and to actively participate in the processes of its improvement in accordance with modern requirements is an important professional task of the general secondary educational institution pedagogy.

In the strategy of action on further development of the Republic of Uzbekistan, such directions as further improvement of the system of continuous education, increasing the opportunities of quality educational services, continuing the policy of training highly qualified personnel corresponding to the opportunities of the labor market, increasing the quality and effectiveness of education of general secondary educational institutions are determined, and in this The economic development of the industry, especially the country, depends on the use of human resources creative abilities. At the same time, the formation of creative people is one of the functions of the educational system. Creativity means the ability of an individual to create new, original ideas in any activity. At the same time, the process of developing creativeness is characteristic of different spheres of activity.[2]

In today's modern schools, we need to pay more attention to the study of robotics. This is because in the future high school graduates will find themselves in a working environment full of technology and robots will become an integral part of this environment. Even if children choose a profession that is not related to coding and robotics, the study of these subjects in school gives them analytical thinking, programming, teamwork, team thinking, innovative perception and many other important skills. Today, most advanced schools around the world choose STEAM learning strategies for their students. Robotics develop skills in the design, assembly and management of robotics. During the learning process, children interact with robots and mechanical systems, not being afraid of unfamiliar structures, but learning to control them. Numerous updates aimed at raising the economic and social situation of our country are being applied to our lives day by day. Modern technologies are being introduced in all spheres. In particular, in manufacturing enterprises, machine tools controlled by computer programs are widely used. Even in areas that are

dangerous or heavy for human life, computer-based robots are used. It is also possible to meet them in nuclear power plants or chemical enterprises.

According to world research, personal computers first appeared in the late 1970s and 1980s, when there was a problem of teaching children how to program for all. Thousands of schools have started work by teaching millions of students how to write simple programs on a LOGO or vase. In this regard, it is necessary to start work on the basis of the level of mathematical and logical thinking of the child. At present, it is very important to start teaching children programming from the primary school, which is the future of new Uzbekistan..The teacher has many problems in teaching programming to children. The main factor in these problems is the inability of children to master programming syntax. According to the robotics Circle program, which we offer, children learn programming through virtual programs. In it is widely used virtual didactic means.

Virtual reality is described in this context as an environment that is created artificially using a computer tool, in which you can access it, change it from the inside out, observe changes and experience real sensations. This new type of audiovisual in reality, you can communicate not only with other people, but also with artificial characters. With this understanding, virtual reality is a technology that appeared in the sixties of the last century in a quarter of research in the field of three-dimensional computer graphics and human-machine interface.[4]

Increasingly in education from virtual reality technologies at the current stage more are being used. Virtual systems designed for teaching are a stage in the development of software and pedagogical tools for educational purposes. They differ from educational programs that began to be widely used in educational institutions at the end of the twentieth century with three-dimensional synthesis of video on the computer vision, significantly higher programming and algorithmic maintenance, more perfect computational techniques and the application of a number of new subsystems (tactile sensory subsystems, speech response, etc.).

A Virtual didactic environment is a system of lifelong training of a person for the whole life of an open, flexible, individualized knowledge.

This system consists of:

- new educational technologies and structures;
- new methods and techniques of teaching;
- new tools of information and communication technologies.

The Virtual didactic environment, the typological features and principles of the analysis of its definitions, in our opinion, allows us to formulate a working definition of this type of tool that characterizes its essence and purpose. We consider the new means of information communication technologies that provide a virtual learning environment as an open system that expresses interdependence and carries out effective provision with the help of active, interactive communication of all participants in the learning process in accordance with the didactic theories that have been changed taking into account their uniqueness.[5]

### **Main part**

Based on the experience of introducing the basics of Informatics and Information Technology in secondary schools in general, it can be noted that robotics is becoming a new and very important element of educational content, primarily Informatics. However, the introduction of robotics is carried out in two ways: as a subject of study and as a means of teaching. The organization of the activities of the “robotics” gang, taking into account the importance of introducing extracurricular education in the primary classes of secondary schools in general, is one of the main factors of modern education.

At present, the elements of robotics are studied in “informatics” and “technology” in general education sciences. The possibilities of robotics as a training tool have not yet been fully considered. The study of robotics through extracurricular training will help to solve this problem.

A special emphasis is placed on the activities of educational institutions in the new state educational standards of secondary schools in general, which offer to “get

out” from the classroom system, increase the role of extracurricular work, which creates additional opportunities for self-awareness of the child and is aimed at ensuring that each student is able to reflect on creative development, innovative perception, According to the state standard of Education, extracurricular work, along with educational activities within the framework of compulsory subjects, will help to achieve the educational results described in the DTs in students.

The use of virtual didactic tools in the organization of “robotics” mugs is highly effective. The potential of the Virtual didactic environment, in our opinion, can not be limited to describing it as a creative environment for the self-development of a free and active person. In a Virtual didactic environment, it is very important for us to describe in terms of the effectiveness of education and the appropriateness of nature, which is carried out within the didactic system of interactive independent education, and also to adhere to the basic principle of didactic: “Development and education can not be given or transmitted to anyone. Everyone who wants to learn something must achieve this through his activities, his own strength and his own specific loading. Therefore, independence is an educational tool and at the same time the result”. The most important didactic conditions that ensure a high level of interactive independent education in Virtual didactic education are:

- implement a changing approach in the provision of instructional materials;
- increase the level of emotional acceptance of educational information;
- increase the level of motivation for learning through the performance of various independent studies;
- encourage cognitive activity by engaging students in an interactive learning experience and knowledge sharing process;
- to analyze and learn fully presented data;
- ability to choose topics that interest the reader .

In the context of the objectives of this study, it is undoubtedly of interest to determine the didactic properties of virtual didactic education based on the analysis of the proposed four models of education:

authoritarian education;

dialogue independent education;

interactive independent education, independent study.

A brief description of these models is as follows:

If the priority role in teaching belongs to the subject of teaching, then this method is classified as authoritarian education: “authoritarian education is a method of teaching, in which the main, leading - the formation activity of the subject, The directed, passive - the specific educational activity (subjects) teaching”[3]. Interactive self-education is understood as “a method and model of self-education, based on continuous interaction, constant communication between the subject and the subjects taught, compliance with nature, monitoring the results of self-education directed at the individual”. Independent education is described as follows: “independent education is a method and model of learning in which no one, except the subject itself, education is controlled, controlled and not regulated by anything.” Here, as a rule, analytical and forecasting and design work on setting goals, selecting the composition and size of the exercise, determining the training and time frame of the exercise are carried out by the educator. As already mentioned above, it is necessary to identify the didactic potential of the virtual learning environment through the prism of emerging opportunities for the practical implementation of the principle of training in accordance with nature, to be filled with the discussion of the problem of educational effectiveness in this environment. In this regard, first of all, it should be noted that according to modern didactics, the effectiveness of education is determined not only by the level of knowledge of students, their abilities, skills and methods of activity, but also by the development of their personal qualities. It is worth noting that in the general scientific sense, “effectiveness” is understood as “effective, impressive, which leads to the desired result.” The problem of educational effectiveness has been studied by many domestic and foreign scientists. The effectiveness of training is determined by the author by the socially significant quality of training, through which

the results of activities are assessed depending on the degree of proximity to the social goal corresponding to the generalized idea of educating a person [5].

The concept of educational effectiveness is closely intertwined with the concept of quality of education, it is characterized by a combination of characteristics (and their manifestation) reflected in government documents that contribute to the satisfaction of the educational needs of a person and correspond to the interests of society, regulating the activities of educational entities at all levels. Traditionally, the criteria for the quality of the educational process are as follows: the content of education and methods of teaching the completeness of its elements, individualization and stratification of teaching, the use of various organizational forms, the implementation of the educational function of Education. According to them, the following criteria of educational effectiveness can be distinguished: “The accuracy and systematization of acquired knowledge, the formation of the scientific worldview of students, the system of values, morality, labor education, the level of creative application of knowledge and skills” [5]. It makes sense to consider the above criteria of educational effectiveness from the point of view of personal bias. It is known that when a person-oriented education is said, “The organization of interaction between the subjects of the educational process is maximally focused on their individual characteristics (values, relationships, intelligence, ability, etc.), and the specific features of modeling a person aimed at knowing the world” are understood [4; 57-p.]. Personality-oriented educational technology involves the continuous formation of the student's self-organization and self-realization mechanism, the development of his or her cognitive abilities [5]. From the organization of Education based on knowledge of the educational system, the development of the individual's basic forces, abilities and talents, which determines the knowledge and skills of the student as the leading goals, educational results, is directed at the individual, and self-development transition is the main goal of education-modern education

is the leading direction in the process. The implementation of individual-oriented educational ideas in a Virtual didactic environment involves changing approaches to



assess its effectiveness, while the level of primary knowledge of a student should be considered as an additional criterion (the level of primary knowledge is included in the level of initial preparation). In a Virtual didactic environment, a number of requirements to the subject of learning are clear, without which education will not be effective. These include:

- ability to make quick decisions, choose the right information, develop ideas, easily communicate with all participants in the learning process;
- knowledge of a personal computer at the user level implies the ability to work with this program (for example, Microsoft Windows (until the latest version, Microsoft Office and others);
- ability to acquire basic skills of the internet (with email, chat, forum, etc.);
- the ability to express one's thoughts in writing briefly and clearly, as well as discuss several topics at once;
- ability to independently manage learning pace and training.

Perhaps another criterion is the need for the pupil to be distinguished by the degree of intellectual development.

Within the framework of traditional collective education, teachers communicate with students in Real time and are at the center of the educational process. In a Virtual didactic environment, educators are able to adapt to students in the organization of classes using the information and educational resources of the Internet, and mainly on the basis of modern software platforms aimed at individual use in the educational process by students. In fact, in the traditional educational process, the educator does not have such an opportunity. From the point of view of discussing the didactic potential of the Virtual didactic environment, it is very important to understand that teaching in a group is behind collaborative learning. When co-teaching is said a small group of students working on a particular research task, an active solution is understood as a method of learning which is sought within the framework of communication within the network. Such cooperation will help to increase the educational motivation of students and thereby ensure a high level of



achievement of their goals. In particular, skills to work in a team and overcome conflict situations develop. In other words, in a virtual didactic environment, the learning process assumes an increasing role, its activity implies the presence of a subset of difficulties or problems, the elimination of which determines its internal development. In a Virtual didactic environment, absolutely involuntary orientation towards individual education becomes a teacher of the educational process, which allows him to start learning the teaching material at a convenient time for him, if he wishes, as well as academic discipline will allow him to learn at a speed corresponding to his intellectual abilities.[4] if we take into account that independent individual education can prevail in a virtual didactic environment and that standard methods of teaching are absolutely non-existent, we can conclude that the adaptation of the learner to the educator is very low. As a result of our conclusions, we can conclude that another point on the scale of “freedom” can be put in the description of the virtual didactic environment. What form of education prevails in the educational environment?

a) individual;

B) group.

In a Virtual didactic environment, there may be two approaches to organizing the learning process. The first approach will be based on synchronous communication, that is, communication, which is carried out in Real time in the system “educator-pupils”, the focus of which will be the organization of group sessions. Asynchronous communication is able to ensure that the study of the personal network is carried out: “a synchronous learning this is when each educational subject is familiar with the teaching material or does not work with everyone, but for this a form of educational telecommunications at a convenient time” [5]. Practice shows that the organization of a virtual didactic environment is carried out only by organically replacing these approaches: in addition, the approach to individual education should always be a priority, since virtual Learning initially involves independent work with minimal contact with the educator. In a Virtual

didactic environment, the methodology of individual training can consist of basic modules. At the same time, there are several options for creating complex individual methods of teaching. The first option. A beginner will be tested, thanks to which his personal type will be determined, as well as the most appropriate combination of his psychological characteristics will be determined. For each individual type, a specific virtual learning methodology is developed. Depending on the results of the tests, a certain technique is used in the training of a particular person.

The second option. In the educational process, the student is presented with a variety of tasks. Depending on what tasks they learn more quickly, the teaching methodology is changed. This ensures a permanent connection. In a virtual didactic environment, as in any learning process, interactivity is a fundamental concept. The mindset, which is carried out in a Virtual didactic environment, can conditionally be divided into “primary” and “secondary”. In the process of Virtual learning, “primary” communication messages come to the student by the information education resource, for example, to complete an assignment or test. Such communication gives the student the opportunity to assess his / her success and shortcomings in the right direction of his / her educational activities. It is a factor that imposes reflection, stimulates further efforts and helps to adequately assess the effectiveness of educational activities. “Secondary” return Communication provides the educator with materials for analyzing and correcting the learning process, as well as changing the methods of teaching, leading to virtual teaching. Thus, we can emphasize the inevitable wide spread of the type of individual education in the pedagogue, we will interpret it as the presence of an additional opportunity for the free development of an independent student. Another point on the scale of "freedom" is not so difficult to give.[5]

A vector based on elementary calculations, corresponding to one of the twelve types of learning environments, allows to describe the virtual learning environment as a "normal creative environment". This environment predicts the presence of a subject of study with a positive, optimistic mood background, a high internal motivation for

training and cognitive activity, which is carried out on the emotional upsurge. "His strength is not in the determination of the mind, but in the aspiration, with motivation, in action. Do it yourself without waiting. There is no order - there is a good will. There are problems when there is no dogma. There is no caution - there is an aspiration of the soul, diligence. Tolerance here is a respect for the opinion of a person, and not a half of cynicism . In the creative environment, a person is formed that is distinguished by the development and change of the world, self-higher consciousness, openness, as well as the land of thought. The creative environment is characterized by the process of self-development of a free and active person. While we draw conclusions from what has been said, We note that, according to the opinion of many researchers, educators, first of all, are guided not by the social order formed by administrators and officials, but by the personal needs of users of educational services. It is distinguished by the fact that standard teaching methods are absolutely unique. Cases when adapting the reader to the pedagogue are very rare threeraydi.[4]

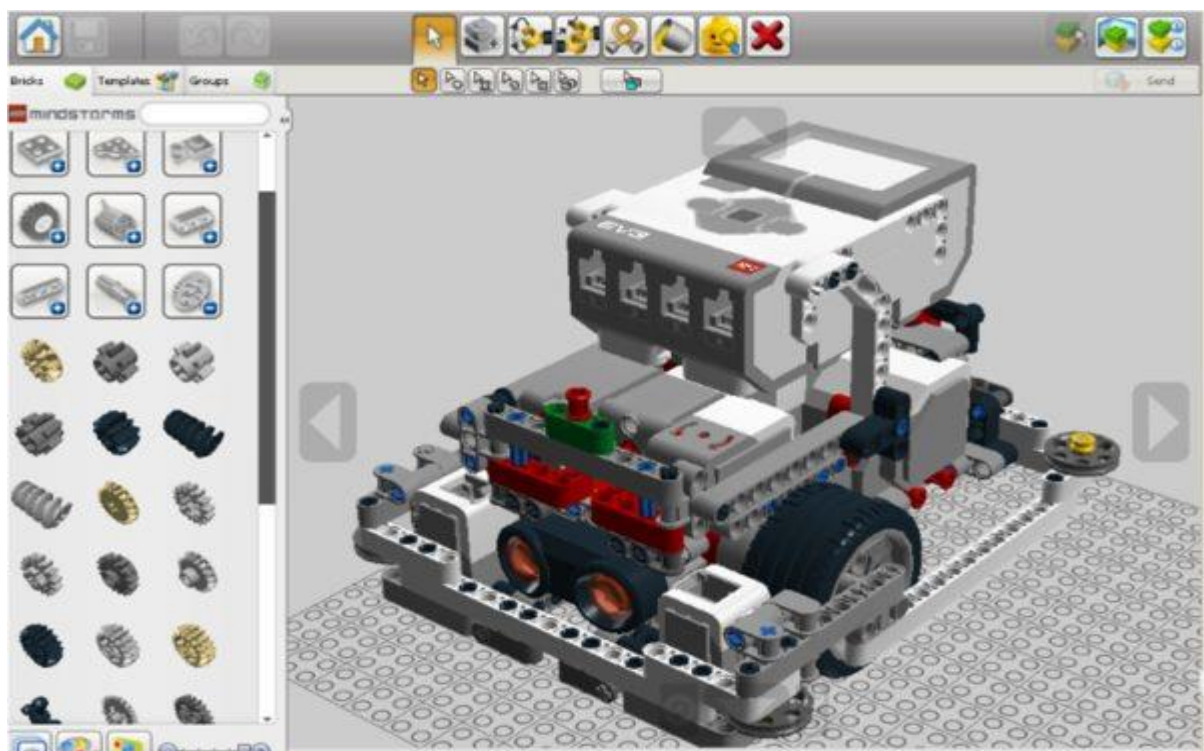
Robotics is a relatively new element of content with a wide range of educational opportunities, on the other hand, it reflects modern trends in the field of technology, in particular the emergence of convergent technologies.

The introduction of robotics into the educational system is, in many respects, similar to the period when education informatization began in the 80-ies of the last century. Then, newly established Informatics and information technology were introduced into the general education science of Information Technology which is regarded as the subject of learning and as a means of teaching. (Since 1985 the subject "Basics of Informatics and computing techniques" began to be taught in our country).[8]

As noted above, until today, a certain amount of experience has been accumulated in the development of robotics, however, one of the most important tasks is the introduction of robotics into the structure of Computer Science and Information Technology Educational Sciences. To date, there are many programs developed by teachers of educational organizations and heads of the Republican

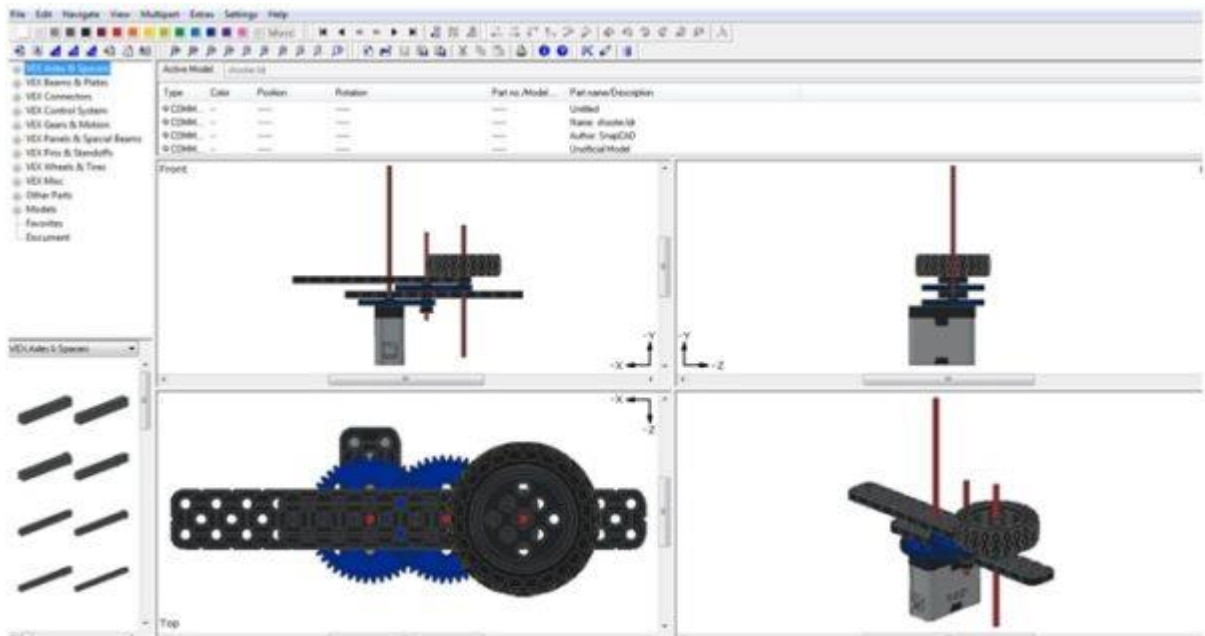
children's technical creativity center “harmonious generation” circle for extra-curricular activities in robotics. During the analysis, we obtained from them that we learned Khodjiboev's program for the gang “robotics and electronic toys” is intended mainly for high-class students. In accordance with the program we are offering, the training of the gang “robotics” from a small school age will lead to the achievement of high efficiency in the future. Because in the child from a young age appear interest in discovery, programming, design will be very high. In the elementary classes, according to the gang program “robotics”, the child learns the elements of robotics using immunity models in interactive mode with the help of Lego DIGITAL DESIGNER, LDRAW , CAD, VIRTUAL ROBOTICS TOOLKIT, TRICK STUDIO programs. Here, greatly contributes to the development of logical, analytical, innovative ideas by helping children to create a virtual model of the child's new ideas, which is also helped by his parents.

Below we will consider the use of the project method in the study of programs that teach robotics virtual in accordance with the program of the circle “robotics”:



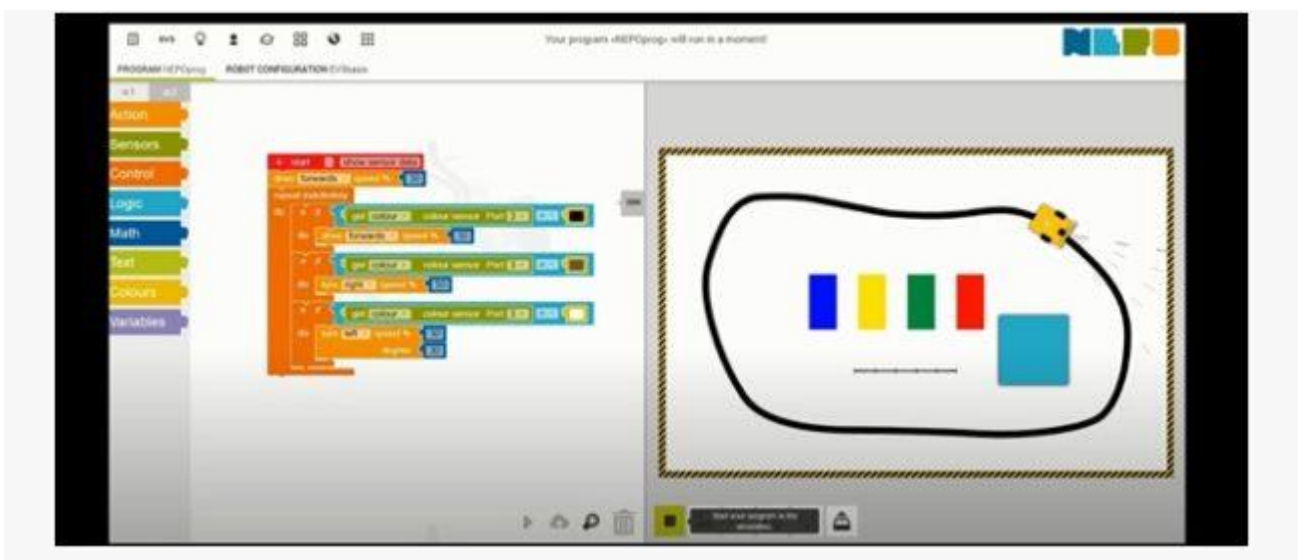
Picture 1. LEGO Digital Designer Software window

This program helps to formulate the concepts of elementary robotics in children 8-10 years old, building different constructions and creating a virtual model of their ideas.



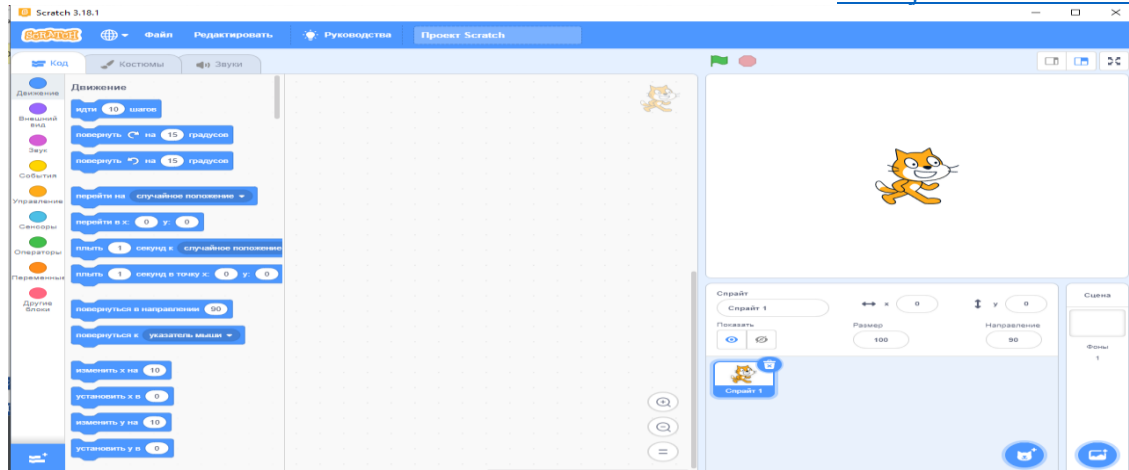
Picture 2. SnapCAD program window

With the help of SnapCAD software's VEX details, children can create 3D models of child-friendly objects.



Picture 3. Open Roberta program window.





Picture 4. Scratch 3.0 program window

Scratch is a block-based visual programming language and website designed mainly for children aged 8-16, who will help in learning the code. Users of the site can create projects on the Internet using a block-like interface. The service was developed by MIT Media lab, translated into more than 70 languages and is used in most parts of the world. Scratch is taught and used in post-school circles, schools and creativity centers, as well as in other extracurricular educational institutions.

Scratch was created to be fun and easy to learn programming. It contains tools for creating interactive stories, games, fiction, simulations, etc. with the help of block-based programming. Scratch has its own paint editor and sound editor installed. Users can drag blocks from the palette of blocks in Scratch and program them by programming them like puzzles, like puzzles. The structures of several blocks are called script. This method of programming (building code with blocks) is called "programming by dragging and dropping".[6]

The method of "project" is the collection, research and implementation of information on the specified topic during the specified period of time in individual or groups of educators. In this method, the educators participate in the processes of planning, decision-making, implementation, examination and Conclusion and evaluation of results. Project development can be either individual or group, but each project is a coordinated result of the joint activities of the training group. In this process, the task of the educator is to develop a new product within the specified time or to find a

solution to another task. From the point of view of the educators, the task should be complicated and it should be a task that requires the educators to apply their existing knowledge in other situations.

The project should serve the study, introduce theoretical knowledge into practice, and create the possibility of Independent Planning, Organization and implementation by the educators.

The stages of the "project" method are as follows:

1. The head of the circle develops assignments on the project work. Educators independently collect data on the assignment on the basis of textbooks, schemes, and distributed materials.
2. Educators independently develop a work plan. In the work plan, educators should plan the stages of work, the time allotted to them and the technological sequence, material, equipment.
3. Small groups will present their work plans. Educators decide on the fulfillment of the task according to the work plan. Educators together with the head of the circle discuss the results achieved by the decisions taken. In this, different decisions are compared and the most optimal option is selected. The head of the circle together with the educators develops an "assessment sheet".
4. Educators independently carry out the assignment on the basis of the work plan. They can work individually or in small groups.
5. Educators check the results of the work themselves. In addition, small groups are also involved in the examination of the results of each other's work. The results of the examination are recorded in the "assessment sheet". Education recipients or small groups will report. The end of the work is reported in one of the following forms: oral Report; report by demonstration of materials; written report in the form of a project.
6. The head of the circle and the educators analyze the work process and the results together during the final conversation. The training practice compares the indicators achieved in training with the normative indicators. If the normative indicators have not been achieved, the reasons for it will be determined.



Through the use of project-based learning method in robotics circles, the child's independent thinking, imagination and independent decision-making skills are developed.

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