

## USING STEAM APPROACHES TO DEVELOP STUDENTS' DESIGN SKILLS

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**Khasanova Sh.B.**

*National Center for teaching educators in new methodologies of Navoi region, p. f. Ph. D. (PhD), associate professor.*

### **Abstract**

*This article describes the issues of using STEAM approaches in the formation of students' design skills*

### **Keywords**

*enjeneering, technology, Science, projects, modeling.*

During the reform of the education system in the republic, a solid legal, organizational, material and technical base has been created, which imposes requirements for updating the content of education and upbringing of the young generation with high intellectual potential, the introduction of innovations. One of the innovations in the education system is the use of design technology in the system of continuing education. Currently, the design technology is successfully used in educational institutions in a number of developed countries. Dew proposed to organize training by activating specifically targeted activities of students, taking into account the interests and needs of students. To do this, students need to apply the acquired knowledge, skills and abilities in practice, show ways to use them in later life, that is, teach theoretical knowledge in connection with practice. In the process of learning, students master new knowledge, skills and abilities, relying on the practice of previously mastered knowledge, skills and abilities, solving significant problems in a familiar situation. In order for students to successfully solve problems, the teacher must give them appropriate instructions, recommend the resources used, indicate ways to achieve the intended result from learning, for this to develop students' activities to solve problems. The main idea of the design technology is to achieve the intended result in the process of solving a problem of practical or theoretical significance. If it is necessary to develop a theoretical problem, it is necessary to develop a specific solution to it, and if a practical problem, it is necessary to develop specific recommendations on its application in practice. To achieve this result, students must master the skills of independent

thinking, understand the problem and look for ways to solve it, use previously acquired knowledge in this area, conduct research in various fields of science, predict results, develop options for various solutions, present cause-and-effect relationships. The main essence of the design technology is the formation of students' interest, the formation of project activities, their acquisition of relevant knowledge, interdisciplinarity by forming a certain problem situation the implementation of links counts. The main idea of the design technology is: "I know why I need the knowledge and skills I am studying, and where and how to use them." The idea is to help students consciously master the basics of science, adapt to life and achieve their goals correctly. When teaching biology, the teacher needs to use design technology not only to solve educational problems in the classroom, taking into account the interests and abilities of students, but also to solve creative problems in the classroom and in extracurricular work. At the same time, students perform educational and project work.

A student performing educational and project work:

it is necessary to think independently, understand the problem, look for ways to solve the problem, use previously acquired knowledge, predict results, develop options for various solutions, present cause-and-effect relationships.

Educational and project work is organized in the following stages.

1. The use of design technology allows for an individual and differentiated approach to students. Definition of the project category, topic and number of participants;
2. Definition of the problem, subject, and tasks of the project
3. Preparation of tasks for the project participants and their distribution among the participants;
4. Organization of independent research of students on the project;
5. Definition of expected results from the project, definition of its formalization and presentation;
6. Determination of ways to complete the project work, evaluation criteria and conclusions.

One of the innovations in the education system is the introduction of STEAM education in the system of continuing education. STEAM-Education technology is a new method of teaching schoolchildren, an alternative to the traditional system of education. Obtaining, processing and using information in practice is the basis of the Steam educational program.

This technology at the same time teaches students science (natural sciences), technology (technology), engineering (engineering), art (art) and mathematics

(mathematics). based on a system in which students attend classes using practical and entertaining projects. STEAM educational technology is a method of teaching students based on the integration of natural sciences, technology, art, mathematics, which forms the student's skills of applying scientific and technical knowledge in real life through practical classes. At the same time, the curricula of subjects written in harmony with each other complement each other and together form the student's creative abilities. The basic idea of the Steam approach is this: practice is just as important as theoretical knowledge. Students use their mind and hands to effectively study most subjects, acquire knowledge on their own, students conduct experiments in training classes, design models, independently create music and films, they make robots, that is, they implement their ideas and create products. The Steam training direction and the application of a practical approach are also based on the integration of all five areas into a single education system. In it, classes are held not on academic subjects, but on topics aimed at integration and promotion.

STEAM Education was developed in America. Some schools, observing the further activities of their graduates, noticed that they needed skills to integrate natural sciences, technology, engineering skills, mathematical sciences, and decided to teach these subjects harmoniously, so the STEM system (Science, technique, Engineering and math) arose. Later, Art was added to it, now Steam has appeared. These directions are popular in the modern world education system and are developing as one of the main directions. Currently, Steam educational technologies are effectively used in the education system of the countries of America, Singapore, Israel, China, Finland and Turkey.

Let's get acquainted with the experience of using these technologies in the Turkish education system.

Steam education is being implemented at all stages of the Turkish education system. While preschool children are focused on completing the simplest projects, in schools and secondary schools they perform somewhat more complex projects. To do this, first of all, teachers' knowledge of Steam should be expanded. Countries realize that everyone must have scientific and technological literacy to create a strong future, and that science plays a key role in this.

One of the educational institutions where STEM education has been introduced in Turkey is the Centers of Knowledge and Art. 137 centers of knowledge and arts have been established in Turkey. This type of education is extracurricular, and students develop and develop their talents here after lessons.

The center develops creativity and creativity, along with giving students strong knowledge in the direction they are interested in.

The center is engaged in the search for gifted students, early identification of their talents, selection, sending them to training, development, production. The center has organized clubs in mathematics, music, fine arts, natural sciences (laboratories of physics, chemistry, biology), robotics, mechatronics, 3D modeling, computer graphics. In these STEAM labs, talented students use digitized science and technology technologies. High school students perform goal-oriented projects at the center, like real engineers. In traditional teaching, subjects and subjects are studied individually. The training is aimed at studying subjects and acquiring the necessary knowledge, and not at using the acquired knowledge and skills, applying them in practice. However, in a learning system based on Steam technology, interdisciplinary communication and the design method are integrated. Children acquire knowledge in the learning process and immediately learn how to use it. As they grow up, they develop critical thinking and problem-solving skills that will be necessary to overcome the difficulties they face in everyday life. Can adapt to a rapidly changing world. The harmonized teaching of five subjects develops students' logical and creative thinking, teamwork skills, adaptability and the ability to find innovative solutions.

For the effective implementation of this system in our country, first of all, it is necessary to start with teaching preschool educational organizations to work with simple projects in the educational process.

The task of STEAM education in primary education is to develop students' interest in natural and technical sciences. The acquisition of knowledge and the loving fulfillment of what he does serves as the basis for the development of his interests. Due to the fact that classes on Steam are very dynamic and exciting, children will not be bored during classes. work and they won't notice how time has passed. If topics related to plants are studied in science (natural science) lessons, plant layouts, the location of leaves and stems in them, the influence of sunlight, moisture, and nutrients on them will be studied, then students will get used to studying nature as an integral system, will simultaneously use their hands and mind.

Let's get acquainted with the methodology of teaching the topic "the system of subtraction" in the science lessons of the senior 8th grades. After studying the theoretical material about the excretion system, students are divided into groups and begin to study the physiology of the kidney and the process of urine formation in it. To do this, you will need plastic, a balloon, a drip syringe system, a syringe,

A3 paper, paint, water, a bucket. First, we make 2 kidney shapes from plastic on A3 cardboard. On top we install the eggplant, cut in half. We insert 2 syringes, piercing its cap, and attach the system to them so that it enters the kidney. The system is placed along the kidney and reaches the bladder. i.e. we use a bladder balloon. We were able to prepare a subtraction system. Now let's get acquainted with the process of urine formation. To do this, we drip the paint into the water, forming colored water. Gradually pour in the colored water from the eggplant. Colored water moves through the system and collects in a balloon.



Thus, we showed readers how the kidneys form the illusion of the process, from the formation of urine to its collection in the bladder. When they perform this task, working in groups, they develop skills of working on projects, creative thinking, using the acquired knowledge in practice, simultaneous use of hands and mind.

In biology lessons of the 9th grade, the passage of the topic "a living organism is an integral system" can be organized as follows. Students study the relationship of human organs and plants as a whole organism through the modeling of plants and humans.

Necessary equipment: cardboard (A3), plasticine, colored paper, scissors, glue, watman, colored pencils

The order of execution of works

1. Make a model of human internal organs out of plasticine.
2. Draw a silhouette of a person on cardboard.
3. Arrange the plasticine organs in order on the cardboard.
4. Cut out the labels from colored paper and write the name of the organs on them, then glue them to the cardboard with glue.
5. Organize a group discussion of the functions of human organs and the functioning of organs in relation to each other based on the model.



When teaching topics on cell structure in biology lessons in the 9th grade, a cell model is made, the processes occurring in the cell, the functions and structure of its organelles, their location in the cell are accurately recognized.



The type of continuing education system is extracurricular education, but general secondary education requires the harmonization of their education with school lessons. When we get acquainted with the educational systems of developed countries, students prepare products for the extracurricular education system based on topics and projects studied in school classes. Steam allows project and educational research activities of students to be carried out both at school and outside of it.

Steam training is aimed at developing students' interest in conducting educational research, experimentation, design-oriented creativity, creating innovations in the classroom and extracurricular daily activities, showing how knowledge, skills and competencies are related to everyday life from a scientific point of view. At the same time, the student develops scientific curiosity and

creativity, identifying the interests of young people at an early stage and directing them to develop their talents and creativity, introducing innovations into life. This curriculum includes practical classes, laboratory work on working with tasks that meet the requirements of the international assessment program (PISA, TIMSS), aimed at developing students' logical thinking and practical skills.

In short, Steam encourages students to experiment, design models, create music and movies on their own, implement their ideas and create products. This approach to learning allows children to effectively implement their theoretical knowledge and practical skills. Increases the creativity of students, forms project skills, lays a solid foundation in the training of highly qualified, time-appropriate personnel.

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