



THE CONTENT OF ORGANIZING THE EDUCATIONAL PROCESS BASED ON STEAM TECHNOLOGY

Gafurova Dilnoza Salokhiddinovna

Department of Theory of Primary and Preschool Education

PhD in Pedagogical Sciences, Samarkand State Pedagogical Institute

dilnozagaffurova@gmail.com

Abstract

This article highlights the content and advantages of organizing the educational process in preschool education based on STEAM technology.

Keywords: Preschool education; children's creativity, imagination, emotions, initiative, mobility and adaptability; development of logical thinking; engineering; design; independence in the educational process; integrated education.

Introduction

STEAM educational technology is a modern teaching methodology that differs from traditional approaches. It is designed to teach learners simultaneously in the fields of science, technology, engineering, art, and mathematics. The need to implement STEAM technology in the educational process has been studied in countries such as the United Kingdom, South Korea, Canada, Japan, Germany, and Russia. Its application in preschool education has been included in the national education systems of developed countries since 2012, and corresponding programs have been developed.

In today's rapidly developing modern society, there is an increasing demand for individuals to possess more knowledge in STEAM fields. As a result, preschool children are taught skills such as teamwork, perseverance and diligence, creativity and ingenuity, logical thinking, and critical thinking. The STEAM educational approach is based on the application of both theoretical and practical methods, as well as the integration of five disciplines into a unified educational system. The advantage of STEAM technology lies in ensuring that new



knowledge is acquired not separately, but in an interconnected manner. It develops non-standard thinking, the ability to find multiple solutions to problems, and creativity in learners, which are highly beneficial for their future lives and activities. STEAM education is designed to teach learners simultaneously in science, technology, engineering, art, and mathematics. It is not organized by separate subjects, but rather as an integrated system based on themes. It is aimed at developing children's competencies in scientific and technical fields. Preschool age is considered a very favorable period for STEAM activities, as children at this stage are naturally curious about surrounding events and capable of free thinking. They tend to explore changes in their environment and show a strong interest in practical activities and experiments. At this age, children are able to absorb more information and concepts. They can also understand what is happening in their inner world and express what interests them. Therefore, it is appropriate to conduct STEAM-based activities within the pedagogical process. It is necessary to create pedagogical conditions that allow children to demonstrate their abilities [1; p. 241].

STEAM education consists of six modules. When these modules are integrated, they ensure the achievement of educational objectives, focus on solving specific problems, promote the development of intellectual abilities through cognitive research activities, and aim to involve preschool children in scientific and technical creativity. The description of all modules is presented below:

The **“F. Froebel’s Didactic System”** module includes activities such as experimenting with objects from the surrounding world, acquiring mathematical concepts through geometric shapes and figures, and understanding spatial relationships. This module helps preschool children develop artistic skills, form mathematical understanding, and learn critical and independent thinking.

The **“LEGO Design”** module involves practical experiments and their generalization, development of speech, the ability to explain the results of one's activities, creation of new images, imagination, and the use of analogy (for example, when a child is given a task to build or create an object, they describe and represent it by closely imitating its features). This module teaches preschool children invention, research activities, and construction skills through experimental learning.

The **“Mathematical Development”** module focuses on the comprehensive solution of mathematical development tasks in preschool children, taking into



account their age and individual characteristics. It includes the concepts of size, shape, space, time, quantity, and counting. This module develops children's spatial thinking and practical skills for mastering mathematical knowledge.

The **“Robotics”** module focuses on developing logical and algorithmic thinking, forming basic programming skills, and enhancing modeling abilities. It also develops information processing skills, as well as the ability to reason in conditions of abstraction and uncertainty.

The **“Multistudio – ‘I Create the World’”** module focuses on the development of information and communication and digital technologies, as well as organizing productive activities based on the synthesis of artistic and technical creativity.

The **“Experimentation with Living and Non-Living Nature”** module involves forming ideas about the surrounding world through experimental activities, understanding the interconnection of natural phenomena, systematically exploring the environment, and visually and emotionally perceiving the properties of natural objects. It also promotes awareness of the unity of all living beings and the development of ecological consciousness. [8].

Based on STEAM technology modules, opportunities for developing creativity in preschool children aged 5–7 are ensured. The systematic enrichment of children's research skills and creativity, as well as providing opportunities for self-development, are carried out in a structured manner. Each of these STEAM modules has its own specific goals, tasks, didactic potential, and application technology.

Considering that STEAM stands for Science, Technology, Engineering, Arts, and Mathematics, some of these areas may present difficulties for preschool children. Since young children do not yet have strong mathematical knowledge, the learning process may initially be challenging. However, through play and discussion, they are able to understand skills and concepts, which creates a strong foundation for future learning. This technology is viewed as a process aimed at developing critical thinking, acquiring necessary information, analyzing it, and forming skills to apply the obtained knowledge in practical activities. An environment is created that supports an individual approach and the development of teamwork skills, enabling the achievement of common goals, conducting discussions, asking questions, and engaging in debates.[8]

When this technology is implemented, preschool children are encouraged to engage in experimental research activities and answer questions through



exploration. They use simple tools such as colored pencils and rulers, as well as more complex tools like microscopes and computers. Engineering involves identifying problems and testing solutions, while art develops creativity and allows children to visually express the concepts they are learning. Mathematics, in addition to numbers, also involves patterns, shapes, organizational skills, and other related concepts. Preschool children are capable of learning basic STEAM concepts. One of the most beneficial aspects of STEAM education for preschoolers is that the skills they acquire—such as artistic, scientific, or mathematical process skills—can later be applied in any subject area and in everyday life. At this age, children naturally demonstrate curiosity and creativity, showing a strong inclination toward science. They are particularly interested in construction, modeling, robotics, and programming. An important aspect of the STEAM approach in education is the proper organization of children's activities. It is well known that science, technology, engineering, arts, and mathematics are part of everyday human life. Therefore, children can learn these subjects in an integrated way through books, discussions, experiments, artistic projects, educational games, and other activities. STEAM learning is more effective when it is implemented continuously rather than only at specific times of the day or week. At the preschool stage, STEAM technology is especially suitable, as it provides constant opportunities for discussion and learning through play.[3]

Educators should connect every piece of information given to children during lessons with practical activities. In STEAM-based learning, children engage in modeling tasks for each topic—they build, construct, and create. For example, children may build a model of a car and then test it. If the expected result is not achieved, they try to identify the reason—perhaps one of the wheels is too large. After each test, the child improves and corrects their mistakes. Children may also build bridges or create models of cars and airplanes, test them, and continuously improve their designs. This process helps develop a sense of self-confidence. STEAM activities also foster active communication skills and the ability to work in a team. During discussions, children learn to express their own ideas independently. An open and discussion-friendly environment is created, and most importantly, the process is engaging and interesting for children.



REFERENCES

1. Gafurova D. S. Maktabgacha ta'limda STEAM texnologiyalari / O'quv qo'llanma. "Samarqand davlat chet tillar instituti" nashriyoti. 2023. 314-bet
2. Gafurova Dilnoza Salokhiddinovna. Advantages of using steam technology in preschool educational organization. – 2023.
3. Gafurova D. Maktabgacha yoshdagi bolalarning tadqiqotchilik qobiliyatlarini shakllantirishda STEAM texnologiyasining ahamiyati. O'ZBEKISTON MILLIY UNIVERSITETI XABARLARI, 2024, [1/5/1] ISSN 2181-7324 94-96 bet.
4. Эвдокимова Е.С. Технология проектирования в ДОУ Е.С.Эвдокимова. – М.: ТЦ Сфера, 2006. – 64 с.
5. Савенкова, Л. Г. Исследовательская и проектная деятельность детей дошкольного возраста. — Москва: Просвещение, 2020.
6. Ксенофонтова, М. Инженерное мышление в дошкольном возрасте. — Москва, 2021.
7. Яковлева, Н. В. STEAM-образование в дошкольных организациях. — Москва: Педагогическое общество, 2020.
8. Yakman, G. STEAM Education: An Overview of Creating a Model of Integrative Education. — STEAM Education Journal, 2010.
9. Волосовец Т.В., Маркова В.А., Аверин С.А. STEM-образование детей дошкольного и младшего школьного возраста. Парциальная модульная программа развития интеллектуальных способностей в процессе познавательной деятельности и вовлечения в научно-техническое творчество: учебная программа / Т. В. Волосовец и др. — 2-е изд., стереотип. — М.: БИНОМ. Лаборатория знаний, 2019. — 112 с.: ил. Рецензия № 224/07 от ФГБОУ ВО «ИИДСВ РАО» Протокол № 7 от 26 сентября 2017 г. заседания Ученого совета ФГБОУ ВО «ИИДСВ РАО»