



## WAYS TO USE STEAM AND STEM TECHNOLOGIES IN PRIMARY GRADES

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**Annotation:** This article examines the methods and possibilities of integrating STEAM and STEM technologies into primary education. It discusses how interdisciplinary learning helps develop students' creativity, logical thinking, problem solving, and practical skills. The article also highlights the role of project-based learning and simple experiments in increasing student motivation and engagement. Recommendations for teachers on organizing lessons using modern educational technologies are provided.

**Keywords:** STEAM education, STEM technologies, primary school, interdisciplinary learning, project-based learning, creativity development, problem solving skills, modern teaching methods.

**Аннотация:** В статье рассматриваются методы и возможности внедрения технологий STEAM и STEM в образовательный процесс начальных классов. Раскрывается значение междисциплинарного обучения в развитии творческих способностей, логического мышления, навыков решения проблем и практических умений учащихся. Особое внимание уделено проектному обучению и простым экспериментам, повышающим мотивацию и активность учеников. Приводятся рекомендации для учителей по организации уроков с использованием современных образовательных технологий.

**Ключевые слова:** STEAM образование, STEM технологии, начальная школа, междисциплинарное обучение, проектное обучение, развитие творчества, навыки решения проблем, современные методы обучения.

**Annotatsiya:** Ushbu maqolada boshlang'ich sinflarda STEAM va STEM texnologiyalarini o'quv jarayoniga joriy etish usullari va imkoniyatlari yoritiladi. Fanlararo ta'lim o'quvchilarning ijodkorligini, mantiqiy fikrlashini, muammoni hal qilish ko'nikmalarini va amaliy qobiliyatlarini rivojlantirishdagi ahamiyati bilan izohlanadi. Maqolada loyiha asosida o'qitish va sodda tajribalar o'quvchilar motivatsiyasini oshirishdagi o'rni ham ko'rsatib beriladi. O'qituvchilar uchun zamonaviy texnologiyalar asosida dars tashkil etish bo'yicha tavsiyalar beriladi.

**Kalit so'zlar:** STEAM ta'limi, STEM texnologiyalari, boshlang'ich sinf, fanlararo ta'lim, loyiha asosida o'qitish, ijodkorlikni rivojlantirish, muammoni hal qilish ko'nikmalari, zamonaviy o'qitish usullari.

Ways to apply STEAM and STEM technologies in elementary grades. Today, in the process of primary education, priority is given to the development of the creativity of students, the formation of their logical thinking and the strengthening of competencies for solving an independent problem. From this point of view, the introduction of STEAM and STEM technologies into education is one of the most important areas of modern pedagogy. These technologies make it possible to organize student activities on the basis of



interdisciplinary communication and expand the interests of children of primary school age. [2;3]

STEAM education in itself comprehensively develops the reader, combining such directions as science, technology, engineering, art and mathematics. The essence of this approach is to turn the reader not only into a receiver of ready-made knowledge, but also into an active participant who is sought, asks questions, experiments, analyzes the result. In STEM education, however, science, technology, engineering, and mathematics are taught through hands-on training. This develops logical thinking, understanding of cause-and-effect relationships, and the search for various ways to solve problems in students.

The use of STEAM and STEM approaches in elementary grades involves students from an early age seeking, observing, experimenting. Creating simple models, studying natural phenomena, making devices using various materials increases student activity. As a result, they strengthen new knowledge through practical activities and learn to freely express their opinion. Thanks to the addition of an art element, the student takes a creative approach to the task being completed, which also develops his aesthetic taste.

Another important aspect of STEAM and STEM Technologies is the possibility of extensive application of project-based teaching methodology. In project activities, the student is independently sought, works in collaboration with other students, defends his idea and presents the result. Such processes shape students' communication skills, teamwork culture, and leadership skills. The teacher is involved in this process as a guide, consultant, motivator.

The use of these technologies in elementary grades significantly increases student motivation. Because every assignment they complete gives a visible result. When experiments come out successfully, self-confidence increases in students, who seek to try new ideas again. This makes the educational process interesting, dynamic and meaningful.

In order to effectively apply STEAM and STEM technologies, the teacher is required to adopt a novelty, conduct methodological research and carefully plan classes. In the course of the lesson, it is important that tasks suitable for the age of the student are selected, safety rules are observed, and materials are convenient and simple. The teacher can also effectively use items and natural materials found in everyday life, depending on the conditions available. [1;11]o effectively apply STEAM and STEM technologies, this in primary schools

Currently, in the process of primary education, it has become a priority to develop the creativity of students, form logical thinking and increase competencies for solving an independent problem. In this regard, the introduction of STEAM and STEM Technologies is considered one of the most relevant areas of modern pedagogy. These technologies help to organize the student's activities on the basis of interdisciplinary communication, make classes interesting and practical. STEAM education combines science, technology, engineering, art, and mathematics to develop the student's creative and analytical abilities, while STEM teaches science, technology, engineering, and mathematics through hands-on activities, preparing children to solve real-life problems.

The use of STEAM and STEM approaches in elementary grades allows students to gain practical experience, complete small projects, and express their opinion. For example,



at school, students observe natural phenomena, create simple mechanisms, prepare models and layouts, as a result of which not only scientific knowledge, but also manual labor and creative thinking develop. The addition of art elements enhances their aesthetic taste and encourages a creative approach to assignments.

Robotics clubs, 3D printers, and interactive labs are currently being introduced in many schools. With these tools, students create their projects in a more practical way, experiment and monitor the results in real time. At the same time, online platforms and AR/VR technologies make classes interactive, helping students visually understand complex processes. [10]

Project-based training is an integral part of STEAM and stem, with students learning to work in a group, voice their opinion, present the result, and solve the problem together. Such processes develop children's communication, leadership and collaborative skills. The teacher participates as a guide and counsellor, allowing students to operate independently. [8;9]

The use of STEAM and STEM technologies increases student motivation. When the experiment comes out successfully, children are confident in their work and strive to try new ideas. At the same time, the presence of the possibility of conducting projects and experts on distance learning platforms makes classes more modern and interesting.

In the future, the application of STEAM and STEM technologies will become more relevant, expanding innovative approaches in primary education. At the same time, they form in students the skills of the XXI century, creative thinking and the ability to solve life problems. For this reason, it is necessary for primary school teachers to make classes practical, interesting and meaningful through the effective application of these technologies.

In summary, the application of STEAM and STEM technologies to primary education is important in developing students' creativity, logical thinking, ability to make independent decisions, and practical skills. This approach shapes the skills of the 21st century in students and enhances their interest in Science, Technology, Engineering in the future. Therefore, it is necessary that the elementary school teacher wisely uses the capabilities of STEAM and STEM technologies to organize the educational process more efficiently and meaningfully.

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