

## PEDAGOGICAL CONDITIONS OF USING STEAM TECHNOLOGIES IN THE SUBJECT OF FORMING ELEMENTARY MATHEMATICAL IMAGINE

Toshmatova Zamira Jumanovna  
Teacher at Kokand State University

### ABSTRACT

This article explores the theoretical and practical foundations of implementing STEAM (Science, Technology, Engineering, Arts, and Mathematics) technologies in the process of preparing preschool children for school education (EMTSH). Throughout the research, the pedagogical conditions necessary for integrating the STEAM approach into the educational process, including the creation of an integrated learning environment and the methodological readiness of educators, are analyzed. The recommendations provided in the article serve to enhance children's logical thinking and creative abilities.

**Keywords:** STEAM, EMTSH, integration, pedagogical conditions, school readiness, innovative approach.

### ANNOTATSIYA

Ushbu maqolada maktabgacha yoshdagi bolalarni maktab ta'limiga tayyorlash (EMTSH) jarayonida STEAM (fan, texnologiya, muhandislik, san'at va matematika) texnologiyalaridan foydalanishning nazariy va amaliy asoslari yoritilgan. Tadqiqot davomida STEAM yondashuvini dars jarayoniga tatbiq etish uchun zarur bo'lgan pedagogik shart-sharoitlar, jumladan, integratsiyalashgan ta'lim muhitini yaratish va o'qituvchining metodik tayyorgarligi masalalari tahlil qilingan. Maqolada keltirilgan tavsiyalar bolalarning mantiqiy tafakkuri va kreativ qobiliyatlarini rivojlantirishga xizmat qiladi.

**Kalit so'zlar :** STEAM, EMTSH, integratsiya, pedagogik shart-sharoitlar, maktabga tayyorgarlik, innovatsion yondashuv.

### INTRODUCTION

Today, in the global education system, it has become a priority not only to equip students with ready-made knowledge, but also to form in them the skills of independent thinking, finding creative solutions in problem situations, and working with modern technologies. Especially at the stage of preparing children for school education (EMTSH), modernization of educational content based on these requirements is of urgent importance.

STEAM technology is an innovative approach that provides interdisciplinary connections and shows the student in the role of a researcher. However, the simple use of STEAM technologies in EMTSH lessons may not yield the expected results. This requires certain pedagogical conditions, including:

1. Enrichment of the educational environment in material and technical terms;
2. Integrated organization of activities based on a project;
3. The teacher must have modern technological competencies.

In the modern preschool education system, the formation of elementary mathematical representations (EMTSH) should not be limited only to the skills of recognizing numbers and calculating. STEAM (Science, Technology, Engineering, Arts and Mathematics) technology allows you to integrate mathematics with real-life processes and engineering projects. In this approach, mathematics acts as a "language" and analysis tool for other areas. When learning geometric shapes, children not only visually recognize them, but also use these shapes to create stable structures (Engineering) and test their durability based on physical laws (Science).

The following pedagogical conditions must be provided for the effective use of STEAM technologies in the process of STEAM:

**Designing an integrated learning environment:** Mathematics lessons should abandon the traditional "desk-blackboard" system and move to an environment in the form of a laboratory-workshop. Here, the child must be able to freely use various measuring instruments, Lego sets and drawings in the process of manipulating numbers.

**Problem-based and project-based learning (PBL):** Mathematical concepts should be presented not in the form of ready-made rules, but as problems that need to be solved. For example, the question "What geometric shape should the base of a bridge have to carry a certain weight?" encourages the child to both calculate (Mathematics) and model (Engineering).

**Multifunctionality of didactic materials:** The materials used in elementary school should not serve only one purpose (for example, only color recognition). According to the requirements of STEAM, the material should allow the child to experiment, measure, build, and aesthetically modify.

**Facilitative competence of the teacher:** In STEAM lessons, the teacher acts as a guide (facilitator), not as the main knowledge provider. He should create conditions for children to make mistakes and, through these mistakes, to understand mathematical laws (for example, symmetry or imbalance).

**Topic of the activity:** "Miracle Bridge: Shapes and Strength"

**Purpose of the activity:**

**S (Science/Fan):** Introduce the concepts of gravity and balance.

**T (Technology):** Develop skills in working with simple tools (scissors, glue).

**E (Engineering):** Learn to build a strong structure from paper.

**A (Arts/San'at):** Give the bridge an aesthetic look and create a design.

**M (Mathematics):** Use measurements (length, width) and geometric shapes (triangle, square).

**Required equipment:** Thick paper or cardboard, tape, scissors, toy cars (to use as weights).

**Activity sequence:**

1. **Problem setting:** Children are asked to place a piece of plain paper between two books and place a toy car on top. The paper car cannot support its weight.
2. **Research and solution:** Children are asked a question about how to make paper stronger. They test the durability of the paper by folding it (accordion method) or shaping it into a tube.
3. **Creative stage:** Each child or small group draws their own bridge project and builds it. Attention is paid to the fact that the bridge is not only strong, but also beautiful (colors, decorations).

4. Testing: Toy cars are placed on the finished bridges and it is determined which structure can bear the most weight.

"In conclusion, the use of STEAM technologies in preschool education classes brings children's readiness for school education to a qualitatively new level. In an environment with properly formed pedagogical conditions, the child manifests himself not only as a learner, but also as a small researcher and discoverer. This, in turn, allows them to form critical thinking, teamwork and creativity, which are called 21st century skills, from the pre-school age."

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