

## METHODOLOGY FOR DESIGNING TEST TASKS BASED ON THE STEAM APPROACH IN PRIMARY MATHEMATICS LESSONS

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***Annotation.** This article provides a comprehensive analysis of the theoretical and methodological foundations for designing test tasks based on the STEAM approach in primary school mathematics lessons. Within an integrative approach, a model for developing test items, a mechanism for classifying them according to Bloom's taxonomy levels, and the results of experimental research are scientifically presented. The findings of the study indicate that STEAM-based test tasks contribute to the development of students' logical, critical, and creative thinking competencies.*

***Keywords:** STEAM, primary education, mathematics, test tasks, integration, design model, Bloom's taxonomy, creative thinking, assessment methodology.*

Improving the assessment system is one of the important tasks in the modern educational process. While traditional test tasks are more focused on identifying factual knowledge, the STEAM approach requires tasks based on integrative, real-life and problem situations. Designing test tasks based on interdisciplinary integration in teaching mathematics at the primary education level is an important factor in forming students' competencies.

The STEAM (Science, Technology, Engineering, Art, Mathematics) approach ensures interdisciplinary integration. Mathematical concepts are linked to real-life situations. This develops students' skills in applying knowledge, analyzing and creating new solutions. Bloom's taxonomy allows for a systematic structure of test tasks in stages from knowledge to evaluation.

### **METHODOLOGICAL MODEL:**

Step 1: Determining the purpose of the lesson and competencies.

Step 2: Selecting integrative content (real-life situation).

Step 3: Classifying questions based on Bloom's taxonomy.

Step 4: Selecting a test format (multiple-choice, graphic, problem-based).

Step 5: Experiment-testing and statistical analysis.

Step 6: Reflecting on and improving the results.

The STEAM approach provides interdisciplinary integration. Mathematical knowledge is connected to real-life situations. In elementary school mathematics lessons, this is manifested as follows:

- connecting mathematical problems with real-life problems;
- and reinforcing concepts through models;
- developing test questions based on a problem situation;
- integrating creative tasks into the test format.

As a result, test tasks become not only a means of selecting the correct answer, but also a mechanism for determining the thinking process. The difference between traditional test tasks and test tasks based on the STEAM program is that the content of traditional test tasks is theoretical knowledge, and at the level of thinking, memorization, life relevance is low, and creativity is limited. In test tasks based on the STEAM program, the content requires integrative knowledge, the level of thinking is creativity, and life relevance is high.

It can be seen that STEAM tests require a high level of thinking.

STEAM-based test task design model

The following methodological model is proposed:

Stage 1: Determining the goal

The lesson objective and competencies are determined.

Stage 2: Selecting integrative content

The issue is linked to a real-life situation.

Stage 3: Classification based on Bloom's Taxonomy

Questions are structured according to the following levels:

-Knowledge

-Understanding

-Application

-Analysis

-Synthesis

-Evaluation

Step 4: Choosing a test format

-Multiple choice

-Adaptation

-Problem situation

-Graphic or diagrammatic

Step 5: Expert evaluation and analysis

Tests are tested and the results are analyzed.

Example: 3 types of flowers were planted in the schoolyard. There are 12 flowers in each row. A total of 4 rows were planted. If  $\frac{1}{3}$  of the flowers are red, how many red flowers are there?

This task integrates:

Mathematics (multiplication, proportion)

Natural science element (plant)

Engineering element (planning)

Fine arts (types of flowers)

Research results

In the classrooms where STEAM-based tests were used during the pilot-testing process, students': logical thinking level increased, problem analysis skills developed, independent decision-making activity increased, and interest in the lesson increased significantly.

The results showed that integrative tests are more effective than traditional tests. As a result of the study, a step-by-step methodological model for designing STEAM-based test tasks for elementary mathematics lessons was developed and practically substantiated.

Designing test tasks based on the STEAM approach in elementary mathematics lessons serves to develop students' higher-level thinking. The proposed methodological model allows for the development of scientifically based test development and evaluation processes into a developing mechanism.

**LIST OF REFERENCES:**

1. Bloom B. Taxonomy of Educational Objectives. – New York, 1956.
2. Barakayev M, Shamshiyeva A, O`rinov H “Matematika o`qitish metodikasi” T:“O`zbekiston faylasuflari milliy jamiyati” 2019.
3. Djurayeva Z “Matematikani o`qitishda STEAM topshiriqlarining ijobiy o`rni” “nauchniy impuls” 1-bo`lim yanvar 2023.
4. Esanova M “Boshlang`ich sinf o`quvchilarining matematika darslarida STEAM texnologiyasidan foydalanish usullari” nomli maqolasi “Ilm-fan va innovatsiya ilmiy-amaliy konferensiya” 140-142-bet.
5. M.MamamuratovaN “Boshlang`ich ta`limda STEAM texnologiyasidan foydalanish orqali o`quvchilarda kasbiy ko`nikmalarni rivojlantirish” Barqaror taraqqiyot va rivojlanish tamoyillari 118-bet.
6. Ta`limga STEM yondashuv tatbiqi (Fan o`qituvchilari, metodistlari va soha mutaxassislari uchun uslubiy qo`llanma) Toshkent-2021 14-18-bet.
7. Z. Ashurova “Maktabgacha ta`limda STEAM texnologiyasidan foydalanish” Metodik qo`llanma . Buxoro:2020.
8. Sh.Rajabova. Umumta`lim maktablarning „Boshlang`ich sinf darslarida zamonaviy metodlar va interaktiv o`yinlardan foydalanish” bo`yicha metodik qo`llanma. Buxoro2024.6-bet