AJSIHD
GLOBAL RESEARCH NETWORK

AMERICAN Journal of Science on Integration and Human Development
Volume 2, Issue 10, 2024 ISSN (E): 2993-2750

Methodology for Implementing Timss International Assessment Tasks in Primary School Mathematics Lessons

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Abstract: The article presents a methodology for developing and implementing practice exercises based on the tasks in the primary school "Mathematics" textbook to prepare for the TIMSS international assessment programs.

Keywords: education, technology, knowledge, science, methodology, collaboration, program, intellect.

In order to raise the younger generation as worthy representatives of today's rapidly developing era of progress and to achieve the goal of forming high-level knowledge and intellect that meet global standards, it is essential to reform the national education system. In addition to its traditional technologies, utilizing the experiences of other countries yields effective results. It is of great importance to create an education system that holds a place in the world rankings for producing specialists capable of meeting international standards. There are also international criteria for assessing students' knowledge, which serve as the foundation for determining the ranking of education systems worldwide.

International assessment systems are also developing as an independent direction for evaluating the quality of collaborative teaching. In particular, the TIMSS (Trends in Mathematics and Science Study) program, an international assessment study in mathematics and natural sciences for general education school students, is organized by the International Association for the Evaluation of Educational Achievement (IEA). This study aims to assess and compare the academic achievements of 4^{th}-grade students at the end of primary school and 8^{th}-grade students at the end of general secondary education in mathematics and natural sciences in various countries around the world, while also identifying the unique characteristics and differences of education systems.

The Resolution of the Cabinet of Ministers "On measures to organize research in the field of assessing the quality of education in the public education system", adopted on December 8, 2018, the Presidential Decree "On the approval of the concept for the development of the public education system of the Republic of Uzbekistan until 2030", signed on April 29, 2020, and several other resolutions and decrees were adopted with this very goal in mind.

Another important international study for assessing students' knowledge in primary grades is the TIMSS program. TIMSS is widely implemented in the education systems of countries worldwide. The TIMSS program was organized by the International Association for the Evaluation of Educational Achievements (IEA), with the first TIMSS (Trends in International Mathematics and Science Study) test conducted in 1995. Its purpose was to carry out a

comparative analysis of the quality of teaching in mathematics and natural sciences. In 1995, students from the 3rd, 4th, 7th, 8th, and 11th grades were invited to participate. Today, only 4th and 8th-grade students take part in the study. This study evaluates the quality and level of education in mathematics and natural sciences among students, as well as their attitude and interest in these subjects. One of the advantages of the study is that additional surveys are conducted among students, school administrators, and teachers to identify and analyze the main obstacles in the subject areas. Solutions to these challenges are then developed. The study is conducted every four years. In 2019, the TIMSS research was carried out in digital format, and according to the results, the education systems of countries such as the United States, Singapore, Hong Kong, South Korea, Japan, Russia, and the United Kingdom achieved the highest rankings.

The methodology for implementing tasks related to the TIMSS (Trends in International Mathematics and Science Study) international assessment program in primary school mathematics lessons includes several important aspects. Below, I will present the main principles:

1. Defining Objectives and Tasks

- Identify the goals of TIMSS and its specific assessment criteria.
- Set clear objectives and tasks aimed at developing students' mathematical skills.

2. Selecting Topics

- Align the mathematical topics in the curriculum with the main areas of the TIMSS assessment system.
- Choose topics that allow for the assessment of students' abilities (such as numbers, geometry, measurement, etc.).

3. Developing Tasks

- Prepare tasks aligned with TIMSS, incorporating multiple-choice, open-ended, and questions with varying difficulty levels.
- Try to adapt the task questions to relate to students' daily lives.

4. Teaching Process

- Organize teaching methods in an interactive and collaborative manner.
- Use group work and discussions to assist students in completing tasks.

5. Evaluating Results

- Assess the results based on students' work and compare them with TIMSS criteria.
- Identify each student's strengths and weaknesses, and develop individual approaches based on this analysis.

6. Analysis and Improvement

- Analyze the lessons considering the feedback from teachers and students.
- Study the experiences and results to improve future lessons.

This methodology helps effectively develop students' mathematical skills in the process of preparing for the TIMSS international assessment program.

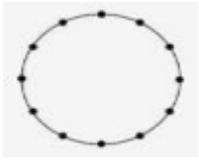
Mathematical Literacy: Examples of tasks from the TIMSS (2019) international assessment program:

Task 1: Noila started from the number 1 and applied the rule "add 4" sequentially. What was Noila's sequence?

A) 1, 4, 8, 12, 16 B) 1, 4, 16, 64, 256

C) 1, 5, 9, 12, 16 D) 1, 5, 9, 13, 17

Task 2: Paint is sold in 5-liter cans. Tohir needs 37 liters of paint. How many cans of paint does he need to buy?



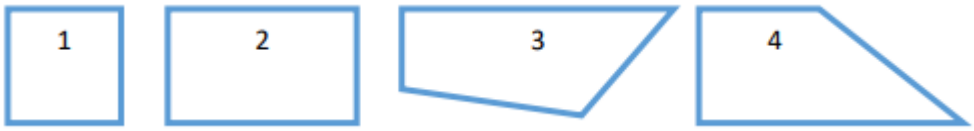
Task 3: Draw an equilateral triangle inside a circle using a dot (.) to represent the triangle.

Task 4: Lola wrote a five-digit odd number that does not contain the digit zero (0). Based on the criteria given, let's identify the number.

A) 10
0051 B) 14037 C) 48303 D) 24074

Task 5: Kozim measured the perimeter of a rectangular tennis court and found it to be 72 steps. If the length of the court is 11 steps, what is the width in steps?

Task 6: The teacher asked the students, "Identify a shape such that it can form a square and a right triangle with a single line". What shape did they identify?



Task 7: Identify the last number in the given sequence:

18, 27, 36, 45, 54, ___

Task 8: In which unit of measurement can the weight of a coin be determined?

A) in grams B) in kilograms C) in quintals D) in tons

Task 9: Identify the pattern in the given sequence: 8, 20, 44, 92, ___

A) Multiply the given number by 3 and subtract 4;

B) Multiply the given number by 2 and add 4;

C) Divide the given number by 2 and multiply the result by 5;

D) Divide the given number by 4 and multiply the result by 10.

Task 10: A truck can carry 1 ton of cargo. There are 1200 kg of cargo in the warehouse. Can all the cargo be delivered to the destination in one trip?

In conclusion, the International Assessment Program not only equips students and learners with knowledge but also prepares them to solve problems encountered in daily life and future endeavors without difficulty. It provides a foundation not just for becoming specialists in a single chosen field, but also for acquiring various skills simultaneously, based on their intellectual capabilities.

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