

DEVELOPING PRIMARY SCHOOL STUDENTS' LOGICAL THINKING SKILLS BASED ON INTERNATIONAL ASSESSMENT PROGRAMS

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Annotation: This article examines the nature of international assessment programs — PISA, TIMSS, and PIRLS—their role in evaluating education quality, and their significance in developing logical thinking abilities among primary school students. Through practical examples, the article highlights the teacher's role, interactive methods, and opportunities offered by educational tasks in fostering logical reasoning. Recommendations are provided for developing students' skills in problem solving, identifying cause-and-effect relationships, and making decisions.

Keywords: logical thinking, international assessment programs, PISA, TIMSS, PIRLS, primary education, reasoning, competence, problem-based learning.

Introduction

In recent years, Uzbekistan has been actively integrating into the global educational space. In 2022, the country participated in the PISA assessment for the first time. These assessment programs measure not only students' knowledge, but also their ability to think, analyze, and solve real-life problems. Therefore, it is essential to develop logical thinking skills among primary school students based on the results and structure of international assessments.

Developing logical thinking at the primary level ensures students' readiness for independent thinking, analysis, and creativity at later stages of education.

Main Part

1. The essence and purpose of international assessment programs

- PISA (Programme for International Student Assessment) evaluates the functional literacy of 15-year-old students in reading, mathematics, and science. PISA tasks are based on real-life situations and require logical analysis and reasoning.
- TIMSS (Trends in International Mathematics and Science Study) measures the ability of 4th- and 8th-grade students to apply knowledge in mathematics and science.
- PIRLS (Progress in International Reading Literacy Study) assesses the reading literacy and comprehension of 4th-grade students.

These programs aim to develop analytical thinking, critical reasoning, and creativity in students.

2. Methods for developing logical thinking in primary school

a) Problem-based learning

The teacher presents a question or problem; students search for possible solutions.

Example:

“There are 12 birds on a tree; 5 fly away. How many remain?”

Instead of a simple arithmetic answer, the student should reason that the remaining birds might also fly away due to disturbance. Logical answer: 0 birds.

b) Brainstorming

Students provide quick ideas, then choose the most logical one.

Example: “Why does a rainbow appear after rain?”

c) Venn diagram

Students identify similarities and differences between two concepts.

Example: Comparing “birds” and “insects.”

d) Game-based technologies

Games such as Sudoku, Tangram, and math chains stimulate mental activity.

3. Integrating international-format tasks into the learning process

PISA-style example

“If each row requires 3 trees and a total of 45 trees are to be planted, how many rows are needed?”

Students learn division, reasoning, and practical problem solving.

TIMSS-style example

“A red ball weighs 12 g, and a blue one weighs 18 g. What is the difference in weight?”

Students develop comparison and analysis skills.

4. The teacher’s role

The teacher should:

- ask open-ended questions (“Why?”, “How?”, “For what reason?”);
- allow students to find their own solutions;
- evaluate the thinking process rather than just the final answer;
- include international-style tasks in lessons.

TIMSS-format math tasks

1. A box contains 36 apples. If each basket holds 6 apples, how many baskets are needed?

Solution: $36 \div 6 = 6$ baskets.

Logic: Understanding whole-part relationships.

2. A pencil costs 2,000 soums, a notebook 3,000 soums. What is the total cost of 4 pencils and 2 notebooks?

Solution: $(2,000 \times 4) + (3,000 \times 2) = 14,000$ soums.

Logic: Applying numerical information in real-life situations.

3. What is the approximate degree measure of the angle between the hour and minute hands at 3:45?

Answer: About 90° .

Logic: Connecting time and geometry.

PISA-format real-life tasks

1. The price of one book is 25,000 soums. With 120,000 soums, how many books can be purchased?

Solution: $120,000 \div 25,000 = 4.8 \approx 4$ books.

Reasoning: Understanding that partial books cannot be bought.

2. If each row contains 4 trees, how many rows are needed for 52 trees?

Solution: $52 \div 4 = 13$ rows.

Reasoning: Mathematical modelling in a real-life context.

3. You have a 5-liter bucket and a 2-liter container. How can you measure exactly 3 liters of water?

Logical solution:

1. Fill the 2-liter container.

2. Pour it into the bucket — now 2 liters.

3. Refill the 2-liter container and pour into the bucket; only 1 liter fits, leaving 1 liter in the container.

4. Now the bucket contains 4 liters, and the container holds 1 liter. Thus, 3 liters can be measured through logical steps.

Conclusion

Organizing primary education based on international assessment programs develops students' logical, critical, and creative thinking skills. This forms the foundation for success in later stages of education. Therefore, teachers should adapt PISA, TIMSS, and PIRLS-format tasks to classroom practice and cultivate students' problem-solving, analytical thinking, and reasoning skills.

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