



DEVELOPMENT OF MATHEMATICAL IMAGINATION OF ELEMENTARY SCHOOL STUDENTS BASED ON INTERNATIONAL ASSESSMENT PROGRAMS (TIMSS)

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Abstract: this article explains the importance of the TIMSS program, which is considered one of the international evaluation programs, in the development of general mathematical concepts of elementary school students.

Keywords: mathematical imagination, example, concept, logic, knowledge, student

We all know that in recent years, as a result of the reforms carried out in our country, huge economic growth indicators have been achieved, which increases the demand for qualified, smart, diligent, inquisitive and mature specialists in all fields. This, in turn, requires newly developing personnel to work more on themselves, as well as to have information about new research and studies in developed countries in a certain way, and to study them perfectly in order to put them into practice. is doing. In order to create sufficient conditions for young pedagogues and personnel in our country, the Cabinet of Ministers of the Republic of Uzbekistan "On measures to organize international research in the field of education quality assessment in the public education system" dated December 8, 2018, 997 - the National Center for the implementation of international studies on the assessment of the quality of education was established in the Cabinet of Ministers of the Republic of Uzbekistan under the State Inspection of the Quality of Education. The purpose of this is, first of all, to include our country among the countries that are developing on a large scale and to use the international experiences that have shown good results in them. In addition, the tasks of participation in international studies on the assessment of the quality of education were defined:

PIRLS - assessment of reading and comprehension level of primary 4th graders;

TIMSS - assessment of literacy of 4th and 8th grade students in natural and scientific subjects;

TALIS - study of the environment of teaching and learning of leaders and pedagogues in general secondary educational institutions and the working conditions of teachers;

PISA - is an assessment of the level of literacy of 15-years old students in reading, mathematics and natural sciences.

EGRA and EGMA assess reading and math skills in elementary grades. Based on the results of the evaluation, new curricula, teaching methods and approaches will be adapted for the better performance of the youth of Uzbekistan¹.

At the moment, the international assessment programs listed above are widely applied to teaching processes, and the results obtained from them are also visible. The main goal of these is to bring up a broad worldview, deep thinking, deep thinking in all aspects, intelligent

¹ PIRLS 2021 Assessment Framework. Ina V S.Mullis O.Martin. International Association for the Evaluation of Educational Achievement (IEA), TIMSS & PIRLS.

generations. If we take the TIMSS International Assessment Program as an example, it is simply an international monitoring of the quality of learning mathematics and natural sciences. and we mentioned above that it is an evaluation system. This study has as its main goal the comparative study of students' achievement levels in mathematics and natural sciences in the 4th grade of the primary school and the 8th grade of the basic school in different countries of the world, and according to the obtained results, each recognizes the unique aspects and achievements of a country's education system.

TIMSS international research methods include:

- 1) positive test results;
- 2) questionnaires (for students, teachers, administration of the educational institution, experts in the field of education, observers of the quality of research);
- 3) methodological support (a guide for national coordinators on the organization and conduct of research, a guide for school coordinators, a guide on conducting tests, on checking tasks with free answers manual, data entry manual, etc.);
- 4) software (for selecting classes and students, entering data).

International tests are developed based on the following principles:

- 1) adequate coverage of tested contents and types of educational and cognitive activities;
- 2) maximum compatibility of the content of international tests with the material studied in most participating countries;
- 3) ensuring the interaction of tests;
- 4) the significance of the examined content in terms of the development of mathematics and science education;
- 5) compliance with the age characteristics of the students, evaluation of the achievements of the developed test;
- 6) compliance with public research requirements.²

As a result of the Timss International Assessment Program, the educational achievements of students are assessed mainly in their knowledge, application, and reasoning. As a result of this program, it is believed that the students' mathematical imagination will be radically developed, because the examples in the TIMSS program will provide students with new concepts in all aspects, that is, they cover social, economic, scientific and educational aspects, and most importantly, they are very interesting and thought-provoking, the student unknowingly becomes more interested in these examples and problems, as a result of which his understanding of mathematics develops. Let's prove this with a few examples:

1. Davron first traveled 4.8 km by car, then 1.5 km by bus. How far did the period go?
 - a)* 6.3 km
 - b) 5.8 km
 - c) 3.3 km
 - d) 9.6 km

The content area is numbers and operations, the subject area is simple and decimal fractions, and the cognitive area is application. As a result of solving this example, it is clear how much the student knows and is interested in the topic of decimals.

2. In which number does the number 8 represent 800?






² <https://uz.wikipedia.org/wiki/TIMSS>



- a) 1428
- b) 2584
- c)* 6812
- d) 8127

As we can see, this example is also considered a task related to the cognitive domain "Knowledge" and helps to strengthen the skills of working on natural numbers, as well as to expand the understanding of it.

3. Symbol represents the number of pencils in Akrom. Kamal gave 7 more pencils to Akrom. How many pencils are there in Akrom?

- a) 3: 
- b)  +3
- c)  - 3 
- d) 3* 

The above example attracts the reader on its own terms. Because the answer is hidden in the condition, and as a result of reading the condition at least 2 times, the student understands the essence of the example and determines the answer. These types of examples lay the groundwork for deeper understanding of the topics of numerical expressions and equations.

4. Paint is sold in 5 liter cans. Sanjar needs 37 liters of paint. How many cans should he buy?

- a) 5
- b)*8
- c) 7
- d) 6

In this example, we will get acquainted with the task of the cognitive domain "Application" and work on natural numbers. We will also develop and strengthen knowledge about this mathematical concept. This automatically increases the student's interest in mathematical knowledge. We see that the reader gets a new understanding, additional knowledge and the result of research from each given example. Mathematical concepts are strengthened, and it becomes easier for pedagogues to assess their knowledge potential and skills. Due to this, the level of self-mastery of students differs.

As we all know, various examples, problems, exercises and assignments are gradually introduced into the public textbooks based on the age, thinking range, and comprehension skills of the "International Assessment Programs" system. In turn, it would not be wrong to say that the program for students to acquire the required knowledge and potential for the international developing education system. As an example, we can cite several examples from 4th grade textbooks.

1) The following advertisement is posted in the store: "If you buy two shirts for the price of three shirts, we will give you the third shirt as a gift". If the price of one shirt is 355,000 soums, how much money will be saved?

Solution: If we read the condition of this problem at least 2 times, the solution will be known from the condition of the problem. It goes without saying that if two shirts are given for the price of three shirts, even if the third shirt is given for free, no money will be saved.

That is:

A=shirt=355000

1065000 for 2 shirts

$$3A = 3 * 355000 = 1065000$$

$$1065000 = 1065000$$

So, if we take 2 shirts and give money for 3 shirts, and giving the third one is not considered free, it will not have any benefit.

2) Calculate by showing the correct order of actions. What word is hidden here? How does this relate to work?

$$652 \ 652 : ((403 * 36 - 182 * 45) : 9 - 691) : 4 - 13 \ 223$$

$$T \ 1610 \quad L \ 59 \ 332 \quad M \ 14 \ 508 \quad O \ 14 \ 833$$

$$S \ 702 \quad H \ 6 \ 318 \quad A \ 8 \ 190 \quad U \ 11$$

Solution:

$$\text{Step 1: } 403 * 36 = 14508 \ (M)$$

$$\text{Step 2: } 182 * 45 = 8190 \ (A)$$

$$\text{Step 3: } 14508 - 8190 = 6318 \ (H)$$

$$\text{Step 4: } 6 \ 318 : 9 = 702 \ (S)$$

$$\text{Step 5: } 702 - 691 = 11 \ (U)$$

$$\text{Step 6: } 652652 : 11 = 59332 \ (L)$$

$$\text{Step 7: } 59332 : 4 = 14833 \ (O)$$

$$\text{Step 8: } 14833 - 13223 = 1610 \ (T)$$

Answer: PRODUCT

A PRODUCT- is a set of tools or resources that can be produced in a certain enterprise, factory or specific building based on the level of people's needs.

3) Pizza delivery person at 5 in the morning 160 km in the morning and in the evening. He traveled 189 km in 7 hours. When did it move faster: Morning or evening and how did its speed change?

Given:

$$S1 = 160 \text{ km} \ S2 = 189 \text{ km}$$

$$T1 = 5 \text{ hours} \ T2 = 7 \text{ hours}$$

$$V1 = ? \ V2 = ?$$

Formula:

$$S = V * T$$

$$V = S / T$$

$$T = S / V$$

Solution:

$$V1 = 160 / 5 \ V2 = 189 / 7$$

$$V1 = 32 \text{ km/h} \ V2 = 27 \text{ km/h}$$

$$32 > 27$$

$$V1 > V2;$$

$$32 - 27 = 5$$

Answer: So, the pizza delivery man was moving fast in the morning and his speed decreased by 5 km/h in the evening.

5) Mark the unknown with the letter x and make an equation for this problem. What is common in this equation?

Cyclist traveled 504 km in 2 days. If he traveled the same distance per day, how many meters did he travel in one day?

We make an equation suitable for the problem, we have an unknown issue, this is our day/One day= x . He traveled 504 km in two days and he covered the same distance on both days.

Solution:

$$x + x = 504$$

$$2x = 504$$

$$x = 504/2$$

$$x = 252$$

Answer: $x = 252$

If we pay attention to this problem, the common aspect with the equation is that one or more things are definitely unknown in the problem, and if we bring it into a convenient situation and bring it to one or more known equations, our work will be much easier. and the result is clear.

In all of the examples and issues mentioned above, it is considered to apply all-round knowledge and skills of students to practice, as well as to gradually adapt them to the assignments given in "International Assessment Programs".

Of course, in every class, in contrast to the student who learns knowledge slowly, there are also talented students who understand very quickly, who progress quickly. It is necessary not only to evaluate and reward them and show them as an example to the underachievers, but also to occupy them with assignments so that they can spend their free time effectively. For example, here are some examples from class textbooks:

1. Is the collection named correctly?

Set of numbers:

1,2,3,4,5,6,7,8,9,10

Answer: no (because 10 is not a number): The given set is not a set of numbers, but a set of natural numbers.

2. Kamil entered a password on his computer. Find these numbers. You need to write one number in each box. We have a 3-cell barol. The first cell is the number between the human hand and the number of rainbow colors, the second is the number between the legs of a spider and the 8-legged spider, and the third cell is the result of comparing the number of bicycle and car wheels. Enter the correct number and the correct password will appear. Find the password?

Solution: a person has five fingers on one hand and there are 7 colors in the rainbow. So, there is a 6 between the numbers 5 and 7. The first number of the password is 6.

The second is that a ladybug has 6 legs, and a spider has 8 legs, between 6 and 8 there is a number 7. So the second number of the password is 7. The third one is that a bicycle has two wheels, and a car has 4 wheels, and the number 3 is on the left. So, code 673 was detected.

Answer: 673

3. The players were divided into teams. Odd numbered players will play in the first team, even numbered players will play in the second team. Which of the children got lost and went to another team?

Team A: 1,3,7,15,23,9,5,11,17,8,13.

Team B: 6,8,4,12,18,24,2,10,14,16.

Answer: A player number 8 was added to team A, he should have been in team B. Because its serial number is even.

We can give many examples of such tasks, because all textbooks are rich in examples and problems that strengthen logic and thinking, as well as help strengthen memory. These, in turn, act as a program to develop the knowledge of all students.

In conclusion, the International Assessment Program not only makes pupils and students knowledgeable and intelligent, but also enables them to solve the problems and debates encountered in the course of daily life in the future without difficulties, and to pursue a career in a single direction of their choice. not only being the owner, but based on his intellectual potential and interests, he creates enough conditions for him to acquire various professions at the same time. The organization of independent work in the study of new material on the assignment of tasks similar to the examples given in the TIMSS program in elementary school mathematics classes creates conditions for the implementation of differentiated education, taking into account the individual characteristics of students. As a result, not only does each student have a perfect mathematical imagination, but also contributes enough to the development of their logical abilities.

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