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TIMSS INTERNATIONAL STUDY AND ITS IMPACT ON THE THINKING OF 4TH GRADE STUDENTS

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ABOUT ARTICLE

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Abstract: The article examines changes in the state and psychological perception of fourth-grade students when performing TIMSS tasks, especially in the mathematical part. Attention is paid to the international assessment study TIMSS and its significance in modern society and leading world powers. The article describes the contribution of the leading countries in the study to the development of education and comprehensive personality development of primary school students. The development of schoolchildren affects the stability of education in the state and its international capabilities. Thearticle describes the educational environment in several major countries with a full description of its structure. The article also discusses the results of TIMSS and its impact on students 'creative thinking, the structure of TIMSS test tasks (blocks "Knowledge", "Applications", "Reasoning"). The articleis relevantforteachers, teachersandstudentsof primaryeducation.

INTRODUCTION

To fully understand how TIMSS tasks affect the thinking of elementary school students, you must firstunderstand what thinking is. Thinking is the ability to perceive the world around you in all its diversity, create images of objects and phenomena, find logical connections between them, and solve problems. At the same time, it is important to be able to abstract from the details and see the

big picture.Teachers can develop students ' thinking in many ways: through didactic games, contests, or individual tasks. These methods can also be used for TIMSS tasks.

Thus, lessons using TIMSS tasks can encourage creative thinking in fourth grade students.This study provides an opportunity to compare the level of mathematical education and knowledge in the field of natural sciences among fourth-and eighth-grade students in different countries. TIMSS questions and test tasks are based on the following components: [2]

- tasks and information based on educational and cognitive activities;
- similar content of tasks of the countries that participate in the study;
- control of information in the mathematical and natural science block;
- matching the age capabilities of the participants and the test questions provided.

In the modern world, education is considered one of the most important conditions for stable development. In the concept of international education until 2030, it is defined as a priority task — to create conditions for obtaining high-quality education. This made it possible to apply technology more widely in the educational system. They are aimed at improving methodological training, developing creative thinking among teachers, including primary school teachers.

According to the resolution of the Cabinet of Ministers of the Republic of Uzbekistan "On measures to organize international research in the field of quality assessment of education in the public education system" dated December 8, 2018 No. 997, the Republic of Uzbekistanн intends to introduce international research PIRLS, TIMSS, PISA and TALIS and also take part in these programs. Taking into account the above-mentioned resolutions, special attention is paid to the content of education, new versions of textbooks are being experimented with, and modern methods are being used to improve the effectiveness of the educational process.

When teaching primary school students, it is important to choose and use the right methods, tools and forms of pedagogical technologies in order to expand the horizons of students and their creative abilities. A number of innovative technologies are used in the organization of training sessions.

The very concept of TIMSS (from English Trends in Mathematics and Science Study) is an international study of the quality of mathematical and natural science education in schools and the analysis of results between different countries of 4th and 8th grade students. This is a program organized by the International Association for Academic Achievement Assessment (IEA). [1]

This decision was made in order to improve the techniques and methods used in the mathematics and natural sciences lesson after an in-depth analysis of the results of students who took part in the monitoring. A number of studies have been conducted in this area, as it is currently relevant. Mastering the skills of solving tasks of the TIMSS type depends on the methodical literacy of the primary school teacher, on their understanding of the importance of exercises for the formation of mathematical concepts and other theoretical provisions in mathematics lessons. Therefore, it is necessary to select tasks correctly, taking into account their semantic load.

METHODS

The TIMSS framework allows students to evaluate their educational achievements in three key areas: "Knowledge", "Application" and "Reasoning".

The Knowledge section tests your knowledge of mathematics, including properties of numbers and simple geometric shapes. You also need to be able to reproduce definitions and extract information from standard graphs and charts. In the natural sciences, it is necessary to demonstrate an understanding of the properties of organisms, materials, phenomena and processes, as well as a knowledge of science terms and units of measurement. In the "Application" section, students are asked to solve problems

related to various life situations, interpret data from tables and diagrams, diagrams and graphs, and conduct experiments.

The "Reasoning" section tests your logical and systematic thinking skills. Problems may differ in the level of complexity, the number of solution steps, and the need to integrate knowledge from different areas. The aim of the program is to assess the level of preparation of students receiving compulsory general education and to determine their ability to function fully in society.

It is important to remember that in today's world, where information technology and robotics are actively developing, the skills assessed by TIMSS become even more relevant. If earlier strong memory and encyclopedic knowledge were valued, now these skills are no longer so important. After all, there are electronic search engines, online encyclopedias, and industry databases that allow you to get information without having to memorize it .TIMSS tests are conducted to assess changes in the education system and determine how well students are able to analyze information, draw conclusions and apply knowledge in practice. The results of testing allow us to objectively assess the level of development of education in the country and take measures to eliminate shortcomings.

Participation in TIMSS and other international programs provides an opportunity to apply the experience of developed countries in the education system of Uzbekistan and compare the results with those of other countries. Also, the results of testing will be taken into account when compiling the national rating of schools in Uzbekistan.

Participation in TIMSS studies every three years allows monitoring the effectiveness of the education system on a global scale.

In particular, to improve the quality and effectiveness of primary education, it is necessary to develop broad-minded and critical thinking, so that students can see changes in society and express their attitude to them. One of the tasks of the teacher is to adapt training to the individual characteristics of each student, his interests and preferences in various disciplines, which covers the structure and specifics of TIMSS tasks.

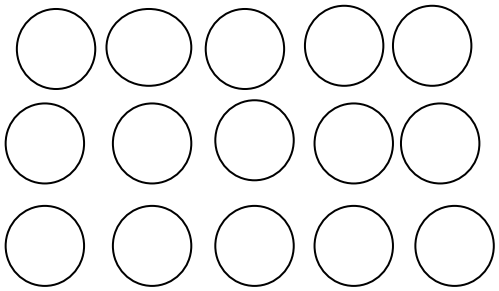
To gradually introduce this practice into the educational process, the teacher should introduce students to tasks similar to those used in the international TIMSS test in stages between completing regular tasks in mathematics and science. It is worth starting from elementary school, so that by the eighth grade students have developed competencies that meet international standards of education.

Examples of typical tasks for "Knowledge" and "Application" are presented below.

1. Группе из 7 детей дали 64 пряника. Сколько пряников надо добавить, чтобы разделить пряники между детьми поровну?
2. Девочка называет числа, указанные в таблице. Мальчик из этих чисел получает другие числа, выполнив некоторое действие.

Числа девочки	**Числа мальчика**
1	**2**
3	**6**
6	**12**
9	**18**

   Какое действие выполняет мальчик?
3. В зале 8 рядов кресел. В каждом ряду по 13 кресел. С помощью какого выражения можно вычислить, сколько всего кресел?
   А) 13+8 Б) 13:8 В) 13-8 Г) 13*8
4. На рисунке 15 кружков. Обведи 1/3 всех кружков.



5. Какое число равно сумме: 2 единицы+ 4 десятка+ 7 сотен?

А) 247 Б) 742 В) 427 Г) 724

6.Какое из следующих чисел ближе к 8?

А) 0,8 Б) 7,99 В) 8,9 Г) 8,20

7. В 6 часов утра температура воздуха была 13 градусов. Затем каждый час она поднималась на 2 градуса и к 10 часам утра достигла 20 градусов. Какая температура была в 9 часов утра?

А) 15 градусов Б) 17 градусов В) 19 градусов Г) 21 градус

8. Проволоку длиной 24 см согнули так, что получился прямоугольник. Если ширина этого прямоугольника равна 4 см, то чему равна его длина?

А) 16 см Б) 6см В) 8см Г) 12 см

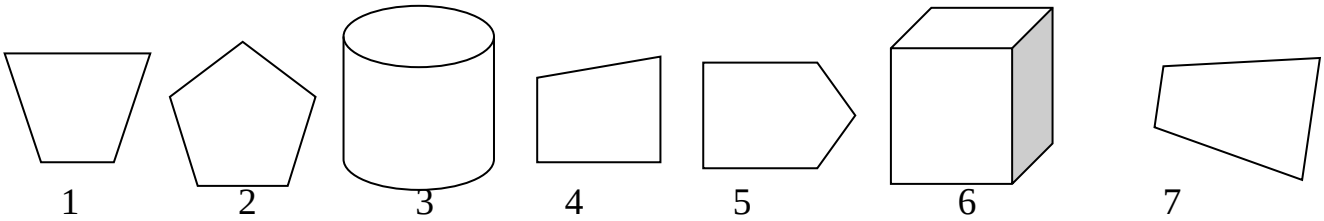
9. При выполнении домашнего задания девочка нечаянно пролила воду на тетрадь. Одну из цифр стало невозможно прочесть. Ответ в примере верный. Какую цифру невозможно прочитать?

1.000
8[redacted]4
106

10. За одним столом, работая в группе, сидят 5 человек. Как узнать, сколько понадобится столов, чтобы посадить 35 человек?

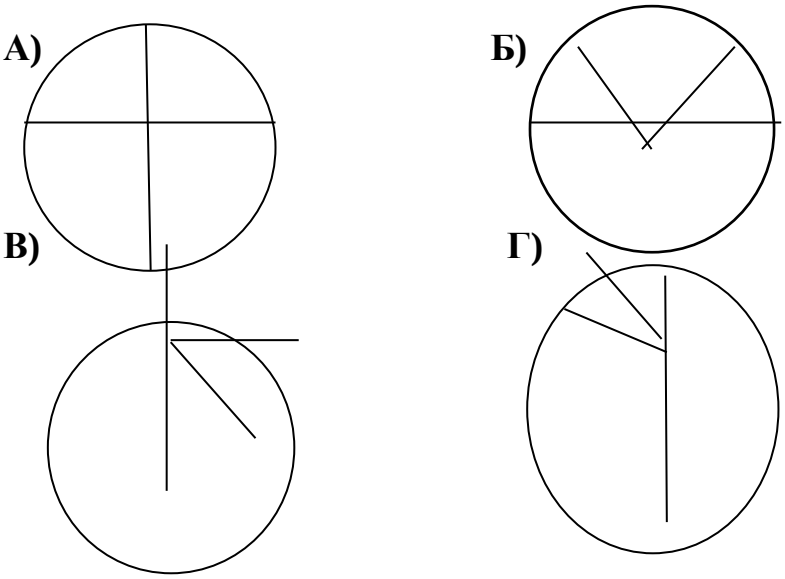
А) отнять 5 от 35 Б) умножить 35 на 5 В) прибавить 5 к 35 Г) 35 разделить на 5

11. Запиши все цифры, которыми обозначены трапеции:



Порода дерева	Число деревьев
Берёза	400
Тополь	200
Рябина	100
Ясень	100

В таблице указано количество деревьев разных пород, которые имеются в парке. На какой из круговых диаграмм правильно представлены данные, отображённые в таблице?



In these cases, the teacher can explain to students the essence of the condition of all tasks in turn, asking leading questions to students. Or use the "Fill in the blanks" method, which gives an example with omissions of the necessary values, and students need to figure out which number to insert judging by the task condition.

A pedagogical experiment was conducted in the fourth grade of Secondary school No. 2 of the Alat district of the Republic of Uzbekistan among well-performing students using TIMSS test tasks. 10 elementary school students took part in this experiment.

RESULTS

When conducting this experiment, the following tasks were set:

-Study the student's psychological state during the lesson using TIMSS test tasks.

- Develop students ' ability to use computer technologies while completing TIMSS tasks.
- Develop a TIMSS task system for fourth-grade students.
- A clear explanation of the importance of TIMSS tasks in math classes at the present time.
- Improve creative thinking when solving math tasks like TIMSS.
- Choose your own material for a pedagogical experiment.
- Experimentally test the effectiveness of using innovative approaches to organizing math lessons in primary schools.
- Differentiation of research results.

A sample of students from the fourth grade as well-performing was determined by the result of their total scores during the educational process for three years of study at this school. The following is a list of students: Gaibullayeva M., Rasulova Sh., Arislonova D., Rustamov Zh., Khamroev S., Kakhramonova N., Yunusova M., Ergasheva M., Ravshanova R., Furkatova M.

The results of the study showed that when introducing TIMSS test tasks in math lessons, students develop:

- independent thinking;
- logical thinking;
- critical thinking.
- fast assimilation of the material;
- worldviews.
- memory.

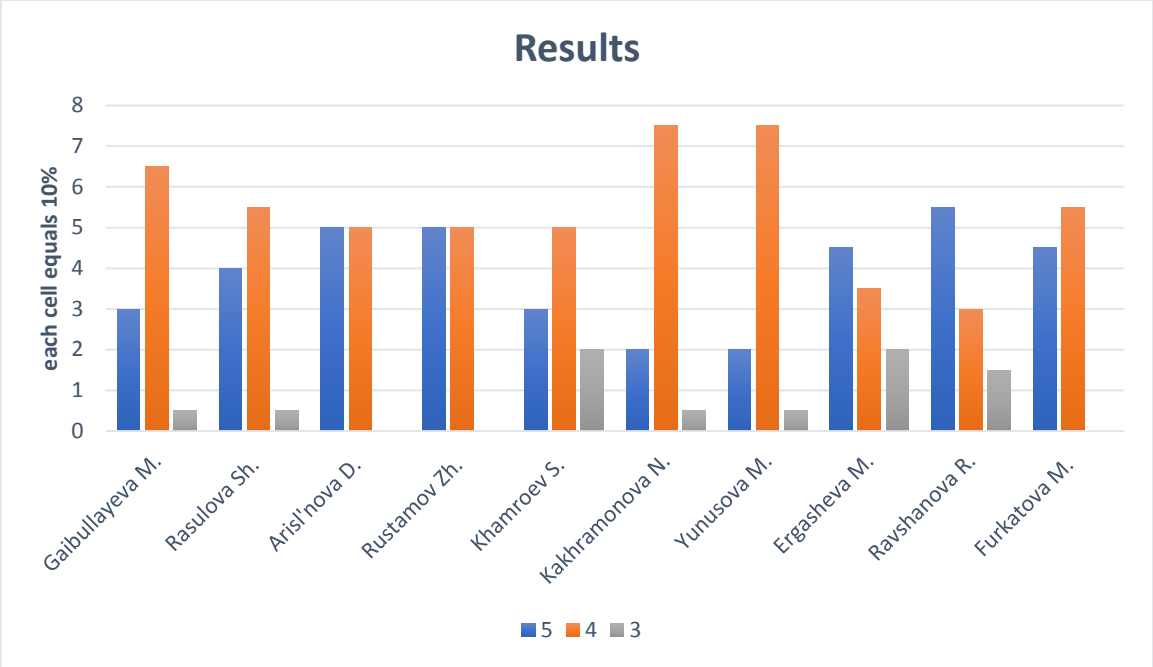
The tasks that were provided to students are commented on above.The criteria for evaluating students were also prepared as follows:

K1 - the student has fully understood the meaning of the test question.
K2 - the student was able to reflect on the content of the question.
K3 - the student was able to complete the task correctly.
K4 - the student found several solutions to the same task.
K5-the student is looking for an easy solution to the same example, if there are several options, and chooses the best one.
Each criterion for assessing mathematical literacy is rated at one point. Then the result is summed up.
/ building 123456789101112

Full name of students / task number	1	2	3	4	5	6	7	8	9	10	11	12
Gaibullayeva M.	4	5	4	3	4	4	4	5	4	5	4	5
Rasulova Sh.	3	4	5	4	4	4	4	4	4	5	5	4
Arisl'nova D.	4	4	5	5	5	4	4	5	4	5	5	4
Rustamov Zh.	4	5	4	5	5	4	4	5	4	5	4	5
Khamroev S.	3	4	4	5	4	3	5	5	4	4	5	4
Kakhramonova N.	5	4	4	4	4	4	4	4	5	4	4	3
Yunusova M.	4	4	4	4	4	4	4	4	5	4	3	5
Ergasheva M.	3	4	5	4	5	5	5	3	5	4	4	3
Ravshanova R.	4	5	5	4	5	4	5	5	4	5	5	3
Furkatova M.	4	5	4	4	5	4	4	5	4	5	4	5

We can draw a conclusion based on the overall estimates as follows:

Full name of students	Total score
Gaibullayeva M.	4,25
Rasulova Sh.	4,2
Arisl'nova D.	4,5
Rustamov Zh.	4,5
Khamroev S.	4,2
Kakhramonova N.	4
Yunusova M.	4
Ergasheva M.	4,2
Ravshanova R.	4,5
Furkatova M.	4,4



It can be concluded from the experiment that the tasks were mostly clear to the students. Tasks # 1,2,3,4,5,9,10,11,12-students solved without difficulty. Tasks 6,7,8 caused difficulties. The teacher should pay special attention to the methodology of teaching integers, time and spatial representations of students.

According to the structure, the tests in the mathematics and natural sciences block in the fourth grade include 175 and 172 questions, respectively. Each booklet consists, on average, of 44-50 tasks, for which 72 minutes are allocated. In this regard, the primary school teacher can apply these tasks during the learning process, integrating them with the capabilities of students and their individual abilities. Thus, it is also necessary to involve students in the time frame, that is, to determine the beginning and end of tasks. The uniqueness of such tasks serves to increase students 'creative thinking and arouse interest in math and science lessons, as well as it serves as a good example of individually selected tasks tailored to students' academic performance in math lessons.

The main sections that the teacher needs to pay attention to are the "Numbers" section. It includes: students ' ability to understand the meaning of digits, decimals or ordinary fractions, writing multi-digit numbers, basic skills in using natural numbers, ways to represent them, establishing relationships between them, performing arithmetic operations, and much more. When performing such tasks, students need to be aware of the relationship between units of measurement, and convert oneunit of measurement to another.[1] Knowledge of natural numbers is considered basic for schoolchildren, because all tasks are related to them.

To fully immerse yourself in the TIMSS international research environment, you should conduct a survey in the classroom (students, teachers, parents, school administration). The data obtained can serve as a good source for identifying factors that influence test results and explain the state of students ' knowledge in mathematics and natural sciences. It is also appropriate to use modern information technologies along with conducting TIMSS tasks during the educational process.

DISCUSSION

The results of international studies evaluating the quality of national programs show that countries such as Singapore, Finland, South Korea, the United States, etc. show the best results compared to other countries in the world. Singapore occupies a separate place. The structure of education in Singapore is significantly different, which makes it a leading country in this environment. [5] For example, the

educational environment is focused on practical significance, which goes back to the pedagogical traditions of many countries in the east and west. It mainly focuses on the prepared individual curriculum by the teacher, the teacher, the transfer of acquired knowledge to students and the direct preparation of students for annual exams by the end of the year, to identify shortcomings, eliminate them and move to a new level of education. Textbooks are developed independently by the teacher based on the psychological and physical data of school students. This is also the case with the curriculum, workbooks, methods, and so on. Mathematical literacy is of particular importance. Educators in Singapore focuses on algorithms and sequences for problem solving and teaching problem formulation with precision and clarity. [5] In this state, there is still a centralized model of teaching. Where the teacher plays an important and central role in the lesson.

In my opinion, when creating TIMSS assignments, a teacher should take into account the following factors that help to create a complete picture when selecting certain tasks for fourth-grade students:

precise interaction of test content verification principles.

significance of the material being tested from the point of view of mathematical and natural science education;

compliance with the age and psychological capabilities of children.

Various types of tasks are prepared to assess students ' mathematical skills, such as open and closed tests, multiple-choice tests, short or full detailed answers, and practical tasks for logic and thinking. For a better assessment, it is appropriate for the teacher to apply a differential approach, where there are four levels of academic achievement: low, medium, high and higher. It is also important to have a time frame that does not exceed what is allowed.

When teaching primary school students, it is important to choose and use the right methods, tools and forms of pedagogical technologies in order to expand the horizons of students and their creative abilities. A number of innovative technologies are used in the organization of training sessions.

The TIMSS structure evaluates students 'educational achievements in such cognitive blocks as" Knowledge"," Application "and "Reasoning". The "Knowledge" area includes math problems that require students to know about the properties of numbers and simple geometric shapes, reproduce definitions, and get information from standard graphs and diagrams. In the natural sciences, it is necessary to demonstrate the level of knowledge about the properties of individual organisms and materials, phenomena and processes, natural science terms and units of measurement.[1]

When performing tasks for "Application", students need to show their abilities in solving mathematical and natural science problems related to various life situations, interpreting data from tables and diagrams, diagrams and graphs, and conducting experimental work.

The block "Reasoning" reveals the skills of logical and systematic thinking of students. Problems that require reasoning may differ in the novelty of the proposed situation, the complexity of the question, the number of solution steps, and the need to integrate knowledge from different sections.

The purpose of this program is to assess students who receive general compulsory education in the skills and knowledge acquired in this period and serve for full functioning in society.

First of all, it is necessary to remember that the current XXI century is the age of information technologies and robotics, which serves to develop not only the skills described above, but also the ability to use computer technologies. And modernity requires specialists to have completely different competencies from the previous ones. If previously strong memory, encyclopedic knowledge, and professionals who knew as much information as possible in their field were highly valued, now these skills are no longer of primary importance. After all, electronic search engines, online encyclopedias, various online databases

by industry have already been created, and now the need to remember this information has faded into the background.

TIMSS tests are conducted to identify current changes in the education system, to determine the extent to which students have the skills to think analytically, draw conclusions and communicate based on real events, and how well the education system adapts to these changes. It is envisaged that the results provide an opportunity to objectively assess the level of development of education in the country and make timely decisions to eliminate existing shortcomings. Also, the results of testing will be taken into account when compiling the national rating of schools in Uzbekistan.

After participation, Uzbekistan will have the opportunity to apply the experience of developed countries in the country's education system through participation in TIMSS and other international programs and will also be able to compare its results with those of other countries. It should also be taken into account that participation in TIMSS studies every three years makes it possible to monitor the effectiveness of our country's education system on a global scale.

In particular, improving the quality and effectiveness of primary education requires a broad world of thinking with a developed worldview, in which each student can see with his own eyes the cardinal changes taking place in our society, express his attitude to each issue that he conducts. One of the most important tasks facing the teacher is the intercorporation of training, taking into account the individual characteristics of the student, his preferences in professions, various disciplines, which covers the structure and specifics of TIMSS tasks.

CONCLUSION

It can be concluded that this approach can develop the thinking of schoolchildren during the educational process. If innovative approaches to organizing math lessons in primary schools are used correctly using TIMSS tasks, the effectiveness of information assimilation increases along with interest in the subject.

The content of a math lesson in primary school serves as a comprehensive means of developing students ' thoughts, worldview, speech, and personality, and occupies an important place among other academic subjects. In the course of math classes, students ' mathematical literacy is improved. Students ' abilities to correctly, consciously and timely understand the essence of tasks and solve them correctly are growing. The development of creative thinking during math lessons, the development of methodological foundations for the practical application of specific forms and methods of using innovative approaches to organizing math lessons in primary schools, as well as the preparation of methodological recommendations: all this serves as a good foundation for building a fully developed student.

Of course, there are special conditions that can be used to achieve these results. They are as follows:

1) the application of innovative approaches to the organization of mathematics lessons in primary schools is theoretically and practically justified;

2) new approaches to the organization of mathematics classes in primary schools with the use of specific content, form, means, methods and techniques of TIMSS are justified;

3) the educational process aimed at using innovative approaches to the organization of mathematics lessons in primary schools, when the educational process is organized on the basis of specific scientific and methodological recommendations. The expected effectiveness is achieved in the primary education process.

Also, on the part of our state, all the resources presented are set out in the Constitution of the Republic of Uzbekistan, the Law of the Republic of Uzbekistan "On the State Language", the Law of the Republic of Uzbekistan "On Education", the State National Program for the Development of School Education for 2004-2009, the Decree of the President of the Republic of Uzbekistan dated April 29, 2019 "On the development of a concept for the development of the public education system based on period until

2030", social, legal, pedagogical, psychological, scientific sources on the topic of mastering national values, glorifying the human factor, recognizing human rights and freedoms in building a democratic state governed by the rule of law.

After participation, Uzbekistan will have the opportunity to apply the experience of developed countries in the country's education system through participation in TIMSS and other international programs and will also be able to compare its results with those of other countries. It should also be taken into account that participation in TIMSS studies every three years makes it possible to monitor the effectiveness of our country's education system on a global scale.

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