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## INTERNATIONAL ASSESSMENT IN THE FRAMEWORK OF THE TIMSS STUDY ON MATHEMATICS

**Annotation:** One of the main tasks of modern education systems is to provide students with solid knowledge and practical skills. It is well known that significant attention is being paid to the development of the education system in our country, particularly general secondary education. This is because the future and progress of the state are in the hands of young students currently studying in general secondary schools. Educating students to think independently and critically, express their opinions on social issues, and apply their theoretical knowledge in practical activities is an important responsibility for all of us.

**Keywords:** TIMSS, mathematics, assessment, education, methodology, teaching methods, school, survey

### Introduction

Today, comparing and evaluating the quality of education in different countries at the international level has become a crucial issue. Such assessments not only help identify the strengths and weaknesses of the education system but also serve as a foundation for planning reforms. The TIMSS (Trends in International Mathematics and Science Study) was established to analyze students' proficiency in mathematics and science across various countries.

TIMSS is conducted every four years to assess the knowledge of 4th and 8th-grade students worldwide based on international criteria. This article provides an in-depth analysis of the content of the TIMSS study, its assessment methodology, results, and its significance for Uzbekistan's education system.

### Methodology

The results of the TIMSS study serve as a valuable resource for educational institutions and policymakers. This research identifies the areas where students excel and where they lag. The TIMSS assessment system follows a specific methodology, focusing on the following aspects:

#### 1. Test Tasks

The TIMSS assessments evaluate students' knowledge in two main subjects—mathematics and science—through three levels of test tasks:

- Basic knowledge questions – These assess students' understanding of fundamental mathematical formulas, calculation rules, and theoretical concepts in science.
- Logical thinking and application questions – These measure students' ability to analyze real-life problems and apply learned knowledge in practice.

- Problem-solving and analysis tasks – These evaluate students’ skills in understanding and solving complex problems.

## 2. Surveys and Educational Environment Analysis

The TIMSS study is not limited to test assessments; it also includes surveys involving students, teachers, and school administrators. These surveys focus on:

- Teaching methods and pedagogy.
- Students’ motivation and self-confidence in learning.
- Availability of educational resources and school infrastructure.
- Teachers’ qualifications and experience.

## Results

The survey results are compared with TIMSS test scores to determine the strengths and weaknesses of each country’s education system. The findings from recent TIMSS studies reveal the following general trends:

- Asian countries – Singapore, South Korea, Japan, and China consistently achieve the highest results, attributed to their extensive study hours, structured teaching methodologies, and strict discipline.
- European countries – Nations like Finland, the Netherlands, and Estonia maintain stable and high performance, indicating the effectiveness of their education systems.
- USA and Canada – Although these countries emphasize innovative approaches in education, their results are slightly lower than those of Asian and European nations.
- Developing countries – Many countries in Africa and Latin America show lower performance due to a lack of educational resources and inadequate teacher qualifications.

Uzbekistan participated in the TIMSS study for the first time in 2019, marking a significant step for the country’s education system. Uzbekistan’s participation in TIMSS has helped identify students’ strengths and weaknesses, analyze school curricula and teaching methodologies, increase attention to STEM subjects (Science, Technology, Engineering, Mathematics), and improve teacher training programs. Based on TIMSS results, the Uzbek government plans to implement several reforms, including:

- Establishing specialized schools with a focus on advanced mathematics and science education.
- Introducing interactive and innovative teaching methods.
- Developing curricula based on international best practices.

## Discussion

TIMSS is one of the key benchmarks for assessing students’ knowledge in mathematics and science at the international level. Its results serve as a primary resource for shaping educational policies and planning reforms.

The results indicate that Asian countries such as Singapore, South Korea, Japan, and China consistently achieve high scores. This suggests that their education systems emphasize structured curricula, strong academic discipline, and extensive practical training. European countries also maintain stable high performance, demonstrating the effectiveness of their education systems, which focus on high-quality textbooks, highly qualified teachers, and individualized learning approaches.

On the other hand, the United States and Canada, despite their focus on innovative education, score slightly lower than Asian and European countries. In developing countries, particularly in Africa and Latin America, performance remains low due to insufficient educational resources and low teacher qualification levels.

Uzbekistan's participation in TIMSS in 2019 provided an important opportunity to analyze the country's education system. Although some challenges were identified, reforms are being planned to address these issues. Measures such as increasing focus on STEM subjects, improving teacher qualifications, and implementing interactive teaching methods will help enhance education quality.

Thus, TIMSS is a crucial tool for countries to evaluate their education systems, identify strengths and weaknesses, and develop effective strategies. For Uzbekistan, the TIMSS results will play a significant role in guiding future education reforms.

## Conclusion

The TIMSS study is an essential tool for assessing students' knowledge in mathematics and science worldwide. The findings help countries identify strengths and weaknesses in their education systems, improve teaching methodologies, and develop strategies to enhance students' knowledge and skills.

Asian countries' high performance reflects their emphasis on strict discipline, effective curricula, and comprehensive training programs. European countries demonstrate stable high results due to innovative and individualized teaching approaches. However, in developing nations, a lack of educational resources and low teacher qualifications contribute to lower performance.

Uzbekistan's participation in TIMSS has allowed for an in-depth analysis of the country's education system, identifying challenges and developing strategies to address them. By focusing more on STEM education, introducing innovative teaching methods, and improving teacher qualifications, student performance can be enhanced.

Overall, TIMSS results serve as a valuable resource for improving education systems, enabling countries to refine their education policies based on international best practices. Uzbekistan should effectively utilize these findings to implement reforms and improve education quality.

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