

THE IMPORTANCE OF TIMSS INTERNATIONAL ASSESSMENT IN TEACHING NATURAL SCIENCES

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Abstract: *This article analyzes the importance of the TIMSS (Trends in International Mathematics and Science Study) approach to teaching science. The article shows the possibilities of comparing students' knowledge levels, pedagogical methods, and international educational standards through TIMSS studies.*

Keywords: *Science, TIMSS, quality of education, pedagogical approach, international comparison, scientific thinking, student skills.*

In the modern education system, it is not enough to assess the level of knowledge of students based on national criteria alone. In the context of global competition, the quality of education is determined by international assessment programs. One such program is TIMSS, which allows for international comparison of students' knowledge and skills in mathematics and natural sciences.

TIMSS studies are aimed at assessing the readiness of 4th and 8th grade students in natural sciences, determining the content of education, teaching methods and the level of students' use of knowledge in real life. Natural sciences - mathematics, physics, chemistry and biology - are especially important for developing young people's logical thinking, scientific research and practical problem-solving skills. For this purpose, the TIMSS (Trends in International Mathematics and Science Study) approach is used to monitor and improve the quality of education around the world.

TIMSS results serve as an important scientific basis for improving the process of teaching natural sciences. Its importance is manifested in the following aspects:

Firstly, it allows you to assess the quality of education based on international criteria. This identifies the strengths and weaknesses of the country's education system.

Secondly, it helps to develop functional literacy in students. TIMSS tasks are based on real-life situations and require students to apply knowledge in practice.

Thirdly, it helps to improve teaching methods. Instead of the traditional reproductive approach, research-based, problem-based and interactive methods are used.

Assessment process:

- Questions test students' knowledge, application and reasoning abilities in mathematics and science.
- TIMSS also collects contextual data on students, parents, teachers and schools.
- This approach not only reports results, but also allows for a more in-depth analysis to improve the educational process.

The 2019 TIMSS international study was conducted in 64 countries and compared student performance in mathematics and science. These results show global education trends and provide a basis for comparison between countries with different populations.

For example: According to the 2023 TIMSS results, Uzbekistan's 8th grade students ranked 32nd out of 44 countries in mathematics with a score of 421, and 39th in science with a score of 396. This shows which areas we need to focus on to strengthen our education system.

From these figures, we can see that there may be weaknesses in some subjects. Therefore, developing strategies to identify and correct them will improve the learning process.

Strategies for in-depth teaching of natural sciences.

The TIMSS assessment system requires students not only to memorize facts, but also to think and solve problems. For example, questions test students':

- application of knowledge
- logical analysis
- scientific research.

This encourages students to increase their experience and laboratory work in the classroom, in addition to just teaching the textbook. In this way, students are taught a scientific research approach - for example, experiments in biology lessons or solving real problems in physics.

Impact on teachers and education policy. The information collected through TIMSS will benefit not only students, but also teachers:

- It will be possible to determine which pedagogical approaches are effective.
- It will allow to improve the knowledge base of students by changing the teaching methodology.
- Teachers will adapt their methodology to international standards.

This approach will strengthen the role of the teacher and improve the quality of education.

Conclusion

The TIMSS (Trends in International Mathematics and Science Study) approach is of great importance as an important tool in the modern educational process in teaching natural sciences. Through this approach, the level of knowledge of students in mathematics and natural sciences is compared internationally, their strengths and weaknesses are identified, and the level of practical skills and logical thinking is assessed. This makes it possible to adapt the teaching process to the individual needs of students, improve pedagogical methods, and conduct lessons on an interactive, experiential basis.

TIMSS results help to determine the quality of education in schools and regions, identify gaps in the education system and develop specific recommendations for their elimination. At the same time, they allow teachers to update methodological approaches, increase laboratory and practical training, and develop scientific research and critical thinking skills in students.

TIMSS results are of strategic importance in the formation of national education policy, as they serve to harmonize the educational process with international standards and radically improve quality. Therefore, the systematic application of the TIMSS approach in natural science lessons is a necessary tool for developing students' scientific thinking and competencies, as well as improving the national education system in accordance with modern requirements.

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