



## TIMSS - Trends in International Mathematics and Science Study

Monitoring mathematics and science achievement in a global context

**TIMSS**, the Trends in International Mathematics and Science Study, is a flagship study of the International Association for the Evaluation of Educational Achievement (IEA). Directed by the TIMSS and PIRLS International Study Centre at Boston College, TIMSS is an international assessment of student achievement in mathematics and science at fourth and eighth grades. Measuring trends in achievement since 1995, TIMSS data have enabled countries around the world to make evidence-based decisions to improve educational policies related to mathematics and science teaching and learning.

Conducted as a large-scale assessment every four years, TIMSS also includes a quasi-longitudinal design, with the fourth-grade students' cohort assessed four years later at the eighth grade. Assessing fourth grade students can provide an early warning for necessary curricular reforms, and the effectiveness of these reforms can be further monitored at the eighth grade four years later.



## WHAT DOES TIMSS PROVIDE?

TIMSS assessments provide an authoritative account of how students in fourth and eighth grades perform in mathematics and science. Countries that participate in multiple cycles of TIMSS can monitor trends in student achievement while assessing changes that have occurred in curriculum, instruction, and other aspects of education that affect learning.

In addition to mathematics and science assessments, the TIMSS school, teacher, student and home questionnaires gather extensive information about the contextual factors at school and home which are associated with learning and students' achievement. TIMSS also provides an encyclopedia that includes data about each country's educational context for learning mathematics and science. These rich data include information on how the education system is organized to facilitate learning; students' home environment and supports for learning; school climate and resources and how instruction usually occurs in classrooms.



## MEASURING PROGRESS TOWARDS THE SUSTAINABLE DEVELOPMENT GOALS

Together with the IEA's PIRLS (Progress in International Reading Literacy Study), TIMSS data are recognized by UNESCO as a solid evidence base for researchers, educators and policymakers interested in monitoring progress towards Sustainable Development Goal (SDG) 4: obtaining a quality education for all. For example, the Low International Benchmarks established by TIMSS and PIRLS are recognized as the most appropriate measures of the "SDG minimum proficiency level" (indicator 4.1.1) for numeracy and literacy. Students who achieve this level in TIMSS fourth grade mathematics can add and subtract whole numbers, have some understanding of multiplication by one-digit numbers, can solve simple word problems, and have some knowledge of simple fractions, geometric shapes, and measurements.

## DESIGNED TO BE USED TO IMPROVE CURRICULUM AND INSTRUCTION

TIMSS assessments use national curricula as the major organizing concept. Assessments are based on comprehensive frameworks that are built in collaboration with participating countries to describe the knowledge and skills expected of students at fourth and eighth grades. National Research Coordinators play an important role in helping to develop the assessment questions and questionnaires, administering the assessment, reporting the results and interpreting the findings within their own national context.

The high quality, internationally-comparative data generated by TIMSS may be used to inform classroom practices and improve student learning. Evaluating students' knowledge, skills and problem solving strategies in an international context provides an evidence base for addressing curricular strengths and weaknesses. Targeted professional development based on the areas of weaknesses and needs identified by the assessment enables teachers to act as change agents for their education system.

## BROADENING THE SCOPE OF THE ASSESSMENT

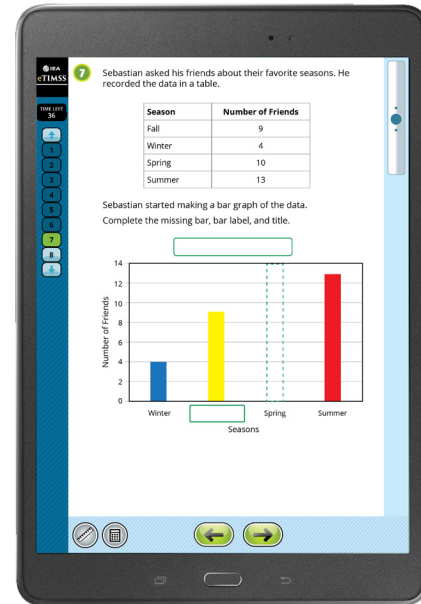
Over its more than two-decade lifespan, TIMSS has grown considerably, not just in the numbers of participating educational systems (from 46 in 1995 to 70 in 2019) but also in the variety of assessment options available. These include:

### ASSESSING A NEW GENERATION WITH E-ASSESSMENT

From the 2019 cycle onwards, an innovative computerized version of TIMSS enables countries to investigate complex areas of the mathematics and science framework that are difficult to measure with traditional paper and pencil tests. **eTIMSS** is an engaging, interactive assessment that encompasses the content of the paper-and-pencil version of TIMSS while also integrating problem solving and inquiry tasks designed to stimulate student motivation through items that simulate real world situations. In addition to new measurement opportunities, e-assessment also has practical benefits for countries including more efficient translation, data entry and scoring procedures and reduced printing and shipping costs. TIMSS 2023 will include a wide variety of interactive item types and features that capitalize on the dig to the end of the paragraph: gital environment and engage students.

### ASSESSING ACHIEVEMENT AT ALL LEVELS

Students in the TIMSS countries demonstrate a wide range of mathematics and science achievement. In some countries many children are still developing fundamental skills, while in other countries, many children are demonstrating advanced skills. TIMSS is designed to be able to measure mathematics and science achievement across the achievement distribution and can provide valuable information about strengths and weaknesses in students' mathematics and science knowledge and skills in all countries.



### ASSESSING ADVANCED STUDENTS PREPARING FOR STEM CAREERS

**TIMSS Advanced** is an assessment for students in their final year of secondary school who are enrolled in special advanced mathematics and physics programs. It is the only international assessment that provides essential information about students' preparedness to enter university-level studies in science, technology, engineering, and mathematics (STEM). TIMSS Advanced is conducted on a longer cycle than regular TIMSS studies and was administered in 1995, 2008 and 2015.



## COSTS AND FUNDING

Participating countries are required to cover all the costs of administering the study at the national level, and to share the costs of coordinating the study internationally. National costs depend on the salary levels and cost structures within each country. IEA can assist participants with developing their own national budget, by providing an outline of the staffing required, tasks to be covered, and equipment needed for successful implementation.

## BENEFITS OF PARTICIPATION

Joining TIMSS is an opportunity for educational systems to participate in a world-class assessment of mathematics and science. The high-quality, internationally comparative data enable countries to:

- ✓ Monitor and compare system-level achievement trends in a global context
- ✓ Use results to inform educational policy, and monitor the impact of new or revised policies
- ✓ Pinpoint any underperforming areas and stimulate curriculum reform
- ✓ Assess student's attitudes towards learning, and the support they receive at home and at school
- ✓ Survey home, classroom and school contexts for teaching and learning
- ✓ Monitor the fourth-grade cohort at the eighth grade in a later cycle

## PARTNERS

TIMSS, a project of IEA, is directed by the TIMSS & PIRLS International Study Center at Boston College. Other partners involved with TIMSS are IEA, Statistics Canada, and Educational Testing Service (ETS) in the United States. As in all IEA studies, the international coordination and development are undertaken in close cooperation with the national research centers of participating countries.



**IEA**

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## ABOUT IEA

The International Association for the Evaluation of Educational Achievement (IEA) is an international cooperative of national research institutions, governmental research agencies, scholars, and analysts working to research, understand, and improve education worldwide.

We conduct high-quality, large-scale comparative studies of education across the globe to provide educators, policymakers, and parents with insights into how students perform.

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