



TIMSS & PIRLS
International Study Center
Lynch School of Education
BOSTON COLLEGE

TIMSS Longitudinal Study:

Measuring Student Progress over One Year



TIMSS continues leadership and innovation in comparative international assessments by introducing an optional international study of student progress based on TIMSS 2023. Following a longitudinal design, in which the TIMSS 2023 student sample is reassessed the following year, the aim of the longitudinal study is to quantify student learning gains over a year and to investigate contextual factors of student achievement.

Two overarching research questions guide the TIMSS Longitudinal Study:

- 1) **What are the achievement gains as students progress from one TIMSS grade to the next?**
- 2) **Which individual differences—as well as home, classroom, and school variables—are associated with achievement gains over a year?**

The TIMSS Longitudinal Study promises deeper insights into education systems, enriching what is possible to learn from cross-sectional studies, and providing groundbreaking new insights in educational effectiveness research. The longitudinal study is offered at fourth and eighth grade.

STUDY DESIGN: HOW DOES THE TIMSS LONGITUDINAL STUDY WORK?

The longitudinal study is designed to measure growth in student achievement in a stable institutional setting. To facilitate country participation, the study builds on the existing infrastructure of TIMSS 2023 and is intended to produce results meeting the same high-quality standards as any IEA study.

FOLLOWING THE TIMSS 2023 SAMPLE IN A STABLE INSTITUTIONAL SETTING

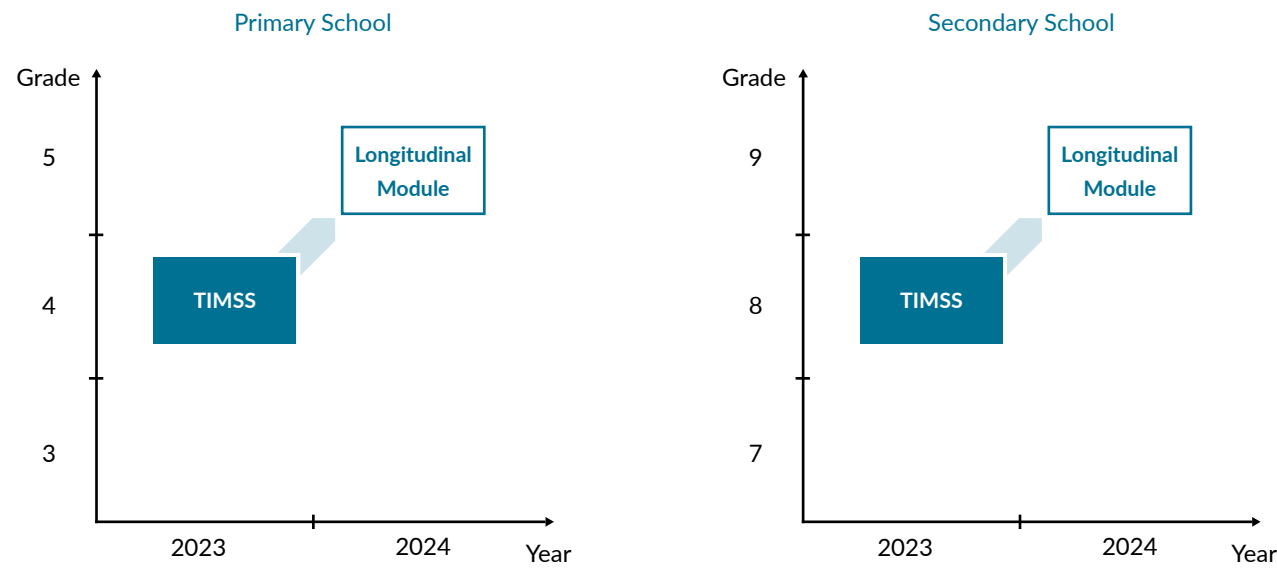
The TIMSS 2023 sample of fourth and eighth grade students constitutes the baseline sample of the TIMSS Longitudinal Study. These students will be assessed again one year later in fifth and ninth grade, respectively.

The longitudinal study is ideally implemented in a setting where the classroom and/or school context remains stable to minimize costs and to maximize the analytical potential. That is, between the two measurements, in an ideal setting students generally remain in the same schools, preferably in the same school classes.

This allows for classroom-based assessment instead of tracking and assessing students across different schools.

Countries can participate in the longitudinal design for one or both grade options if the feasibility of following the same students as they transition to another school or class can be assured. However, countries where a stable setting is not likely between the two adjacent grades outlined within this study design are invited to contact the IEA to discuss their options (e.g., if a stable setting is more likely from grades 3 to 4 and/or grade 7 to 8).

Figure: TIMSS Longitudinal Study design



SEIZING THE POTENTIAL OF THE NEW GROUP ADAPTIVE ASSESSMENT

Learning gains will be measured on the well-known TIMSS achievement scales for mathematics and science. Similar to TIMSS 2023, the fully digital TIMSS assessment will be used in 2024. The group adaptive design introduced in TIMSS 2023 provides the flexibility to cater to the ability level of the subsequent grade levels tested in 2024. This is achieved by using the same item pool as in TIMSS 2023 but allocating a higher proportion of more difficult items for the second measurement in 2024.



ADDITIONAL VARIABLES ILLUMINATING THE CONTEXT OF ACHIEVEMENT GAINS

At the second time point in 2024, a newly developed set of context questionnaires will be administered to students, parents, teachers, and school principals. While the usual TIMSS context questionnaires are aimed at collecting context variables to study cross-sectional associations with student achievement, the context questionnaires for the second time point will be specifically designed to collect information to **test hypotheses about home, classroom, and school factors that may explain achievement gains**.

The context questionnaires administered in 2024 will also incorporate some of the TIMSS 2023 context variables to study changes in time-varying measures of interest, such as students' attitudes towards mathematics and science and school climate.

THE ADVANTAGES OF LONGITUDINAL DATA

MOVING BEYOND CROSS-SECTIONAL STUDIES

The data provided in TIMSS and other international large-scale assessments is a valuable source of information for monitoring system-level trends in learning. The TIMSS Longitudinal Study allows for additional analysis regarding individual learning gains over a single year, and how these gains are associated with context variables. This longitudinal design provides several analytical advantages and expands the range of research questions that can be answered using TIMSS.



A VALID MEASURE OF LEARNING GAINS

With two measurement points, it is possible to calculate changes in the TIMSS achievement scale for groups of students over a one-year period. Learning gains can provide an advantage in international comparisons by accounting for baseline measures of previous achievement in mathematics and science. This new measure gives an **additional view of academic performance** and can highlight, for example, countries making strong learning gains despite relatively lower levels of overall achievement. Furthermore, differences in learning gains can be analyzed in relation to context variables at different levels, including comparisons of country-level data. The potential factors that change the context of learning can be analyzed and related to student achievement as well as to achievement gains, providing additional evidence on their success.



CONTEXTUALIZING DIFFERENCES WITHIN AND ACROSS COUNTRIES

The TIMSS Longitudinal Study will provide a measure of average learning gains over the course of a school year that can be used to contextualize achievement differences across countries and gaps within countries. As an example, the average learning gains measure can be used to relate a 10-point advantage on the TIMSS achievement scale between one group of students and another (e.g., boys and girls) to a measure of schooling. With a measure of average learning gains over the course of a year, such differences can be seen in relation to a typical year of growth for a particular grade level. Similarly, the magnitude of across countries differences can be better understood in terms of these average gains.



NEW KNOWLEDGE ABOUT CONTEXTS OF STUDENT ACHIEVEMENT

The **TIMSS Longitudinal Study expands the range of research questions** that can be answered using TIMSS. For example, do high performing students also have higher learning gains? Furthermore, longitudinal designs provide many analytical advantages. Some cross-sectional studies have found negative associations between homework time and achievement, however it's possible that poor performing students just need to spend

more time on homework. Therefore, it is difficult to interpret this correlation without information on students' prior achievement. Longitudinal studies collect baseline measures, such as prior achievement, to address these kinds of issues. As a result, research can draw more robust inferences about successful practices observed in education systems.



Costs & Funding

Participating countries are required to cover the costs of the study at the national level, and to contribute to the additional costs of coordinating this optional TIMSS Longitudinal Study internationally. The fees are standardized for all participating entities and are expected to be around 100,000 ICUs per population, based on at least ten education systems participating.

BENEFITS OF PARTICIPATION

Participating in the TIMSS Longitudinal Study will provide education systems with high-quality, internationally comparative longitudinal data that can answer important questions about education. On top of the materials received as a part of TIMSS 2023, participants in the TIMSS Longitudinal Study will receive an additional dataset with achievement scores based on the joint analysis of the two time points, as well as an international report on achievement differences between the two measurement points.

With this data, countries will be able to:




- ✓ Make information about achievement growth visible and available to education stakeholders
- ✓ Compare educational quality in a global context using an alternative outcome measure
- ✓ Contextualize achievement gaps and gain insights into how to address them
- ✓ Use longitudinal evidence related to home, classroom, and school features associated with learning gains to inform educational policy decisions
- ✓ Build capacities to conduct longitudinal studies

PARTNERS

The TIMSS Longitudinal Study, a project of IEA, is directed by the TIMSS & PIRLS International Study Center at Boston College. Other partners involved with TIMSS are IEA, RTI, 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.



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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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