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Substantial Percentages of Fourth- and Eighth-Grade Students Worldwide Reach at Least the Low International Benchmarks of Mathematics and Science Achievement in 2023

AMSTERDAM (4 December 2024) — TIMSS 2023 — the eighth cycle of the longest-running, large-scale international assessment of mathematics and science — revealed that substantial percentages of fourth- and eighth-grade students across participating countries demonstrated at least basic knowledge and skills in mathematics and science.

More than 650,000 students in 64 countries and six benchmarking systems around the world participated in TIMSS 2023. These international results are an important resource for researchers, policymakers, and educators to monitor mathematics and science education worldwide. Participating countries use these TIMSS International Benchmarks to monitor the percentage of students demonstrating foundational mathematical and scientific knowledge, and UNESCO uses the Low and Intermediate International Benchmarks to monitor sustainable development goals in education. *“The TIMSS International Benchmarks provide a deeper understanding of student achievement beyond average scores,”* says Matthias von Davier, Executive Director of the TIMSS & PIRLS International Study Center at Boston College. *“They serve as a valuable tool for countries to assess what students know and can do, highlighting strengths and areas for improvement within their education systems. By identifying specific points along the achievement scales, researchers and educators can better understand the distribution of knowledge and skills among students, which is crucial for informed policy-making and educational strategies.”*

Ninety-one percent of fourth-grade students internationally reached at least the Low International Benchmark (400 points on the TIMSS scale) in mathematics, an indication that they demonstrated skills such as adding and subtracting up to three-digit numbers and applying basic properties of geometric shapes. Eighty-one percent of eighth-grade students internationally reached at least this standard, demonstrating knowledge of integers, basic shapes, and visual representations, including finding the lengths of sides in polygons and reading information from graphs. Substantial percentages of students internationally also reached higher international benchmarks of mathematics achievement in both grades.

Similar percentages of fourth- and eighth-grade students reached at least the Low International Benchmarks in science. Ninety percent of fourth-grade students reached at least this standard, having demonstrated knowledge of some science facts, such as basic information about plants and animals and properties of matter in everyday situations. Eighty percent of eighth-grade students reached at least the Low International Benchmark, showing that they can apply knowledge of some science facts, including demonstrating understanding of ecosystems using simple models and distinguishing between physical and chemical changes. Substantial percentages of students internationally also reached higher international benchmarks of science achievement in both grades.

Achievement trends in mathematics and science are reported over time for countries that participated in prior TIMSS cycles and in TIMSS 2023. The previous cycle, TIMSS 2019, occurred before the COVID-19 pandemic disrupted education systems worldwide. The following trends provide insights into students' achievement in mathematics and science as observed in TIMSS 2019 and TIMSS 2023, spanning the period before and after the pandemic:

- For the 49 countries with comparable fourth-grade data in TIMSS 2019, 14 showed an increase in average mathematics achievement in TIMSS 2023, 13 indicated a decrease, and 22 had no change. Trend results are similar for these countries in science, where 15 showed an increase in average achievement, 13 exhibited a decrease, and 21 had no change.
- For the 34 countries with comparable eighth-grade data in TIMSS 2019, only three showed an increase in average mathematics achievement, 14 displayed a decrease, and 17 had no change. The results are similar in science, where again, only three countries showed an increase in average achievement, 15 indicated a decrease, and 16 had no change.

The fourth-grade results demonstrate a balance between increases and decreases in average achievement compared to the eighth grade where more countries showed decreases in average achievement.

TIMSS 2023 also includes a wealth of additional information collected from students, their parents, their teachers, and their principals that contextualizes the achievement results.

Highlights include:

- **There is a clear-cut relationship between home resources, and mathematics and science achievement for fourth- and eighth-grade students internationally.** Students with higher socioeconomic status or rich home resources have substantially higher achievement, on average, than students with lower home socioeconomic status or fewer resources.
- **Frequent absenteeism is associated with lower mathematics and science achievement for fourth- and eighth-grade students internationally, but many students report relatively infrequent absences from school.** On average, a little more than half of fourth-grade students (55 percent) and nearly half of eighth-grade students (46 percent) reported that they are “never or almost never” absent from school. Just over 10 percent of students, on average, in both grades reported being absent “at least once a week,” and these students have substantially lower average achievement in both subjects.
- **Fourth- and eighth-grade students possessing more positive attitudes toward mathematics and science experience higher achievement in those subjects.** Confidence has a strong relationship with achievement in mathematics and science for students in both grades. The association is likely to be reciprocal, i.e., students who perform well in these subjects become more confident, and then continue to perform well.

The *TIMSS 2023 International Results* present numerous visualizations on these and other variables in an interactive, web-based format. Across different exhibits of countries' respective mathematics and science achievement and contextual data, users can select countries of interest, sort data in different ways, and download results in Excel or PDF formats. The *TIMSS 2023 International Results* are complemented by the TIMSS 2023 Encyclopedia, which provides country-level information about education systems and mathematics and science curricula around the world.

The *TIMSS 2023 International Results* include encouraging findings about student achievement but also raise important questions for policymakers. IEA Executive Director Dirk Hastedt stated, ***“Although it is undoubtedly positive that a high percentage of students report relatively infrequent absences from school, it is food for thought that around 1 in 10 students internationally report being absent from school at least weekly. Students who are absent more often tend to have lower achievement levels, and there is a risk that a worryingly high proportion of student populations are disengaging from school at quite a young age.”***

Located at Boston College's Lynch School of Education and Human Development, the TIMSS and PIRLS International Study Center conducts regular international comparative assessments of student achievement in mathematics and science and in reading in more than 60 countries. TIMSS and PIRLS comprise the core cycle of studies for the Amsterdam-based IEA, whose major data processing and research center is located in Hamburg. IEA has been conducting international comparative studies of student achievement since 1959.

For more information about this release, early access to the TIMSS 2023 International Report, or to arrange interviews with IEA Executive Director Dr. Dirk Hastedt, Dr. Thierry Rocher, IEA's chair, or Professor Matthias von Davier, Executive Director of the TIMSS & PIRLS International Study Center in the Lynch School of Education at Boston College, please contact:

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About IEA (International Association for the Evaluation of Educational Achievement)

Founded in 1958, [IEA](http://www.iea.nl) is an independent, international cooperative of national research institutions, governmental research agencies, scholars, and analysts working to research, understand, and improve education worldwide. IEA conducts large-scale studies on diverse topics, including

mathematics, science, reading, civic and citizenship education, and early childhood and teacher education. By linking research, policy, and practice, we support countries to understand effective practices in their education systems and to develop evidence-based policies to improve education.

About the TIMSS & PIRLS International Study Center at Boston College

TIMSS is directed by the [TIMSS & PIRLS International Study Center](http://www.timssandpirlsinternationalstudycenter.org) in the Lynch School of Education at Boston College, working in close cooperation with the IEA and the national centers of the participating countries. TIMSS (Trends in International Mathematics and Science Study) and PIRLS comprise IEA's core cycle of studies measuring achievement in three fundamental subjects—mathematics, science, and reading.