



 IEA  
**TIMSS**  
LONGITUDINAL  
2023 — 2024

# TIMSS 2023 Longitudinal: The Unique Value of Longitudinal Data

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# TIMSS 2023 Longitudinal

*The first-ever student-level longitudinal extension of TIMSS*



Followed the same sample of students from 2023 to 2024 to track their growth directly



Re-administered context questionnaires to explore factors related to rate of growth



## Grade 5 Participants

Georgia  
Italy  
Kosovo  
Montenegro  
North Macedonia  
Slovenia

## Grade 5 and 9 Participants

Jordan  
Korea, Rep. of  
Sweden

# Zooming in on the Pixels: Students Liking Learning

From TIMSS 2023, we know for example:

Across questions relating to liking mathematics and science, **a greater share of students reported that they do not like learning the subjects in grade 8 than in grade 4**



# Zooming in on the Pixels: Students Liking Learning

Now from TIMSS-L, we discover:

- In all nine participating education systems, **the percentage of students who reported that they very much like learning mathematics and science dropped between Grade 4 and Grade 5**
- In seven of the participating education systems, **Grade 5 students reporting that they do not like learning mathematics had lower average growth in achievement, compared to those who reported liking the subject**
- In Korea and Sweden, we saw **increases in the percentage of students who reported that they very like learning mathematics between Grade 8 and Grade 9**





## WHO LIKES LEARNING MATHEMATICS?

### Findings from TIMSS 2023 Longitudinal: Girls' and Boys' Enjoyment in the Fourth and Fifth Grades

Do both boys and girls enjoy learning mathematics as they progress through school? Research suggests there is an association between students' enjoyment of learning mathematics and their achievement, although the direction of influence is less clear.<sup>1,2</sup> TIMSS (Trends in International Mathematics and Science Study) 2023, found that, on average, boys have higher achievement in mathematics than girls in the majority of participating education systems. Other research has also presented similar findings.<sup>3,4,5</sup> Given this general link between liking mathematics and achievement, possible gender differences in the enjoyment of mathematics deserve attention. This *Teacher Snippet* will dive further into this topic using IEA's TIMSS 2023 Longitudinal Study.

In TIMSS 2023 Longitudinal, the same students participated in the study in the fourth grade, and one year later in the fifth grade, providing unique opportunities to look into changes in mathematics achievement and attitudes over time.

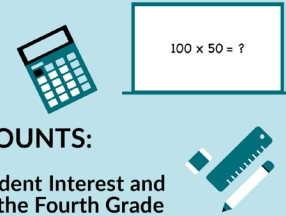
#### What TIMSS 2023 Longitudinal found

TIMSS 2023 asked students if they *agree a lot*, *agree a little*, *disagree a little*, or *disagree a lot* with seven statements about learning mathematics. Their responses were combined to create scores to classify students into three categories: those who *very much like*, *somewhat like*, and *do not like* learning mathematics.

Asking students to respond to multiple statements leads to a more comprehensive and reliable understanding of their attitudes toward mathematics compared to asking them to respond to a single question. If students provide similar responses to a set of items, there can be more confidence that the score resulting from all the responses together accurately represents their feelings about learning mathematics.

Figure 1: Students Like Learning Mathematics scale

How much do you agree with these statements about learning mathematics?	Agree a lot	Agree a little	Disagree a little	Disagree a lot
1) I enjoy learning mathematics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2) I learn many interesting things in mathematics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3) I like mathematics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4) I like any schoolwork that involves numbers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5) I like to solve mathematics problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6) I look forward to mathematics lessons	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7) Mathematics is one of my favorite subjects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



## LIKING MATHEMATICS COUNTS:

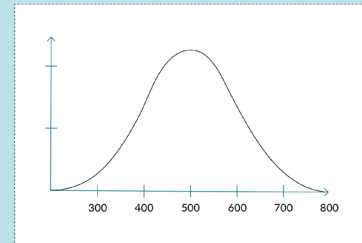
### Results from TIMSS 2023 on Student Interest and Achievement in Mathematics at the Fourth Grade

Young children frequently show interest in learning and curiosity about the natural world, both in and out of formal schooling.<sup>1,2,3</sup> It is often observed that when primary school students exhibit positive attitudes toward learning mathematics, there is a positive impact on their achievement in the subject.<sup>4</sup> The enjoyment of learning mathematics is important at this stage and can lead to future interest in the subject as students progress through their education and beyond.<sup>5</sup>

This *Teacher Snippet* highlights findings from IEA's TIMSS 2023 (Trends in International Mathematics and Science Study) about how much fourth-grade students internationally like learning mathematics and how this relates to their achievement on the TIMSS mathematics assessment.

#### How do we know that fourth-grade students like learning mathematics?

TIMSS 2023 collected data from representative samples of students within each country, and the results reflect national populations. The sampled students completed the TIMSS mathematics assessment and the accompanying context questionnaire that asked about students' experiences and attitudes.



The TIMSS mathematics assessment contains items (questions) based on an internationally agreed-upon framework of mathematics topics taught widely to fourth-grade students. The mathematics topics represent the areas: Number, Measurement and Geometry, and Data. The assessment items form the basis of the overall mathematics achievement scores. Most countries show an average student achievement between 450 and 550 points, but a few countries' average achievement scores reach values slightly below 400 or slightly above 600.

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our *IEA Teacher  
Snippets* here



# Context is Key

- Learning gains varied significantly between and within countries
- **No easy answers**
- Contextual factors that relate to learning are crucial to investigate
- TIMSS-L unlocks huge potential for further analysis
- The work starts here!



# Context is Key – Longitudinal Insights

- Across nearly all countries and grade levels, **students who reported frequent bullying showed less growth and lower average scores in mathematics and science**
- **Students who reported a higher sense of well-being tended to demonstrate higher growth in achievement across one school year** than their peers who reported a lower sense of well-being
- **Students who reported they were often absent from school showed less growth** and lower achievement in both mathematics and in science



# Can We Finally Answer...

“How many scale score points are associated with one year of learning?”



# Considering the FAQ

...how many scale score points are associated with one year of learning?

- One of the most frequently asked questions after every study release—**can we attach a measurement of time to a specific number of scale score points?**
- TIMSS Longitudinal participants now can!
- Example: Sweden saw the average change in learning achievement for mathematics from Grade 4 to Grade 5 was an increase of 30 points
- Gaps in achievement across a whole range of variables can be described in tangible terms
- However, again, no easy answers internationally—Countries need to participate to unlock the full value!





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Thank you!

