



Researching education, improving learning

TIMSS 2023: GEORGIA ON THE GLOBAL EDUCATION MAP

STUDENT ACHIEVEMENT, TRENDS, AND CHALLENGES

SERIES #1

Lessons from
TIMSS 2023

About the Series

TIMSS 2023: Georgia on the Global Education Map

High-quality and equally accessible education in mathematics and science plays a decisive role in a student's future success. To understand how close an education system is to achieving this goal, it is essential to have large-scale, regular, and reliable assessments of academic achievement, teaching and learning processes, and access to education. International studies play a crucial role in this regard, including TIMSS (Trends in International Mathematics and Science Study), which evaluates the quality and outcomes of teaching and learning in mathematics and science. This study is conducted in more than 60 countries and enables policymakers and education system representatives to make data-driven decisions and ensure access to high-quality science and mathematics education for all students.

The digital revolution, technological progress, and remarkable discoveries are transforming the global context and placing new challenges before educational institutions. Accordingly, reforming education systems and adapting them to the accelerated pace of the modern world becomes a priority—something that is impossible without educational policies grounded in in-depth and contextual research. TIMSS provides a unique opportunity in this respect.

This is the first series of the national report on TIMSS 2023. It presents student achievement results in mathematics and science from the 2023 cycle of TIMSS. The information provided here is descriptive in nature and primarily based on the international report prepared by the International Association for the Evaluation of Educational Achievement (IEA). It allows us to evaluate the performance of Georgian students within a global context (<https://www.iea.nl/studies/iea/timss/timss2023>).

Georgia has been participating in TIMSS since 2007. This series also analyzes the dynamics in student academic achievement over the period from 2007 to 2023. The presented data reflect both progress and existing challenges, offering an evidence-based framework to understand where we stand today, the path we have taken, and how we can act to build a better education system in the future.

The results of TIMSS 2023 serve as a guide for systemic change. The evidence presented in this series can become an important reference point not only for shaping education policy but also for improving the quality of learning at the school level, as it clearly reveals the weaknesses in the teaching and learning process. The study highlights the urgent need to seek pathways for systemic improvement, which involves revisiting and developing both education policy and school practices to ensure the success of every student.

To learn about the research findings and a brief summary, please find the [summary](#).

The report was prepared by the National Center for Educational Research (NCER)



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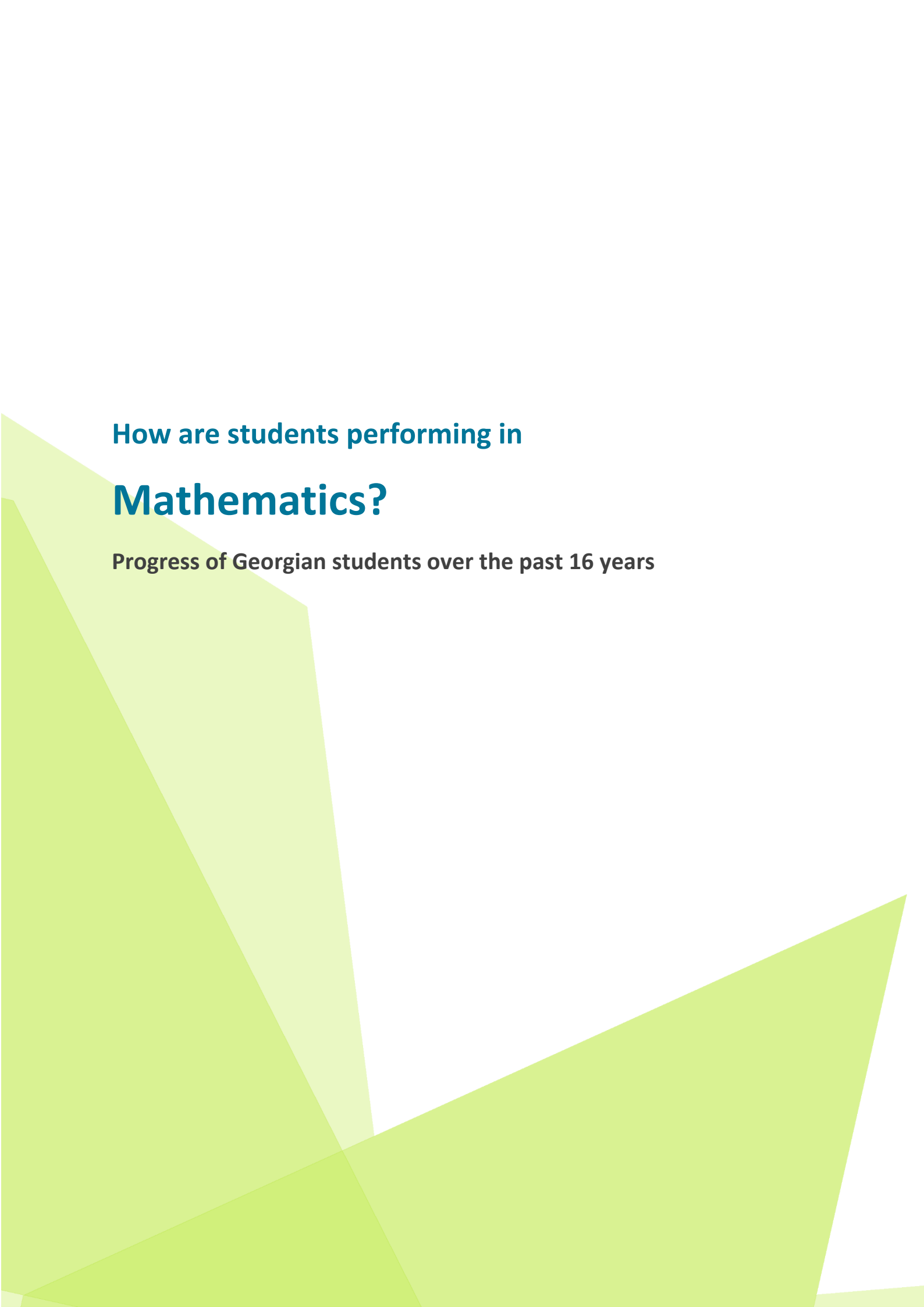
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Participating countries (map)





How are students performing in

Mathematics?

Progress of Georgian students over the past 16 years

Country Rankings Based on Student Achievement

Where Do We Stand in the Global Educational Space, and How Are Students' Academic Achievements in Mathematics Changing?

This chapter presents the evidence and the global ranking based on students' mathematics achievements from the TIMSS 2023 assessment. It includes the results of countries and regions that participated in TIMSS-2023 and highlights Georgia's accomplishments, challenges, and development potential in mathematics teaching and learning.

We begin with the ranking list based on student achievement. This ranking shows the 2023 average mathematics scores of the participating countries and regions. The countries are arranged in descending order of their average scores.

Primary Level

International results: In 2023, the **average mathematics achievement of fourth-grade students** across all participating countries was 503 points (standard error 0.5). According to the ranking, the top five performers in mathematics at both the fourth- and eighth-grade levels are East Asian countries—Singapore, Chinese Taipei, Korea, Hong Kong, and Japan. Their average achievement scores surpass the international mean by 100 points or more.

Georgia's results: Georgian fourth-graders had an average score of 498 (standard error 3.1), which is very close to both the TIMSS scale average of 500 and the international average of 503, calculated from the participating countries' mean scores. With 95% confidence, we can say the performance of Georgian fourth-graders ranges between 492 and 504 points, indicating their achievement is at the international average level.

Basic Level

Georgian eighth-graders had an average score of 467 (standard error 3.2). With 95% confidence, their scores fall between 460 and 473 points. This is significantly below both the TIMSS scale average (500) and the international average (478).

Clarifications Regarding Statistical Indicators Used in the Study

Average Achievement

In the TIMSS assessment, students' test scores are placed on a **standardized scale with an average of 500 and a standard deviation of 100**. All student scores are converted to this scale, which remains unchanged in every cycle, enabling countries to assess progress over time.

In addition to this fixed scale, TIMSS also reports the **international average** of the participating countries in a specific cycle. This average may change from cycle to cycle depending on factors such as new countries joining or changes in existing participants' performance. The key difference between these two indicators is that the TIMSS scale average (500) is fixed for long-term comparability, while the international average of countries varies depending on the year's participants.

Assessment Accuracy

There is no perfectly precise way to measure achievement—some level of error is always present. In TIMSS, assessment error arises mainly from two factors:

- **Sampling Error** – Not all students in the target population take part; the results are based on a sample. This means the results may differ slightly from the actual performance of the full population. Such sampling error is unavoidable and must be considered in interpreting results.
- **Measurement Error** – Each student participating in the study completes only a portion of the TIMSS test items, which are included in the booklet assigned to them (it is not possible to complete all TIMSS items or all possible tasks within the time allocated for testing). Accordingly, an individual student's results reflect only the scores obtained from the test items they completed. This leads to what is known as measurement error. We do not know what the student's score would have been had they completed all the tasks. This type of error must be carefully considered during the analysis and interpretation of results.

Due to these factors, average scores are always presented with a standard error. Therefore, when a country's average score and ranking are reported, they are approximate and include a margin of error. Results are typically shown with a 95% confidence interval.

TIMSS is a cross-cultural, comparative study aimed at providing a fair and objective comparison of students' academic achievement across different countries. To achieve this, the study includes a **Test-Curriculum Matching Analysis (TCMA)**, which examines the alignment between the test items and the national curricula. Limiting the assessment to only those items taught uniformly across all countries would significantly reduce the scope of coverage and undermine the research objectives of TIMSS. The alignment of TIMSS 2023 items with national subject curricula varies across countries. The overall picture in mathematics is as follows:

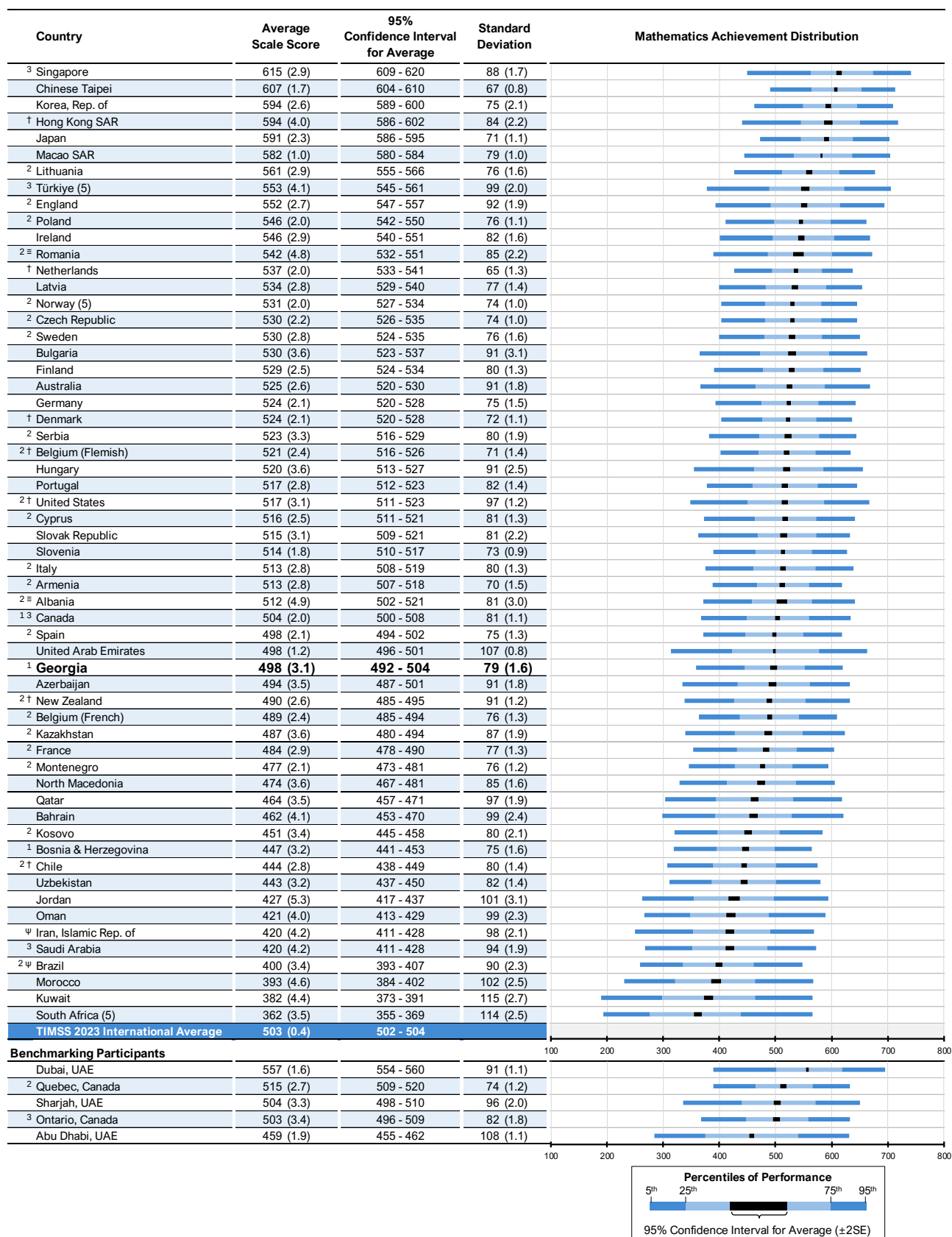
- **Grade 4:** Among 51 countries, 39 countries and 2 benchmarking regions have at least a 75% alignment between the TIMSS test and their national curriculum. Several countries demonstrate 100% alignment (9 out of 51 participating countries and 3 out of 5 benchmarking participants).
- **Grade 8:** Among 39 participating countries, 7 countries and all benchmarking participants show 100% alignment. All remaining countries report at least 75% alignment between test items and the national curriculum.

In Georgia's case, there is significant alignment between the "TIMSS curriculum" and the national curriculum in mathematics for both Grade 4 and Grade 8. The national curriculum covers a substantial portion of the content areas assessed by the TIMSS achievement test—with an alignment of 81% in Grade 4 and 93% in Grade 8. Despite these results, the national mathematics curriculum will need to be updated in the long term. It should better integrate topics that are represented in the TIMSS assessment but are either absent or only minimally addressed in the current national curriculum (<https://timss2023.org/results/appendices/#appendixC>). We believe this will lay a positive foundation for improving the content of instruction and enhancing students' competitiveness in the context of international assessments.

It is also worth noting that Georgian fourth-graders performed better than eighth-graders, even though the eighth-grade curriculum had a higher alignment with the TIMSS framework. This suggests that **curriculum alignment alone is not enough for high achievement**. Other factors such as teaching quality, methodology, and a learning-centered environment play a critical role. **TCMA results also indicate that, in most cases, the selection of test items does not significantly affect countries' relative performance**. Countries that demonstrated high or low achievement in mathematics and science based on all items maintained a similar ranking even when the assessment was based only on tasks aligned with their national curricula¹.

¹ Although the rankings of some countries changed slightly within the TIMSS framework, these differences mostly fell within the margin of sampling error.

Illustration 1: Average Mathematics Achievement and Scale Score Distributions (Grade 4)



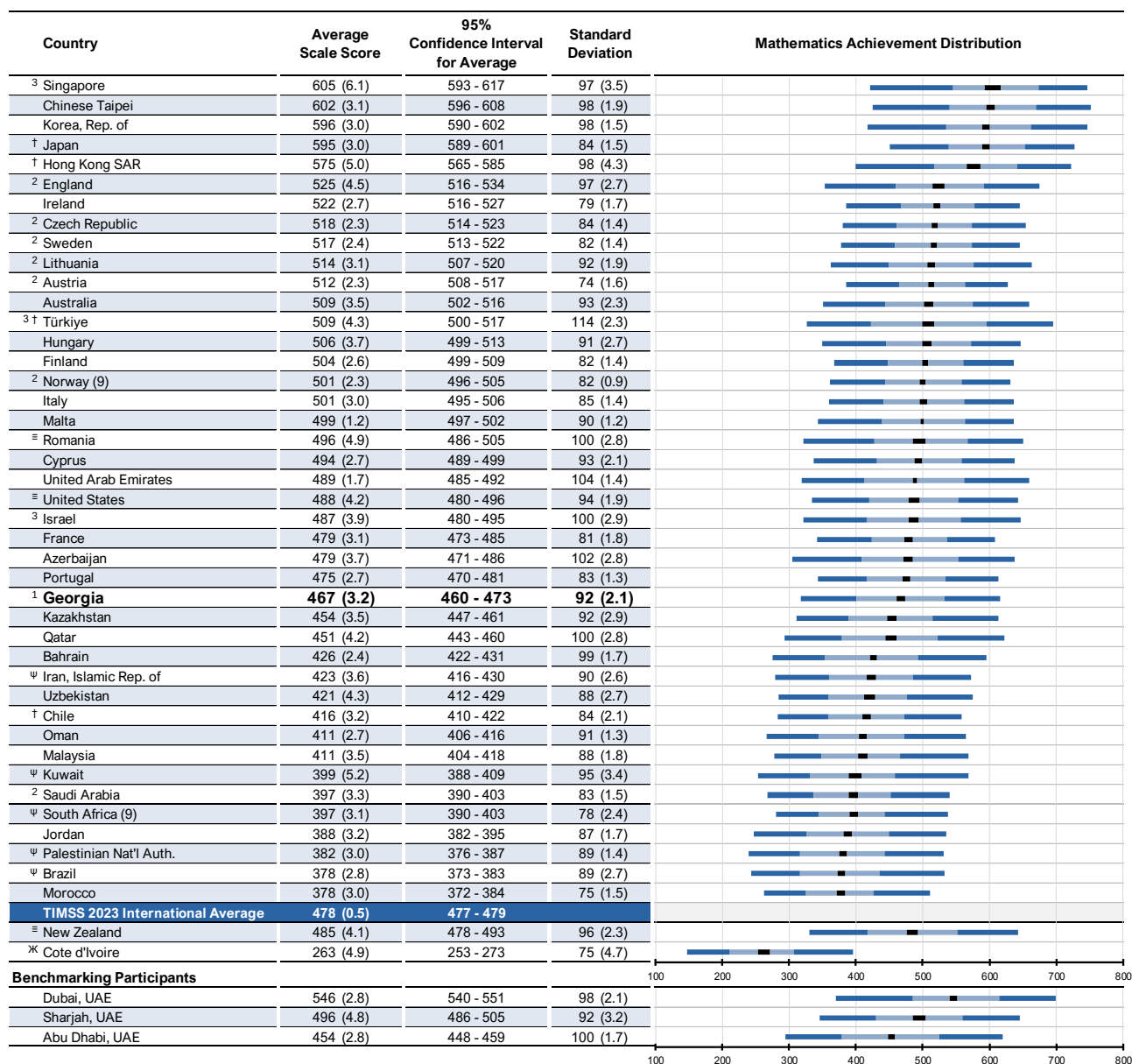
The TIMSS achievement scale was established in 1995 based on the combined achievement distribution of all countries that participated in TIMSS 1995. To provide a point of reference for country comparisons, the scale centerpoint of 500 was located at the mean of the combined achievement distribution. The units of the scale were chosen so that 100 scale score points corresponded to the standard deviation of the combined achievement distribution.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

Illustration 2. Average Mathematics Achievement and Scale Score Distributions (Grade 8)



The TIMSS achievement scale was established in 1995 based on the combined achievement distribution of all countries that participated in TIMSS 1995. To provide a point of reference for country comparisons, the scale centerpoint of 500 was located at the mean of the combined achievement distribution. The units of the scale were chosen so that 100 scale score points corresponded to the standard deviation of the combined achievement distribution.

([†]) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes [†], [‡], and [≡].

^ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

[✕] Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

New Zealand did not satisfy guidelines for minimum school participation rates. Achievement could not be reliably estimated for Cote d'Ivoire.

International Achievement Benchmarks

Student performance on the TIMSS test is reflected through various indicators. One of the most illustrative indicators is the distribution of student achievement according to the established achievement benchmarks (levels). The TIMSS scale is divided into four achievement benchmarks: Advanced, High, Intermediate, and Low:

- Advanced benchmark: 625 points and above
- High benchmark: 550-624 points
- Intermediate benchmark: 475-549 points
- Low benchmark: 400-474 points

The four-level achievement system used by TIMSS enables a deeper and more detailed analysis of student performance, making it a valuable tool for improving education systems. When assessing students' academic results, the **average score** provides only a general overview—it shows the average level of student achievement in a given country but does not reveal how these results are distributed among students. In this regard, **the benchmark system significantly expands the possibilities for analysis**. The four-level structure (low, intermediate, high, and advanced) reflects not only the quantitative measure of student achievement but also offers a qualitative perspective — for example, what proportion of students in a country possess deep, systematic knowledge and can handle complex tasks (advanced level), or what proportion of students are unable to solve even the tasks designed for the lowest benchmark. Therefore, by using benchmarks, it becomes possible to conduct a differentiated analysis of student achievement levels across different groups. This, in turn, allows for the planning of education policy that not only aims to improve average results but also targets specific student groups — offering more practical support in both policymaking and instructional planning.

What is the distribution of Georgian students in mathematics according to the achievement benchmarks, and what trends emerge in this regard based on data from TIMSS 2007–2023?

The illustrations below show the distribution of students across achievement benchmarks. Cumulative percentages are used for the analysis. This means, for example, that a student who meets the high benchmark also successfully completes tasks corresponding to the intermediate and low benchmarks. Conversely, a student at the **low benchmark** can only handle tasks at that level. By grouping students according to benchmarks, it is possible to identify a particularly concerning group of students who, due to a lack of minimum competencies, struggle even with tasks at the low benchmark.

The illustrations show that:

Primary Level (Grade 4):

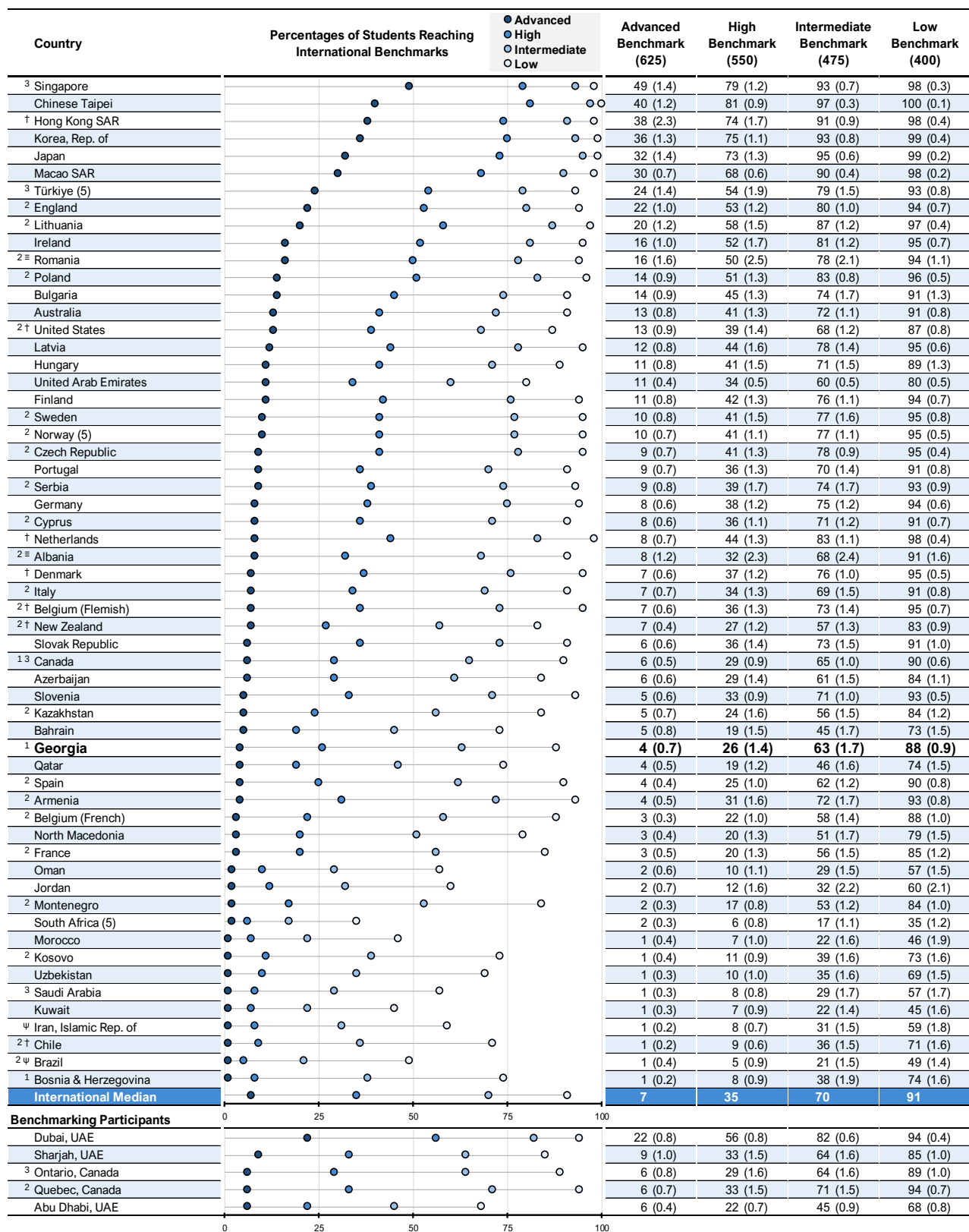
- 4% of Georgian fourth-grade students reached the advanced benchmark, 26% reached the high benchmark, 63% reached the intermediate benchmark, 88% reached the low benchmark. This means that 12% of fourth graders in Georgia are unable to successfully complete tasks at the low benchmark level.

Basic Level (Grade 8):

- 4% of students reached the advanced benchmark, 19% reached the high benchmark, 47% reached the intermediate benchmark, 75% reached the low benchmark. 25% of eight graders in Georgia are unable to successfully complete tasks at the low benchmark level.

If we compare the results to international trends (see attached Illustrations 3 and 4, which present international median indicators), we can see that the proportion of students in Georgia with high academic achievement is relatively low, while the share of students who fail to demonstrate even basic knowledge is significantly higher compared to international data. The proportion of students at the advanced and high benchmarks is low in both grades, meaning only a small segment of students demonstrate outstanding academic achievement. The data clearly show that the majority of both fourth- and eighth-grade students remain within the intermediate or low benchmarks. Particularly alarming is the fact that in Grade 4, more than 1 in 10 students (12%) and in Grade 8, 1 in 4 students (25%) cannot complete even the simplest tasks. There is a clearly visible trend of **increasing academic underperformance from the primary to the lower secondary level** — the number of students who fail to complete basic tasks nearly doubles from Grade 4 to Grade 8. This trend suggests that schools lack effective mechanisms for timely identification and support of struggling students. Obviously, when students are not supported adequately at an early stage, their academic progress is significantly hindered.

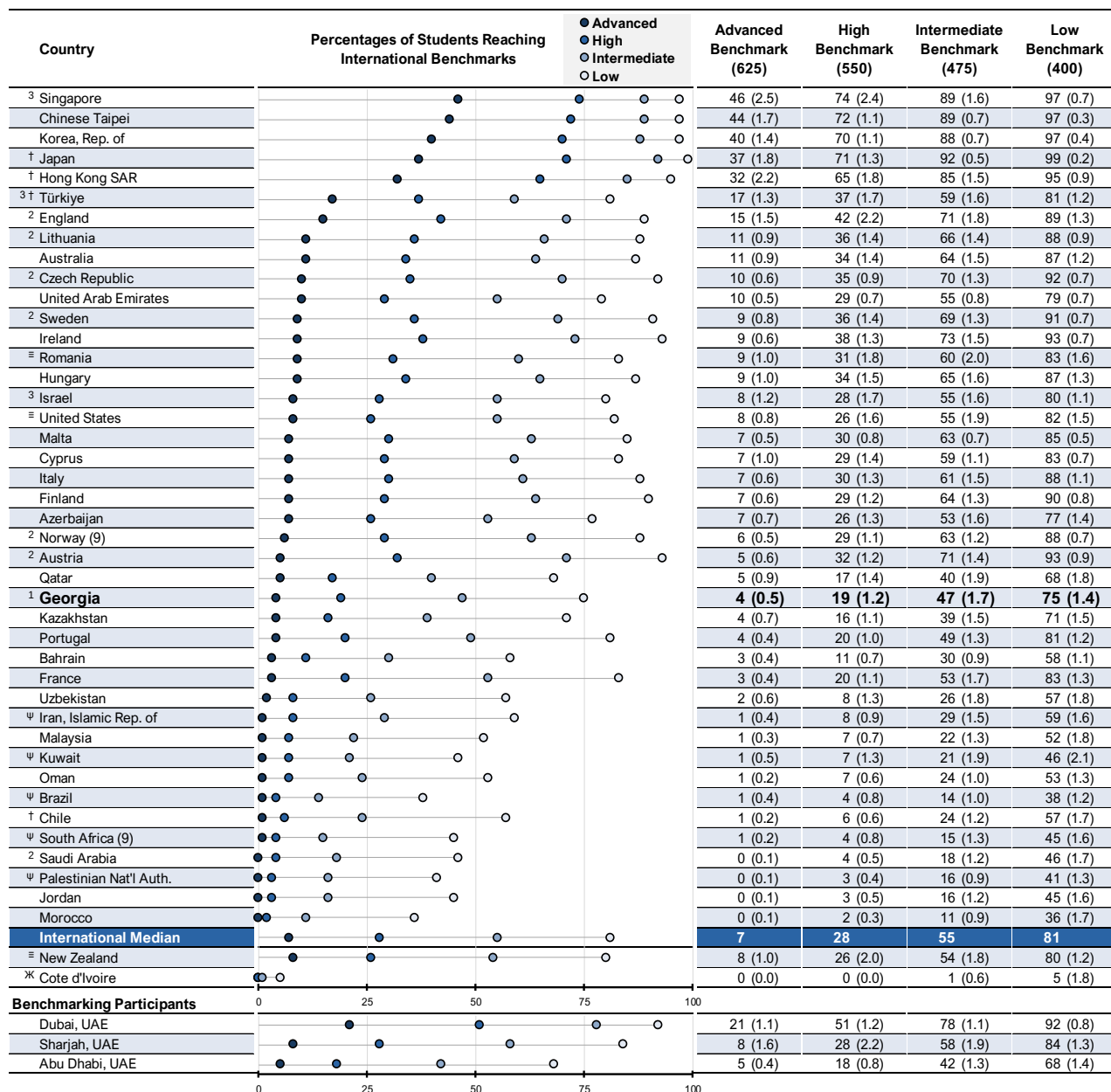
Illustration 3. Percentages of Students Reaching the TIMSS International Benchmarks of Mathematics Achievement (Grade 4)



() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and =.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

Illustration 4. Percentages of Students Reaching the TIMSS International Benchmarks of Mathematics Achievement (Grade 8)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.

^ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

[✱] Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

New Zealand did not satisfy guidelines for minimum school participation rates. Achievement could not be reliably estimated for Cote d'Ivoire.

The analysis of student performance in Grades 4 and 8 reveals significant gaps in the teaching and learning of mathematics, which hinder students' full development and academic success. To identify the underlying causes of these issues, we use collected information on contextual and environmental factors, which is presented in other sections of the TIMSS national report. It is important to highlight here that early detection of learning gaps and targeted intervention are critically important in order to prevent more widespread problems. The findings clearly indicate the urgent need to strengthen inclusive practices and invest in teacher professional development so that all students have the opportunity to receive a quality education and reach their full potential.

Achievement Trajectory: How Have Georgian Students' Math Results Changed from 2007 to 2023?

TIMSS enables long-term monitoring of education systems around the world and allows us to track student progress over extended periods. Georgia first participated in TIMSS in 2007 and has since taken part in five cycles (2007, 2011, 2015, 2019, and 2023), offering a unique opportunity to assess trends in student progress and identify changes in the education system over time.

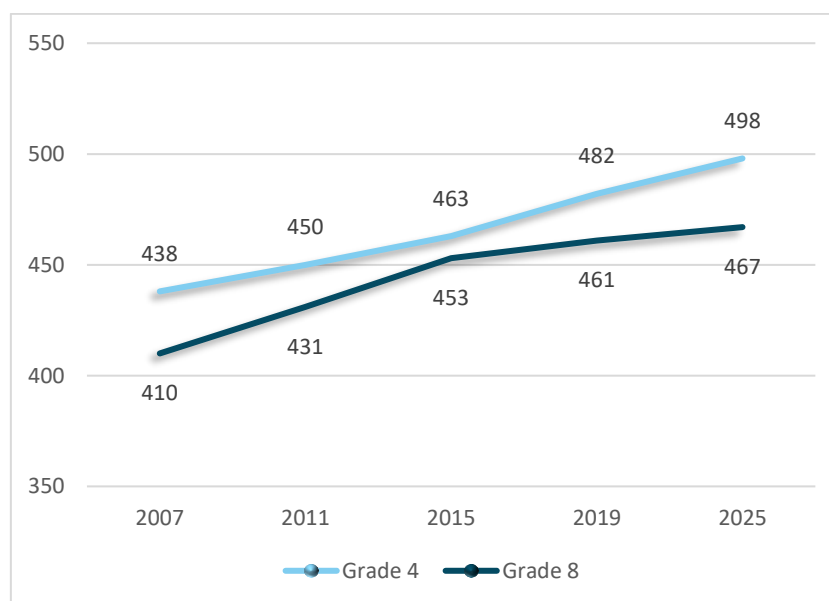
How have Georgian students' mathematics results changed from 2007 to 2023?

Examining long-term trends in achievement allows us to evaluate the effectiveness of educational reforms and policies implemented in the country, understand shifts in student preparedness, and determine future directions for system improvement. TIMSS results are also essential for assessing the country's position in an international context.

Over the past 16 years, both Grade 4 and Grade 8 students in Georgia have demonstrated progress. As the accompanying illustration shows, in 2023, Georgian fourth-graders scored 60 points higher in mathematics compared to 2007. Importantly, in every TIMSS cycle, the improvement in the average score of Grade 4 students has been **statistically significant**. Grade 8 students improved their average achievement by 57 points since 2007. For this group, statistically significant improvements were observed in the 2011 and 2015 cycles; however, since 2015, the trend appears to have plateaued – the pace of improvement has slowed, and the difference from the previous cycle is not statistically significant. In contrast, the progress among fourth-graders has remained steady since 2007.

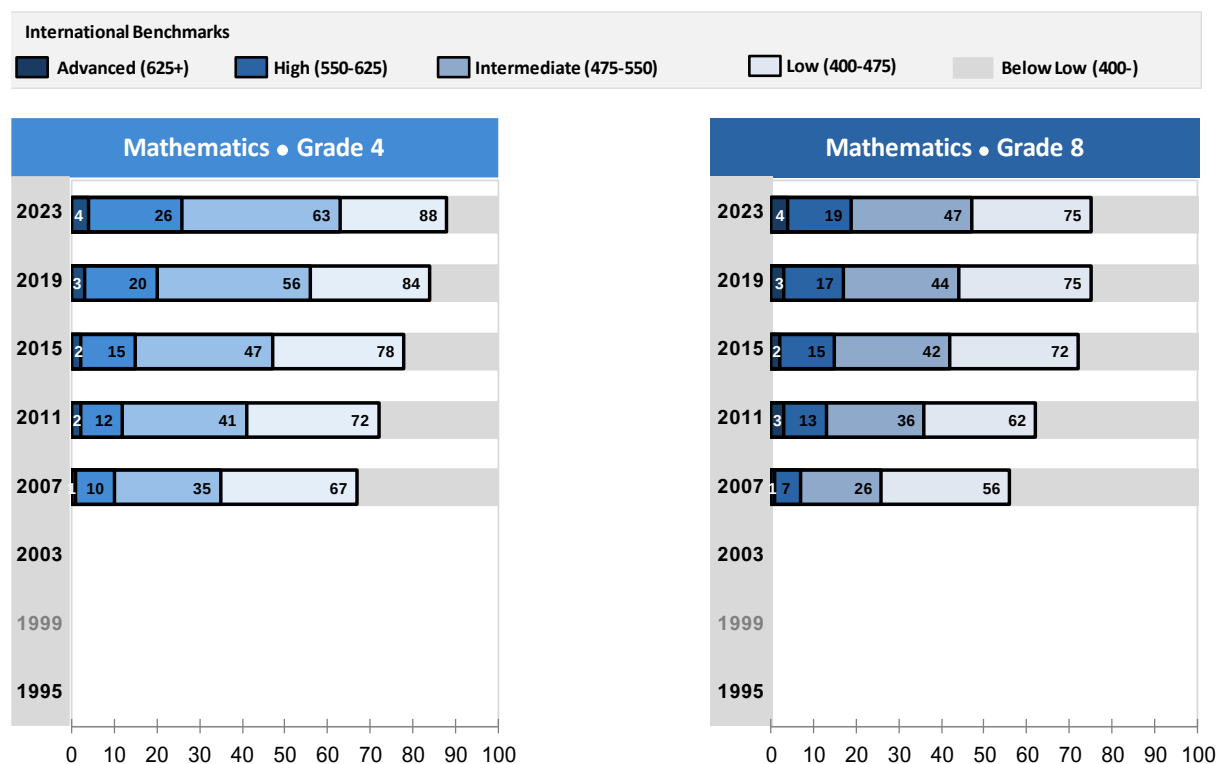
It is also noteworthy that even in the first TIMSS cycle, Grade 4 students, while achieving modest results, outperformed Grade 8 students. Across all cycles, a consistent performance gap is evident between the two grades – fourth-graders not only achieve higher results but also show a clearer upward trend in performance between 2015 and 2023 compared to eighth-graders.

Illustration 5. Trends in Georgian Students' Mathematics Achievement



The illustration below shows the cumulative percentages of Georgian fourth- and eighth-grade students in mathematics who, in each study cycle, reached the low, intermediate, high, or advanced benchmark of achievement.

Illustration 6. Trends in Distributions of Students Reaching the TIMSS International Benchmarks of Mathematics Achievement (2007–2023)



The illustration shows that the situation has gradually improved since 2007. Most importantly, the proportion of students who are unable to complete even the tasks at the low benchmark level (indicated in grey in the illustration) is decreasing. For example, in 2007, 33% of 4th-grade students fell into this category, whereas by 2023, the figure had dropped to 12%. Accordingly, the proportion of students reaching the low, intermediate, high, and advanced benchmarks has increased. This progress indicates a *positive trend* in the quality of school education. However, the continued presence of low-achieving students remains a concern and calls for targeted interventions, especially in the 8th grade.

The trends observed in the TIMSS results serve as an important signal for policymakers — future education policy steps should be based on achievement analysis and an assessment of the factors influencing both progress and ongoing challenges.

Student Achievement by Content Domains in Mathematics

TIMSS evaluates student achievement across different content domains in mathematics, allowing for a detailed assessment of various components of mathematical knowledge and helping identify students' strengths and weaknesses in specific areas.

In Grade 4, the content domains assessed are: Numbers, Measurement and Geometry, Data representation. In **Grade 8**, the assessed domains are: Numbers, Algebra, Geometry and Measurement, Data and probability.

The illustrations below present the average scores of participating countries for each content domain, compared to the country's overall mathematics score (used for international ranking). If students' knowledge in a specific content area falls below their overall average level, this may be interpreted as a relatively weak aspect of subject knowledge that requires greater attention and targeted development.

Primary Level:

An analysis of Georgian students' performance in different mathematical domains shows that 4th-grade students perform particularly well in the number's domain — scoring 512 points (standard error 3.0). This is higher than their average overall mathematics score. This indicates that solving number-related tasks is a relatively strong area for them, whereas in other areas of mathematics. For instance, in geometric shapes, measurement, and data representation their achievements are more modest — the average scores in these areas are lower than their overall mathematics score.

Basic Level:

In Grade 8, Georgia also shows relatively better performance in numbers and algebra, where students' scores exceed the country's overall average score. The most problematic area is data and probability, where Georgia records one of the lowest results among participating countries. The average score in this domain is significantly below the national average mathematics score, with a gap of 33 points. This points to serious challenges in the quality of teaching and learning in these content areas and calls for additional attention to improving subject curricula and providing stronger pedagogical support.

Content Domains: Comparative Analysis in the International Context**Grade 4:**

- **Numbers:** In this domain, 21 countries (including Georgia) have scores significantly higher (▲) than their overall mathematics score in this domain, and 15 countries have lower scores (▼).
- **Measurement and Geometry:** 16 countries perform statistically better, and 17 countries (including Georgia) perform worse than their overall score.
- **Data representation:** 17 countries perform better, and 25 countries (including Georgia) perform worse than their overall score.

Grade 8:

- **Numbers:** 14 countries (including Georgia) score higher, and 11 countries score lower than their overall average.
- **Algebra:** 16 countries (including Georgia) score higher, and 13 countries score lower than their overall average.
- **Geometry and Measurement:** 10 countries score higher, and 17 countries (including Georgia) score lower than their overall average.
- **Data and probability:** 14 countries score higher, and 23 countries (including Georgia) score lower than their overall average.

As a summary, it should be noted that these data indicate that mathematics teaching and learning in Georgia has both strengths and weaknesses. It is evident that more emphasis should be placed on improving the areas where students perform relatively poorly in order to ensure balanced development of mathematical skills.

Illustration 7. Relative Achievement in Mathematics Content Domains (Grade 4)

Country	Overall Mathematics Average Scale Score	Number (94 Items)		Measurement and Geometry (49 Items)		Data (40 Items)	
		Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score
³ Singapore	615 (2.9)	613 (2.9)	-1 (0.8)	619 (3.1)	4 (0.8) ▲	616 (3.5)	1 (1.9)
Chinese Taipei	607 (1.7)	602 (1.6)	-5 (0.7) ▼	622 (1.8)	15 (1.1) ▲	601 (2.0)	-6 (1.2) ▼
Korea, Rep. of	594 (2.6)	586 (2.7)	-8 (1.4) ▼	605 (2.7)	11 (0.9) ▲	606 (3.0)	12 (2.3) ▲
[†] Hong Kong SAR	594 (4.0)	598 (4.2)	4 (1.1) ▲	598 (4.5)	4 (1.7)	588 (4.0)	-6 (1.3) ▼
Japan	591 (2.3)	581 (2.3)	-9 (1.0) ▼	605 (2.7)	15 (1.2) ▲	598 (2.5)	7 (1.5) ▲
Macao SAR	582 (1.0)	578 (1.0)	-4 (0.8) ▼	591 (1.2)	9 (1.0) ▲	583 (1.2)	1 (0.8)
² Lithuania	561 (2.9)	562 (2.9)	1 (0.9)	556 (3.0)	-5 (1.5) ▼	567 (3.2)	6 (1.1) ▲
³ Türkiye (5)	553 (4.1)	550 (4.5)	-3 (1.8)	557 (4.4)	3 (1.3)	556 (3.9)	3 (1.8)
² England	552 (2.7)	556 (2.9)	4 (1.6)	539 (3.2)	-13 (1.6) ▼	561 (3.5)	9 (2.6) ▲
² Poland	546 (2.0)	541 (2.3)	-5 (1.0) ▼	557 (2.5)	11 (1.2) ▲	546 (2.4)	0 (1.7)
Ireland	546 (2.9)	548 (3.0)	2 (1.3)	540 (3.2)	-5 (1.9) ▼	546 (3.2)	0 (1.7)
² Romania	542 (4.8)	552 (5.0)	10 (1.4) ▲	538 (5.2)	-4 (1.5)	519 (5.4)	-23 (1.9) ▼
[†] Netherlands	537 (2.0)	536 (2.2)	-1 (1.2)	534 (2.8)	-3 (2.2)	544 (2.4)	7 (1.4) ▲
Latvia	534 (2.8)	533 (2.9)	-1 (1.8)	540 (3.1)	6 (1.4) ▲	532 (3.1)	-2 (1.7)
² Norway (5)	531 (2.0)	530 (2.2)	0 (1.2)	526 (2.6)	-5 (2.0)	537 (2.1)	6 (1.1) ▲
² Czech Republic	530 (2.2)	534 (2.1)	4 (1.0) ▲	537 (2.0)	6 (1.1) ▲	512 (2.9)	-19 (2.1) ▼
² Sweden	530 (2.8)	527 (2.6)	-3 (1.0) ▼	532 (2.8)	2 (1.6)	535 (3.0)	6 (1.4) ▲
Bulgaria	530 (3.6)	545 (3.3)	15 (0.9) ▲	527 (3.9)	-3 (2.0)	506 (4.8)	-24 (2.2) ▼
Finland	529 (2.5)	522 (2.6)	-7 (0.9) ▼	539 (2.7)	9 (1.5) ▲	536 (3.0)	7 (0.9) ▲
Australia	525 (2.6)	520 (2.7)	-5 (1.2) ▼	522 (3.0)	-3 (1.7)	540 (2.7)	15 (1.4) ▲
Germany	524 (2.1)	524 (2.5)	0 (1.4)	527 (2.3)	4 (1.3) ▲	520 (2.6)	-3 (1.2) ▼
[†] Denmark	524 (2.1)	516 (2.3)	-8 (0.8) ▼	530 (2.1)	6 (1.2) ▲	532 (2.3)	8 (1.3) ▲
² Serbia	523 (3.3)	529 (3.3)	6 (1.0) ▲	524 (3.8)	1 (2.1)	505 (4.0)	-18 (2.5) ▼
² Belgium (Flemish)	521 (2.4)	513 (2.3)	-8 (0.9) ▼	536 (3.0)	15 (1.3) ▲	524 (2.7)	3 (1.2)
Hungary	520 (3.6)	527 (3.4)	7 (1.4) ▲	516 (3.7)	-4 (2.1)	504 (3.9)	-16 (1.5) ▼
Portugal	517 (2.8)	516 (2.8)	-1 (1.1)	510 (3.0)	-8 (1.0) ▼	528 (3.0)	10 (1.9) ▲
² United States	517 (3.1)	523 (3.1)	6 (1.0) ▲	499 (3.3)	-18 (1.2) ▼	519 (3.1)	3 (0.9) ▲
² Cyprus	516 (2.5)	527 (2.3)	10 (0.8) ▲	508 (2.6)	-8 (0.9) ▼	501 (3.2)	-15 (1.5) ▼
Slovak Republic	515 (3.1)	518 (2.9)	3 (1.3)	513 (3.0)	-2 (1.5)	508 (3.7)	-7 (2.5) ▼
Slovenia	514 (1.8)	513 (1.9)	-1 (1.6)	515 (2.0)	2 (1.6)	515 (2.2)	1 (1.5)
² Italy	513 (2.8)	515 (2.7)	2 (1.0)	512 (3.3)	-1 (2.2)	505 (3.4)	-8 (1.6) ▼
² Armenia	513 (2.8)	530 (2.7)	17 (1.3) ▲	507 (3.1)	-5 (1.7) ▼	470 (3.2)	-43 (1.4) ▼
² Albania	512 (4.9)	520 (4.9)	8 (1.3) ▲	512 (5.2)	1 (1.8)	488 (5.7)	-24 (3.2) ▼
¹ Canada	504 (2.0)	501 (2.1)	-3 (0.7) ▼	499 (2.2)	-5 (0.7) ▼	515 (2.3)	11 (0.7) ▲
² Spain	498 (2.1)	497 (2.3)	-2 (0.7)	497 (2.4)	-1 (1.4)	502 (2.2)	4 (1.2) ▲
United Arab Emirates	498 (1.2)	501 (1.1)	3 (0.5) ▲	489 (1.5)	-9 (0.6) ▼	498 (1.5)	0 (0.5)
¹ Georgia	498 (3.1)	512 (3.0)	14 (1.4) ▲	482 (3.9)	-16 (1.8) ▼	476 (3.3)	-22 (1.5) ▼
Azerbaijan	494 (3.5)	506 (3.3)	12 (1.1) ▲	491 (3.5)	-4 (1.8)	465 (3.9)	-29 (1.5) ▼
² New Zealand	490 (2.6)	487 (2.4)	-3 (1.1) ▼	484 (2.5)	-7 (1.6) ▼	503 (2.5)	13 (1.7) ▲
² Belgium (French)	489 (2.4)	480 (2.5)	-9 (1.0) ▼	506 (2.4)	17 (1.1) ▲	490 (3.2)	1 (2.3)
² Kazakhstan	487 (3.6)	498 (3.4)	11 (1.2) ▲	475 (3.5)	-13 (1.3) ▼	472 (3.8)	-15 (1.6) ▼
² France	484 (2.9)	479 (3.0)	-5 (1.6) ▼	495 (3.1)	11 (1.4) ▲	480 (3.0)	-5 (2.3)
² Montenegro	477 (2.1)	481 (1.7)	4 (1.3) ▲	480 (2.0)	3 (1.6)	458 (1.9)	-19 (2.1) ▼
North Macedonia	474 (3.6)	479 (3.2)	6 (1.4) ▲	475 (3.4)	1 (1.6)	453 (4.0)	-21 (2.7) ▼
Qatar	464 (3.5)	465 (3.6)	2 (1.0)	447 (3.7)	-17 (1.8) ▼	472 (3.6)	8 (1.0) ▲
Bahrain	462 (4.1)	463 (4.0)	1 (1.5)	453 (4.3)	-9 (1.6) ▼	463 (3.8)	1 (1.7)
² Kosovo	451 (3.4)	457 (3.4)	5 (1.4) ▲	457 (3.7)	6 (1.9) ▲	429 (3.7)	-22 (1.6) ▼
¹ Bosnia & Herzegovina	447 (3.2)	454 (3.6)	7 (1.5) ▲	448 (3.5)	1 (1.7)	427 (4.3)	-20 (2.2) ▼
² Chile	444 (2.8)	432 (2.5)	-11 (1.9) ▼	442 (2.5)	-1 (1.4)	464 (3.0)	20 (2.8) ▲
Uzbekistan	443 (3.2)	457 (3.2)	13 (0.9) ▲	438 (3.3)	-5 (1.1) ▼	407 (4.2)	-36 (2.2) ▼
Jordan	427 (5.3)	437 (5.6)	10 (1.2) ▲	414 (5.7)	-13 (1.8) ▼	404 (5.7)	-23 (1.6) ▼
Oman	421 (4.0)	421 (4.2)	-1 (0.9)	423 (4.3)	1 (1.6)	416 (4.1)	-6 (1.1) ▼
^ψ Iran, Islamic Rep. of	420 (4.2)	423 (4.1)	3 (1.1) ▲	424 (4.2)	4 (1.3) ▲	401 (4.5)	-19 (1.4) ▼
³ Saudi Arabia	420 (4.2)	418 (4.2)	-1 (1.6)	419 (4.0)	0 (1.6)	415 (4.5)	-5 (1.7) ▼
Morocco	393 (4.6)	392 (4.7)	-1 (1.6)	392 (5.2)	-1 (2.1)	394 (5.2)	1 (2.0)
Kuwait	382 (4.4)	383 (4.4)	1 (1.6)	378 (4.5)	-4 (2.6)	378 (5.8)	-4 (3.4)
South Africa (5)	362 (3.5)	362 (3.6)	1 (0.9)	353 (3.8)	-8 (1.5) ▼	362 (4.2)	0 (1.6)
² Brazil	400 (3.4)	- -	- -	- -	- -	- -	- -
Benchmarking Participants							
Dubai, UAE	557 (1.6)	559 (1.6)	2 (0.7) ▲	549 (1.6)	-8 (1.5) ▼	563 (1.6)	6 (1.0) ▲
² Quebec, Canada	515 (2.7)	510 (2.7)	-5 (1.3) ▼	521 (3.1)	6 (2.0) ▲	518 (3.2)	3 (1.3)
Sharjah, UAE	504 (3.3)	507 (3.3)	3 (1.0) ▲	498 (3.8)	-5 (1.2) ▼	500 (3.5)	-4 (1.3) ▼
³ Ontario, Canada	503 (3.4)	499 (3.4)	-4 (0.9) ▼	497 (3.7)	-5 (1.2) ▼	516 (4.0)	13 (1.6) ▲
Abu Dhabi, UAE	459 (1.9)	462 (1.7)	4 (0.9) ▲	446 (2.7)	-13 (1.3) ▼	457 (2.4)	-2 (0.9)

▲ ▼ Subscale score significantly different from overall score ($p < 0.01$)

Numbers of items are based on the TIMSS 2023 fourth-grade mathematics items included in scaling.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

Illustration 8. Relative Achievement in Mathematics Content Domains (Grade 8)

Country	Overall Mathematics	Number (63 Items)		Algebra (58 Items)		Geometry and Measurement (42 Items)		Data and Probability (37 Items)	
	Average Scale Score	Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score
³ Singapore	605 (6.1)	606 (5.7)	1 (1.6)	604 (6.8)	-1 (1.8)	605 (6.0)	-1 (1.3)	615 (6.8)	10 (1.7) ▲
Chinese Taipei	602 (3.1)	611 (3.4)	9 (1.7) ▲	612 (3.2)	10 (1.4) ▲	600 (3.0)	-2 (1.6)	585 (2.9)	-17 (1.1) ▼
Korea, Rep. of	596 (3.0)	602 (3.1)	6 (1.5) ▲	595 (3.1)	-1 (1.4)	603 (3.6)	7 (1.6) ▲	584 (3.8)	-12 (2.9) ▼
[†] Japan	595 (3.0)	590 (3.7)	-5 (1.2) ▼	593 (3.5)	-2 (1.3)	600 (3.2)	5 (1.6) ▲	609 (3.2)	15 (2.0) ▲
[†] Hong Kong SAR	575 (5.0)	576 (5.3)	1 (1.2)	577 (5.5)	3 (1.3)	579 (5.6)	4 (1.3) ▲	562 (5.4)	-13 (1.7) ▼
² England	525 (4.5)	532 (4.8)	8 (1.5) ▲	513 (4.8)	-12 (1.6) ▼	519 (4.6)	-6 (1.1) ▼	537 (5.4)	12 (2.2) ▲
Ireland	522 (2.7)	528 (2.9)	6 (1.3) ▲	503 (2.9)	-19 (1.2) ▼	513 (3.3)	-8 (2.4) ▼	546 (3.3)	24 (1.3) ▲
² Czech Republic	518 (2.3)	525 (2.4)	7 (0.8) ▲	513 (2.6)	-5 (1.5) ▼	520 (2.5)	2 (1.0)	504 (2.3)	-14 (0.9) ▼
² Sweden	517 (2.4)	514 (2.4)	-4 (1.2) ▼	511 (2.8)	-6 (1.7) ▼	516 (3.1)	-1 (2.0)	532 (3.0)	15 (1.2) ▲
² Lithuania	514 (3.1)	509 (3.2)	-5 (1.1) ▼	512 (3.3)	-1 (0.8)	526 (3.3)	12 (0.9) ▲	506 (3.5)	-7 (1.6) ▼
² Austria	512 (2.3)	511 (2.3)	-1 (1.2)	517 (2.7)	5 (2.1) ▲	519 (2.8)	7 (1.7) ▲	495 (2.5)	-17 (0.8) ▼
Australia	509 (3.5)	505 (3.6)	-4 (1.2) ▼	498 (3.4)	-10 (0.9) ▼	506 (3.5)	-3 (1.6)	532 (3.8)	24 (1.0) ▲
^{3†} Türkiye	509 (4.3)	511 (4.6)	2 (1.6)	498 (4.9)	-11 (1.5) ▼	496 (4.4)	-13 (2.1) ▼	529 (4.4)	20 (1.0) ▲
Hungary	506 (3.7)	510 (3.9)	4 (1.0) ▲	504 (3.9)	-2 (1.6)	506 (3.8)	0 (1.6)	498 (3.5)	-8 (0.9) ▼
Finland	504 (2.6)	504 (2.6)	0 (1.3)	490 (2.7)	-13 (0.8) ▼	513 (2.7)	9 (0.9) ▲	508 (2.9)	4 (1.2) ▲
² Norway (9)	501 (2.3)	495 (2.4)	-5 (1.2) ▼	485 (2.6)	-15 (1.0) ▼	506 (2.8)	6 (1.4) ▲	521 (3.3)	21 (2.2) ▲
Italy	501 (3.0)	502 (2.8)	2 (1.1)	492 (3.3)	-9 (1.9) ▼	509 (3.8)	8 (1.6) ▲	496 (3.2)	-5 (0.8) ▼
Malta	499 (1.2)	500 (1.3)	0 (0.8)	496 (1.6)	-3 (1.3)	496 (1.5)	-3 (1.3)	505 (1.6)	6 (1.3) ▲
[≡] Romania	496 (4.9)	503 (4.7)	7 (1.2) ▲	502 (5.1)	6 (1.7) ▲	492 (5.1)	-4 (1.8)	467 (6.1)	-29 (2.8) ▼
Cyprus	494 (2.7)	487 (2.9)	-7 (1.3) ▼	507 (3.0)	14 (1.4) ▲	492 (3.0)	-2 (1.4)	486 (3.2)	-8 (1.7) ▼
United Arab Emirates	489 (1.7)	493 (1.7)	4 (0.4) ▲	496 (1.8)	8 (0.4) ▲	479 (2.0)	-10 (0.7) ▼	475 (1.9)	-13 (0.7) ▼
[≡] United States	488 (4.2)	486 (4.4)	-2 (1.1)	492 (4.6)	4 (0.9) ▲	480 (4.0)	-8 (1.0) ▼	492 (4.1)	4 (1.1) ▲
³ Israel	487 (3.9)	485 (3.9)	-2 (1.0)	494 (4.1)	7 (1.9) ▲	484 (4.1)	-4 (1.7)	481 (4.4)	-6 (1.9) ▼
France	479 (3.1)	475 (3.2)	-3 (1.2) ▼	466 (3.6)	-13 (1.4) ▼	482 (3.6)	3 (1.8)	491 (3.5)	12 (1.4) ▲
Azerbaijan	479 (3.7)	494 (4.0)	15 (1.8) ▲	489 (4.2)	11 (1.9) ▲	458 (4.1)	-20 (1.9) ▼	442 (4.6)	-37 (2.5) ▼
Portugal	475 (2.7)	468 (2.6)	-8 (1.1) ▼	474 (3.3)	-1 (2.3)	485 (3.0)	10 (1.7) ▲	474 (2.5)	-1 (1.4)
¹ Georgia	467 (3.2)	477 (3.4)	10 (2.0) ▲	476 (3.5)	10 (1.6) ▲	452 (3.2)	-15 (1.7) ▼	433 (3.2)	-33 (2.1) ▼
Kazakhstan	454 (3.5)	454 (3.3)	0 (1.3)	466 (4.1)	12 (1.7) ▲	445 (3.4)	-9 (1.4) ▼	432 (3.4)	-22 (2.4) ▼
Qatar	451 (4.2)	448 (4.5)	-3 (1.7)	459 (4.4)	8 (1.4) ▲	441 (4.5)	-10 (1.2) ▼	443 (4.5)	-9 (1.4) ▼
Bahrain	426 (2.4)	423 (2.4)	-3 (1.7)	434 (2.8)	7 (1.4) ▲	416 (2.7)	-11 (1.7) ▼	421 (2.6)	-5 (1.7) ▼
^ψ Iran, Islamic Rep. of	423 (3.6)	416 (3.7)	-7 (2.1) ▼	424 (3.8)	1 (1.0)	406 (3.7)	-17 (1.3) ▼	423 (3.4)	-1 (1.5)
Uzbekistan	421 (4.3)	433 (4.6)	12 (1.2) ▲	427 (5.1)	6 (2.0) ▲	415 (4.3)	-6 (1.8) ▼	371 (4.8)	-50 (2.5) ▼
[†] Chile	416 (3.2)	411 (3.0)	-5 (1.6) ▼	414 (3.7)	-2 (2.9)	410 (3.0)	-6 (2.3)	420 (3.9)	4 (1.4) ▲
Oman	411 (2.7)	408 (2.8)	-3 (1.6)	419 (2.8)	8 (0.7) ▲	403 (2.7)	-8 (1.6) ▼	403 (2.7)	-8 (1.6) ▼
Malaysia	411 (3.5)	409 (3.6)	-2 (0.8)	406 (3.7)	-4 (1.1) ▼	417 (3.4)	6 (1.0) ▲	403 (3.5)	-8 (1.4) ▼
^ψ Kuwait	399 (5.2)	399 (5.4)	0 (2.1)	382 (6.1)	-17 (1.6) ▼	386 (6.3)	-13 (2.8) ▼	402 (4.5)	4 (2.2)
² Saudi Arabia	397 (3.3)	393 (3.7)	-4 (1.6) ▼	401 (3.5)	5 (1.0) ▲	385 (3.4)	-12 (2.1) ▼	397 (3.4)	0 (1.8)
^ψ South Africa (9)	397 (3.1)	410 (3.2)	13 (1.4) ▲	411 (3.6)	14 (1.8) ▲	358 (3.8)	-39 (1.3) ▼	341 (3.6)	-55 (1.8) ▼
Jordan	388 (3.2)	392 (3.1)	4 (1.4) ▲	405 (3.4)	17 (1.4) ▲	373 (3.6)	-15 (1.6) ▼	359 (4.0)	-29 (2.9) ▼
Morocco	378 (3.0)	382 (3.2)	5 (1.7) ▲	375 (3.8)	-3 (1.5)	380 (3.6)	2 (1.6)	354 (2.8)	-24 (1.3) ▼
^ψ Palestinian Nat'l Auth.	382 (3.0)	-	-	-	-	-	-	-	-
^ψ Brazil	378 (2.8)	-	-	-	-	-	-	-	-
[≡] New Zealand	485 (4.1)	484 (4.2)	-1 (1.5)	472 (4.5)	-13 (1.9) ▼	483 (4.5)	-3 (2.8)	503 (4.0)	18 (1.5) ▲
[✱] Cote d'Ivoire	263 (4.9)	-	-	-	-	-	-	-	-
Benchmarking Participants									
Dubai, UAE	546 (2.8)	550 (2.7)	4 (0.9) ▲	552 (2.9)	6 (0.8) ▲	537 (3.0)	-9 (1.3) ▼	542 (3.3)	-4 (1.6)
Sharjah, UAE	496 (4.8)	501 (5.0)	5 (1.4) ▲	504 (5.0)	8 (1.4) ▲	486 (5.2)	-9 (1.9) ▼	476 (5.1)	-20 (1.6) ▼
Abu Dhabi, UAE	454 (2.8)	457 (2.7)	3 (0.9) ▲	462 (2.9)	8 (0.9) ▲	443 (2.9)	-11 (0.9) ▼	440 (3.2)	-13 (1.4) ▼

▲ ▼ Subscale score significantly different from overall score ($p < 0.01$)

Numbers of items are based on the TIMSS 2023 eighth-grade mathematics items included in scaling.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

✱ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

New Zealand did not satisfy guidelines for minimum school participation rates. Achievement could not be reliably estimated for Cote d'Ivoire.

Student Achievement by Cognitive Domains

The TIMSS 2023 assessment evaluates three cognitive domains — knowing, applying, and reasoning — alongside the content domains discussed above. In order to answer TIMSS items correctly, students need more than just subject-specific knowledge. To solve the problems posed in the test, they also require cognitive skills such as application and reasoning. Therefore, TIMSS evaluates student achievement not only in terms of content but also cognitive domains, offering a multidimensional picture of their academic capabilities.

Cognitive Domains:

- **Knowing** – This domain includes tasks that can be solved by recalling learned facts, content, or procedures, using basic computation or classification.
- **Applying** – This domain focuses on students' ability to apply factual knowledge in solving problems, including developing strategies, implementing them, and achieving correct results.
- **Reasoning** – Tasks in this domain go beyond every day, routine problems and involve unfamiliar, complex, and multistep situations.

The illustrations below present the average scores of participating countries in each cognitive domain and compare those scores to their overall mathematics achievement, which is used for international rankings. TIMSS results show that students' achievements vary across the cognitive domains of mathematics. In some cases, students perform above their overall mathematics average in specific cognitive domains, while in others, their scores are lower. This indicates that students face different challenges across the domains of *knowing*, *applying*, and *reasoning*.

- **In Georgia, students in both fourth and eighth grades perform better in the domain of applying.** Notably, the achievement of fourth-grade students in this domain is at the international average. Eighth-grade students also achieve their highest average in application tasks, although their score is significantly lower than that of fourth graders in the same domain.

Cognitive Domains: Comparative Analysis in the International Context***Grade 4:***

- **Knowing:** In this domain, 13 countries perform statistically significantly above (▲) their overall mathematics score in this domain, while 17 perform below (including Georgia) (▼).
- **Applying:** 11 countries (including Georgia) perform significantly above their overall mathematics score, and 7 perform below.
- **Reasoning:** 9 countries perform above and 16 below their overall mathematics score. Georgian students' average in reasoning tasks does not differ statistically from their overall average in mathematics (498).

Grade 8:

- **Knowing:** 13 countries perform significantly above and 10 below their overall mathematics score. Georgian students' average in this domain does not differ statistically from the national mathematics average (467).
- **Applying:** 7 countries (including Georgia) score significantly above and 7 below their mathematics average.
- **Reasoning:** 7 countries perform significantly above and 17 below their overall mathematics score. Georgian students' average in reasoning tasks does not differ statistically from their national mathematics average (467).

In summary, Georgia's education system appears to be relatively stronger in developing students' ability to apply mathematics in practical situations, while deep conceptual understanding and the development of mathematical reasoning remain significant challenges.

Illustration 9. Relative Achievement in Mathematics Cognitive Domains (Grade 4)

Country	Overall Mathematics Average Scale Score	Knowing (58 Items)		Applying (85 Items)		Reasoning (40 Items)	
		Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score
³ Singapore	615 (2.9)	624 (2.9)	10 (1.1) ▲	615 (2.9)	0 (0.8)	609 (3.0)	-6 (0.7) ▼
Chinese Taipei	607 (1.7)	619 (1.7)	12 (1.3) ▲	612 (1.8)	5 (1.3) ▲	589 (1.8)	-18 (0.7) ▼
Korea, Rep. of	594 (2.6)	600 (3.0)	5 (1.5) ▲	593 (2.6)	-1 (1.2)	592 (2.9)	-2 (1.5)
[†] Hong Kong SAR	594 (4.0)	598 (4.0)	4 (1.2) ▲	592 (4.2)	-2 (1.1)	595 (4.4)	1 (2.5)
Japan	591 (2.3)	591 (2.5)	1 (1.7)	597 (2.5)	6 (1.2) ▲	576 (2.5)	-15 (0.8) ▼
Macao SAR	582 (1.0)	582 (1.5)	0 (1.0)	583 (1.3)	1 (1.2)	582 (1.3)	0 (1.4)
² Lithuania	561 (2.9)	556 (2.8)	-4 (1.4) ▼	566 (2.9)	5 (1.2) ▲	554 (3.1)	-7 (0.8) ▼
³ Türkiye (5)	553 (4.1)	543 (4.9)	-10 (2.6) ▼	559 (4.4)	6 (1.2) ▲	551 (4.5)	-3 (1.4)
² England	552 (2.7)	558 (2.9)	6 (1.1) ▲	550 (2.7)	-2 (1.1)	550 (3.3)	-2 (2.0)
² Poland	546 (2.0)	539 (2.3)	-7 (1.4) ▼	547 (2.4)	1 (1.3)	550 (2.6)	4 (1.3) ▲
Ireland	546 (2.9)	551 (3.3)	5 (1.4) ▲	546 (3.0)	0 (1.0)	541 (2.9)	-5 (1.4) ▼
² Romania	542 (4.8)	538 (4.7)	-4 (1.6) ▼	542 (5.0)	0 (1.3)	543 (5.2)	1 (2.1)
[†] Netherlands	537 (2.0)	540 (2.6)	3 (1.7)	536 (2.2)	-1 (0.9)	537 (2.3)	0 (1.5)
Latvia	534 (2.8)	534 (2.7)	0 (1.5)	534 (2.8)	0 (1.3)	534 (3.0)	-1 (1.8)
² Norway (5)	531 (2.0)	525 (2.5)	-5 (1.6) ▼	531 (2.0)	1 (1.1)	534 (2.2)	4 (1.4) ▲
² Czech Republic	530 (2.2)	534 (2.6)	4 (1.2) ▲	528 (2.2)	-2 (1.0)	528 (2.5)	-3 (0.8) ▼
² Sweden	530 (2.8)	525 (2.6)	-5 (1.3) ▼	530 (2.6)	0 (1.2)	533 (2.8)	3 (1.2)
Bulgaria	530 (3.6)	528 (3.6)	-2 (1.5)	532 (3.7)	2 (1.1)	522 (4.6)	-8 (1.6) ▼
Finland	529 (2.5)	538 (2.7)	9 (1.2) ▲	525 (2.6)	-4 (1.1) ▼	528 (3.0)	-1 (1.5)
Australia	525 (2.6)	529 (3.0)	4 (1.3) ▲	523 (2.5)	-2 (0.7) ▼	526 (2.9)	2 (1.5)
Germany	524 (2.1)	532 (2.7)	9 (1.8) ▲	519 (2.5)	-5 (1.4) ▼	524 (2.4)	0 (1.3)
[†] Denmark	524 (2.1)	521 (2.2)	-3 (0.7) ▼	523 (2.5)	-1 (1.6)	525 (2.5)	1 (1.3)
² Serbia	523 (3.3)	522 (3.3)	-1 (1.6)	522 (3.4)	-1 (1.5)	523 (3.4)	0 (1.0)
² Belgium (Flemish)	521 (2.4)	534 (2.9)	13 (1.4) ▲	517 (2.4)	-4 (0.8) ▼	516 (2.8)	-4 (1.3) ▼
Hungary	520 (3.6)	527 (3.5)	7 (1.5) ▲	515 (3.5)	-5 (0.9) ▼	521 (3.4)	0 (1.0)
Portugal	517 (2.8)	517 (2.8)	0 (1.1)	516 (2.9)	-1 (0.8)	518 (2.8)	1 (1.0)
² United States	517 (3.1)	521 (3.4)	4 (1.5)	517 (3.2)	0 (0.8)	513 (3.2)	-4 (1.3) ▼
² Cyprus	516 (2.5)	519 (2.4)	2 (1.3)	514 (2.6)	-2 (1.0)	515 (2.5)	-1 (1.1)
Slovak Republic	515 (3.1)	513 (3.3)	-2 (2.0)	514 (3.2)	-1 (1.8)	518 (3.1)	3 (2.2)
Slovenia	514 (1.8)	516 (2.0)	2 (1.5)	514 (1.8)	1 (1.3)	509 (2.0)	-4 (1.4) ▼
² Italy	513 (2.8)	511 (2.9)	-3 (1.0) ▼	513 (2.9)	0 (1.4)	513 (2.7)	0 (1.3)
² Armenia	513 (2.8)	507 (2.8)	-6 (1.8) ▼	515 (2.9)	2 (1.3)	509 (2.8)	-4 (1.6)
² Albania	512 (4.9)	509 (5.7)	-2 (3.0)	514 (5.4)	2 (1.5)	508 (5.2)	-3 (2.3)
¹ Canada	504 (2.0)	502 (2.1)	-2 (0.6) ▼	504 (2.0)	0 (0.6)	504 (2.2)	0 (0.9)
² Spain	498 (2.1)	500 (2.7)	1 (1.6)	497 (1.9)	-1 (0.8)	500 (2.2)	1 (1.1)
United Arab Emirates	498 (1.2)	497 (1.3)	-1 (0.5)	497 (1.2)	-1 (0.4) ▼	501 (1.2)	3 (0.7) ▲
¹ Georgia	498 (3.1)	491 (3.4)	-6 (1.5) ▼	501 (3.2)	3 (1.2) ▲	496 (3.1)	-2 (1.3)
Azerbaijan	494 (3.5)	492 (3.4)	-2 (1.3)	496 (3.4)	2 (1.3)	490 (3.6)	-5 (1.4) ▼
² New Zealand	490 (2.6)	488 (2.8)	-2 (1.5)	489 (2.5)	-2 (1.3)	495 (2.4)	5 (1.9)
² Belgium (French)	489 (2.4)	496 (2.6)	6 (1.1) ▲	489 (2.8)	-1 (1.5)	484 (2.6)	-6 (1.1) ▼
² Kazakhstan	487 (3.6)	479 (3.3)	-9 (0.9) ▼	490 (3.5)	3 (0.9) ▲	488 (3.5)	1 (1.9)
² France	484 (2.9)	484 (3.4)	0 (2.6)	484 (3.1)	0 (1.3)	482 (2.9)	-2 (1.4)
² Montenegro	477 (2.1)	474 (2.0)	-3 (1.2) ▼	478 (2.1)	1 (1.2)	474 (2.3)	-3 (1.6)
North Macedonia	474 (3.6)	472 (3.2)	-2 (1.5)	473 (3.3)	0 (2.0)	470 (3.4)	-3 (2.0)
Qatar	464 (3.5)	464 (3.4)	0 (1.4)	462 (3.5)	-2 (1.5)	466 (3.4)	2 (1.4)
Bahrain	462 (4.1)	459 (4.3)	-2 (1.9)	460 (4.2)	-1 (1.2)	469 (4.0)	8 (1.5) ▲
² Kosovo	451 (3.4)	453 (3.4)	2 (1.8)	450 (3.4)	-1 (1.4)	447 (3.5)	-4 (1.1) ▼
¹ Bosnia & Herzegovina	447 (3.2)	448 (3.4)	1 (1.4)	447 (3.5)	0 (1.3)	444 (4.0)	-3 (2.6)
² Chile	444 (2.8)	433 (2.8)	-10 (1.0) ▼	444 (2.4)	1 (1.4)	453 (3.1)	9 (1.8) ▲
Uzbekistan	443 (3.2)	441 (3.1)	-3 (1.2)	448 (3.2)	4 (1.4) ▲	428 (4.0)	-15 (1.7) ▼
Jordan	427 (5.3)	422 (5.4)	-5 (1.6) ▼	426 (5.5)	-1 (1.6)	434 (5.2)	7 (2.0) ▲
Oman	421 (4.0)	408 (4.3)	-14 (0.9) ▼	428 (4.1)	6 (1.1) ▲	428 (4.0)	7 (1.2) ▲
^ψ Iran, Islamic Rep. of	420 (4.2)	417 (3.8)	-2 (1.2)	425 (4.3)	5 (0.9) ▲	399 (4.6)	-20 (1.6) ▼
³ Saudi Arabia	420 (4.2)	417 (4.1)	-3 (1.5)	415 (4.2)	-4 (1.5) ▼	431 (4.0)	11 (1.9) ▲
Morocco	393 (4.6)	390 (5.0)	-3 (1.7)	400 (4.4)	7 (1.2) ▲	383 (5.1)	-11 (2.1) ▼
Kuwait	382 (4.4)	379 (4.6)	-3 (1.3)	379 (4.5)	-3 (1.9)	391 (4.9)	9 (3.1) ▲
South Africa (5)	362 (3.5)	357 (3.8)	-5 (1.2) ▼	366 (3.5)	5 (1.2) ▲	363 (3.7)	2 (1.9)
² Brazil	400 (3.4)	- -	- -	- -	- -	- -	- -
Benchmarking Participants							
Dubai, UAE	557 (1.6)	557 (1.4)	0 (0.7)	556 (1.6)	0 (0.8)	558 (1.8)	1 (1.8)
² Quebec, Canada	515 (2.7)	520 (2.8)	5 (1.4) ▲	516 (2.7)	1 (0.9)	505 (2.9)	-10 (1.3) ▼
Sharjah, UAE	504 (3.3)	503 (3.4)	-1 (1.1)	503 (3.4)	-1 (1.1)	506 (3.3)	2 (1.3)
³ Ontario, Canada	503 (3.4)	498 (3.7)	-5 (1.2) ▼	504 (3.5)	1 (1.2)	506 (3.6)	3 (1.2)
Abu Dhabi, UAE	459 (1.9)	458 (2.1)	-1 (1.1)	457 (2.0)	-2 (1.2)	463 (1.8)	5 (1.0) ▲

▲ ▼ Subscale score significantly different from overall score ($p < 0.01$)

Numbers of items are based on the TIMSS 2023 fourth-grade mathematics items included in scaling.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

Illustration 10. Relative Achievement in Mathematics Cognitive Domains (Grade 8)

Country	Overall Mathematics Average Scale Score	Knowing (60 Items)		Applying (91 Items)		Reasoning (49 Items)	
		Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score
³ Singapore	605 (6.1)	606 (6.4)	1 (1.5)	611 (6.0)	6 (1.5) ▲	600 (6.6)	-6 (1.5) ▼
Chinese Taipei	602 (3.1)	611 (3.2)	8 (1.3) ▲	601 (3.0)	-2 (1.4)	600 (2.8)	-2 (1.0)
Korea, Rep. of	596 (3.0)	602 (3.1)	6 (1.5) ▲	596 (2.9)	0 (1.0)	592 (3.2)	-4 (1.1) ▼
[†] Japan	595 (3.0)	591 (2.8)	-4 (1.5)	594 (2.7)	-1 (1.3)	591 (3.2)	-4 (1.0) ▼
[†] Hong Kong SAR	575 (5.0)	580 (5.0)	5 (0.7) ▲	575 (5.1)	0 (1.0)	569 (5.1)	-5 (2.0) ▼
² England	525 (4.5)	528 (4.4)	3 (0.9) ▲	530 (4.5)	5 (1.3) ▲	516 (4.9)	-9 (1.8) ▼
Ireland	522 (2.7)	520 (3.3)	-1 (1.6)	526 (2.8)	5 (1.2) ▲	516 (3.0)	-6 (1.9) ▼
² Czech Republic	518 (2.3)	514 (2.3)	-4 (1.0) ▼	518 (2.3)	0 (0.9)	524 (2.1)	6 (0.6) ▲
² Sweden	517 (2.4)	518 (2.2)	1 (1.1)	518 (2.3)	0 (0.9)	515 (2.6)	-2 (1.4)
² Lithuania	514 (3.1)	510 (3.2)	-3 (0.8) ▼	516 (3.1)	3 (0.8) ▲	514 (3.0)	1 (1.2)
² Austria	512 (2.3)	517 (2.3)	4 (1.7) ▲	509 (2.7)	-3 (1.9)	512 (2.5)	0 (1.6)
Australia	509 (3.5)	508 (3.5)	-1 (1.5)	511 (3.6)	2 (1.0)	504 (3.6)	-5 (1.2) ▼
^{3†} Türkiye	509 (4.3)	505 (4.6)	-4 (1.7)	510 (4.4)	1 (1.6)	511 (4.4)	3 (1.5)
Hungary	506 (3.7)	507 (3.8)	1 (1.0)	504 (3.8)	-2 (1.0)	507 (3.6)	1 (1.0)
Finland	504 (2.6)	505 (2.5)	2 (0.9)	504 (2.6)	0 (0.7)	501 (3.0)	-2 (1.8)
² Norway (9)	501 (2.3)	500 (2.1)	0 (0.8)	502 (2.2)	1 (0.8)	501 (2.9)	1 (2.0)
Italy	501 (3.0)	499 (2.9)	-2 (0.8)	498 (3.0)	-2 (1.1)	511 (3.1)	11 (1.4) ▲
Malta	499 (1.2)	507 (1.3)	8 (1.1) ▲	500 (1.3)	1 (1.0)	492 (2.0)	-8 (1.6) ▼
[≡] Romania	496 (4.9)	502 (5.0)	7 (1.2) ▲	493 (4.8)	-3 (1.3)	498 (4.7)	3 (1.5)
Cyprus	494 (2.7)	503 (2.5)	9 (1.0) ▲	492 (2.7)	-1 (1.1)	491 (2.9)	-3 (1.4)
United Arab Emirates	489 (1.7)	495 (1.8)	7 (0.6) ▲	482 (1.8)	-6 (0.3) ▼	485 (1.8)	-4 (0.4) ▼
[≡] United States	488 (4.2)	496 (4.5)	8 (1.0) ▲	484 (4.4)	-4 (1.1) ▼	480 (4.2)	-8 (0.9) ▼
³ Israel	487 (3.9)	491 (3.9)	4 (1.1) ▲	486 (3.6)	-1 (1.2)	488 (4.1)	1 (1.3)
France	479 (3.1)	477 (3.1)	-2 (1.0)	480 (3.0)	1 (1.0)	487 (3.3)	8 (0.9) ▲
Azerbaijan	479 (3.7)	497 (3.7)	18 (1.3) ▲	480 (3.6)	1 (1.4)	473 (3.7)	-6 (1.7) ▼
Portugal	475 (2.7)	466 (2.9)	-10 (0.9) ▼	477 (2.3)	2 (1.2)	490 (2.7)	14 (1.5) ▲
¹ Georgia	467 (3.2)	469 (3.1)	2 (1.0)	472 (2.8)	5 (1.7) ▲	466 (3.4)	0 (1.3)
Kazakhstan	454 (3.5)	450 (3.7)	-5 (1.7) ▼	457 (3.3)	3 (1.4)	453 (3.5)	-1 (1.5)
Qatar	451 (4.2)	455 (4.5)	3 (1.5)	445 (4.4)	-6 (1.1) ▼	445 (4.4)	-6 (1.7) ▼
Bahrain	426 (2.4)	427 (2.7)	1 (1.1)	420 (3.1)	-6 (1.8) ▼	420 (3.5)	-7 (2.7)
^ψ Iran, Islamic Rep. of	423 (3.6)	406 (4.4)	-18 (2.0) ▼	423 (3.2)	0 (1.0)	433 (3.7)	9 (1.5) ▲
Uzbekistan	421 (4.3)	416 (5.1)	-5 (1.8) ▼	423 (4.0)	3 (1.5)	418 (5.0)	-3 (2.4)
[†] Chile	416 (3.2)	416 (2.7)	0 (2.3)	419 (2.8)	3 (1.2)	434 (2.8)	18 (2.4) ▲
Oman	411 (2.7)	415 (2.9)	4 (0.8) ▲	401 (3.0)	-10 (1.4) ▼	404 (3.0)	-7 (1.1) ▼
Malaysia	411 (3.5)	392 (4.0)	-19 (0.9) ▼	409 (3.6)	-2 (0.8)	405 (3.6)	-5 (1.2) ▼
^ψ Kuwait	399 (5.2)	374 (7.0)	-25 (3.4) ▼	406 (4.9)	8 (1.7) ▲	393 (5.8)	-6 (2.5)
² Saudi Arabia	397 (3.3)	393 (3.6)	-3 (1.5)	390 (3.7)	-6 (1.7) ▼	379 (4.3)	-18 (2.4) ▼
^ψ South Africa (9)	397 (3.1)	397 (3.4)	1 (1.1)	398 (3.0)	2 (1.0)	377 (3.6)	-19 (1.4) ▼
Jordan	388 (3.2)	389 (3.5)	1 (1.8)	376 (3.5)	-12 (1.7) ▼	377 (3.7)	-11 (2.0) ▼
Morocco	378 (3.0)	374 (3.6)	-3 (1.1) ▼	376 (3.2)	-2 (1.6)	391 (3.4)	13 (1.7) ▲
^ψ Palestinian Nat'l Auth.	382 (3.0)	- -	- -	- -	- -	- -	- -
^ψ Brazil	378 (2.8)	- -	- -	- -	- -	- -	- -
[≡] New Zealand	485 (4.1)	476 (4.8)	-9 (2.2) ▼	491 (4.1)	5 (1.5) ▲	487 (4.2)	1 (1.2)
[✱] Cote d'Ivoire	263 (4.9)	- -	- -	- -	- -	- -	- -
Benchmarking Participants							
Dubai, UAE	546 (2.8)	550 (2.8)	4 (0.9) ▲	544 (3.0)	-1 (1.0)	544 (2.8)	-2 (0.8)
Sharjah, UAE	496 (4.8)	504 (4.9)	8 (1.6) ▲	489 (4.9)	-7 (0.8) ▼	493 (5.1)	-2 (1.5)
Abu Dhabi, UAE	454 (2.8)	461 (3.0)	7 (1.1) ▲	445 (2.9)	-9 (0.6) ▼	448 (3.1)	-6 (1.0) ▼

▲ ▼ Subscale score significantly different from overall score ($p < 0.01$)

Numbers of items are based on the TIMSS 2023 eighth-grade mathematics items included in scaling.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

✱ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

New Zealand did not satisfy guidelines for minimum school participation rates. Achievement could not be reliably estimated for Cote d'Ivoire.

The background features several overlapping, semi-transparent green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern, abstract design.

How are students performing in science subjects?

Progress of Georgian students over the past 16 years

Ranking of Countries by Student Achievement

Where Do We Stand in the Global Educational Landscape, and How Are Students' Academic Outcomes in Science Changing?

This section presents the ranking of countries and regions participating in the study based on students' average achievement in science.

Primary Level (Grade 4):

International results: In TIMSS 2023, the international average score of participating countries in science for fourth-grade students is 494 points (standard error 0.4). Based on the average achievement scores of fourth-grade students in science, the top five performers are Singapore, the Republic of Korea, Chinese Taipei, Turkey, and England. Their average scores exceed the international average by 100 points or more.

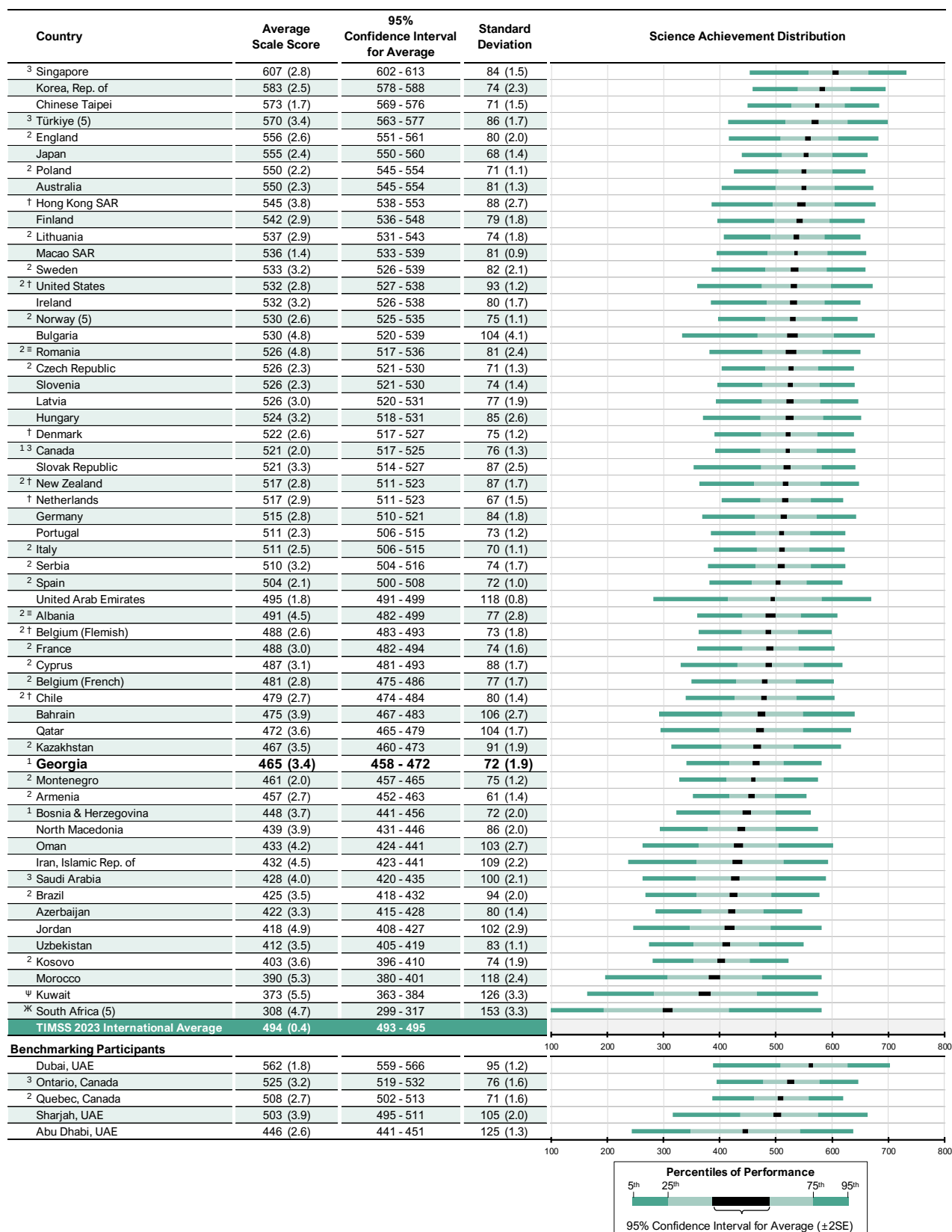
Georgia's results: Georgian fourth-grade students achieved an average score of 465 (standard error 3.4). With 95% confidence, we can say their achievement falls between 458 and 472 points. This difference is statistically significant compared with the TIMSS international average (494), indicating a substantial gap.

Basic Level (Grade 8):

International results: The average achievement score in science among eighth-grade students in the participating countries is 478 points (with a standard error of 0.5). As for the eighth graders, the top performers based on their average scores are Singapore, Chinese Taipei, Japan, the Republic of Korea, and England. The achievements of eighth-grade students in these countries exceed the international average by more than 50 points.

Georgia's results: Georgian eighth-grade students' achievement is statistically significantly below the international average — their average achievement score is 448 points (with a standard error of 2.9). Accordingly, with 95% confidence, the achievement of eighth graders in Georgia falls within the range of 442 to 454 points.

Georgia's modest performance, with scores far below the international average at both the primary and lower secondary levels, highlights the need for more effective science education and systemic reforms to better equip Georgian students with 21st-century scientific competencies.

Illustration 11. Average Science Achievement and Scale Score Distributions (Grade 4)

The TIMSS achievement scale was established in 1995 based on the combined achievement distribution of all countries that participated in TIMSS 1995. To provide a point of reference for country comparisons, the scale centerpoint of 500 was located at the mean of the combined achievement distribution. The units of the scale were chosen so that 100 scale score points corresponded to the standard deviation of the combined achievement distribution.

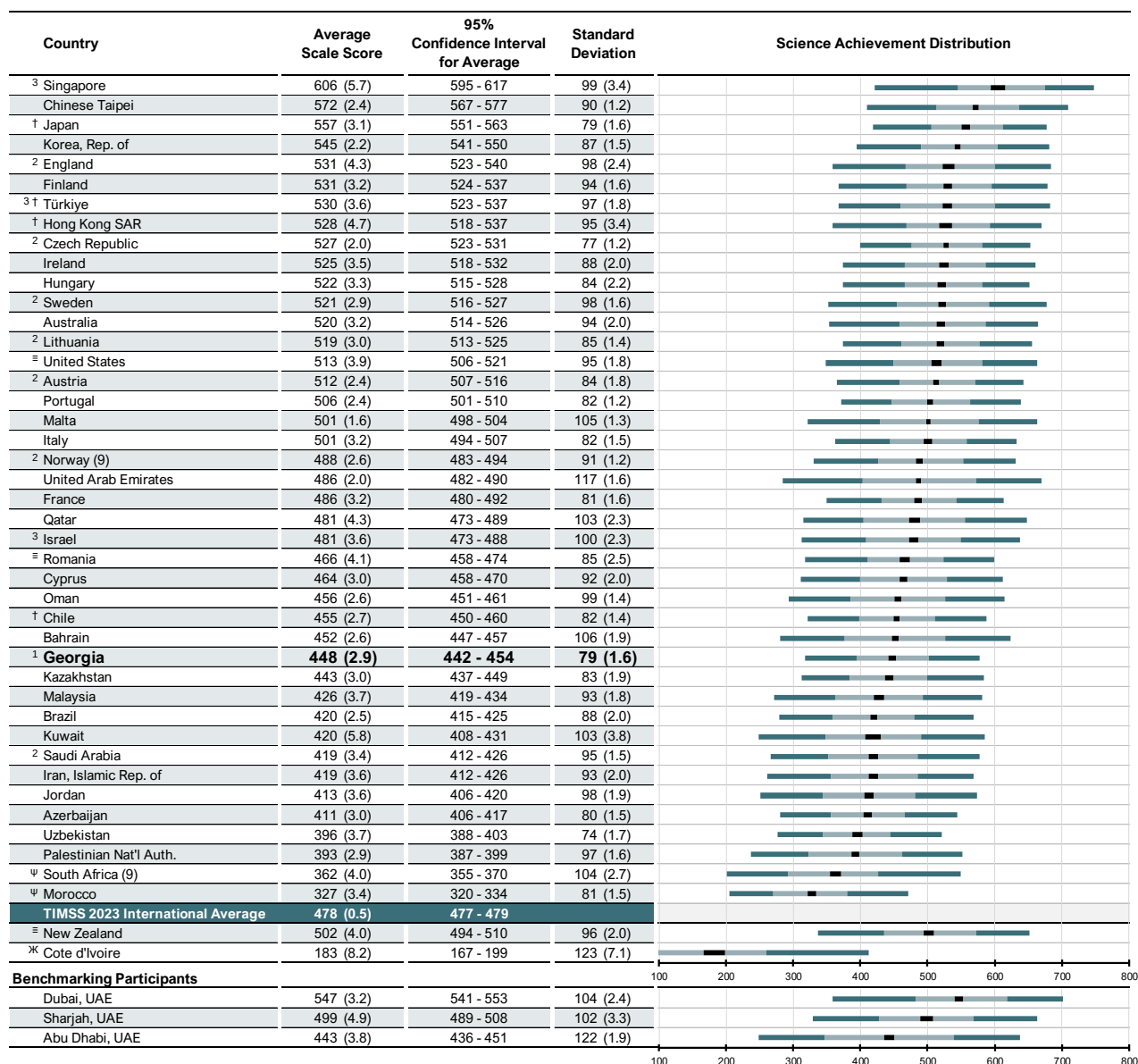
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

✱ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Illustration 12. Average Science Achievement and Scale Score Distributions (Grade 8)



The TIMSS achievement scale was established in 1995 based on the combined achievement distribution of all countries that participated in TIMSS 1995. To provide a point of reference for country comparisons, the scale centerpoint of 500 was located at the mean of the combined achievement distribution. The units of the scale were chosen so that 100 scale score points corresponded to the standard deviation of the combined achievement distribution.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

✱ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

New Zealand did not satisfy guidelines for minimum school participation rates. Achievement could not be reliably estimated for Cote d'Ivoire.

International Achievement Benchmarks

The illustrations below show the distribution of students across achievement benchmarks – low, intermediate, high, and advanced. The analysis uses cumulative percentages. To clarify once again, achievement benchmarks are structured hierarchically, meaning that achieving the advanced benchmark also includes competencies from the lower benchmarks (high, intermediate, low). Consequently, a high level of performance implies the ability to handle lower-level tasks as well, whereas the low benchmark reflects only limited skills.

From the illustrations, we observe that:

Primary Level:

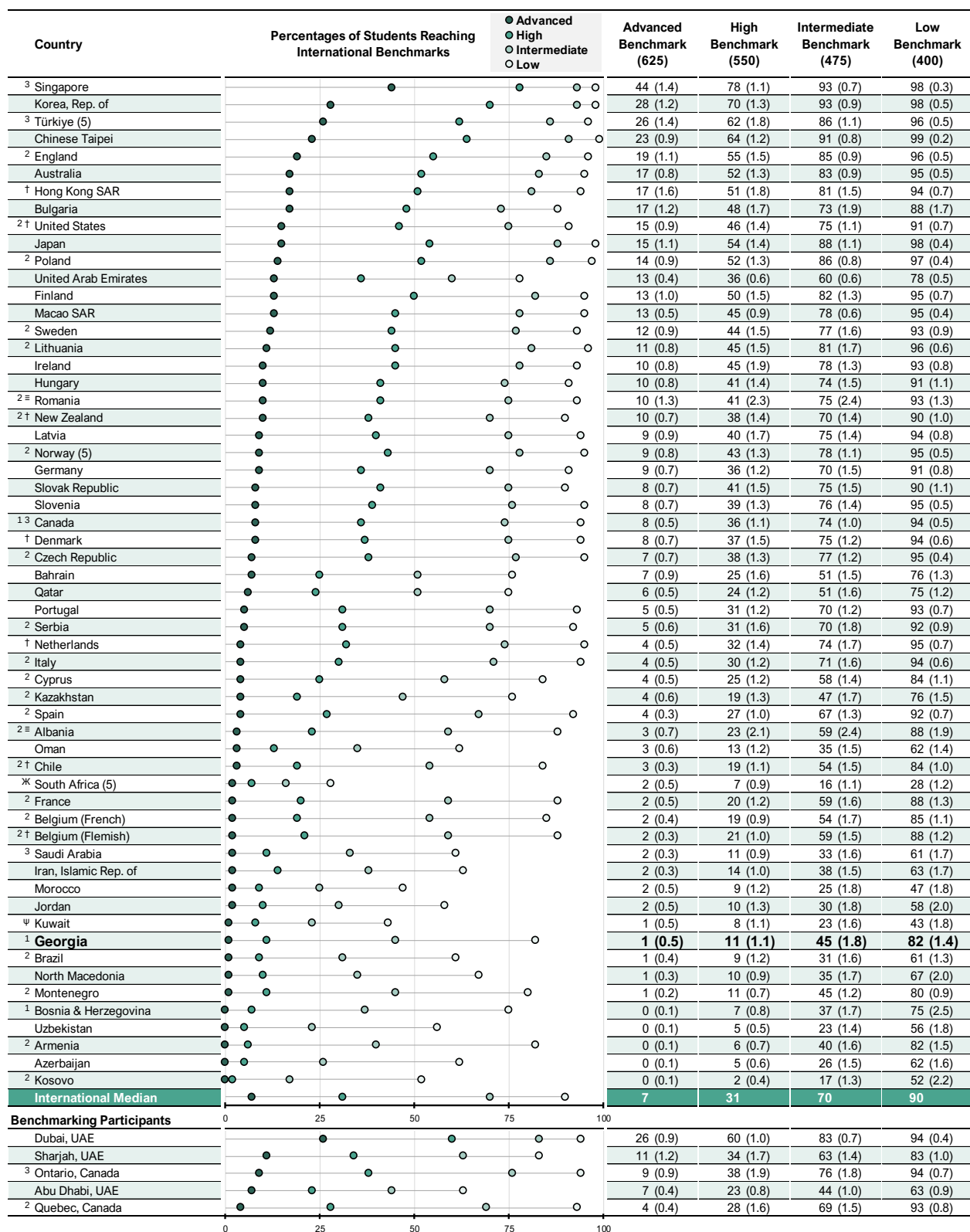
- Among Georgian fourth graders, 1% reached the advanced benchmark, 11% the high benchmark, 45% the intermediate benchmark, and 82% the low benchmark. Accordingly, 18% of Georgian Grade 4 students are unable to complete even the tasks aligned with the low benchmark.

Basic Level:

- For eighth graders, the results are as follows: only 1% reached the advanced benchmark, 10% the high benchmark, 37% the intermediate benchmark, and 72% the low benchmark. Thus, nearly one-third of students (28%) in Grade 8 are unable to complete even the tasks aligned with the low benchmark.

The data clearly show that only a small portion of fourth and eighth graders in Georgia achieve outstanding academic success in science subjects. The majority of students perform at the intermediate or low benchmark levels. The share of students reaching the advanced and high benchmarks is very small in both grades. Additionally, special attention should be paid to the fact that in Grade 4, more than 1 in 10 students (12%) and in Grade 8, nearly 1 in 3 students (28%) are unable to complete even the most basic tasks. There is a clear trend of increasing academic lag from the primary to the lower secondary level – the number of students unable to cope with elementary tasks rises significantly in Grade 8. These results indicate that schools lack effective mechanisms for the timely identification of struggling students and for implementing appropriate interventions. Naturally, this hinders student progress and, on a larger scale, impedes the country's scientific development.

If we compare the results with international trends (see attached illustrations 13 and 14, which present international median indicators), we observe that the share of high-achieving students in Georgia is significantly lower, while the share of students who do not demonstrate even minimum competencies is considerably higher compared to international data.

Illustration 13. Percentages of Students Reaching the TIMSS International Benchmarks of Science Achievement (Grade 4)

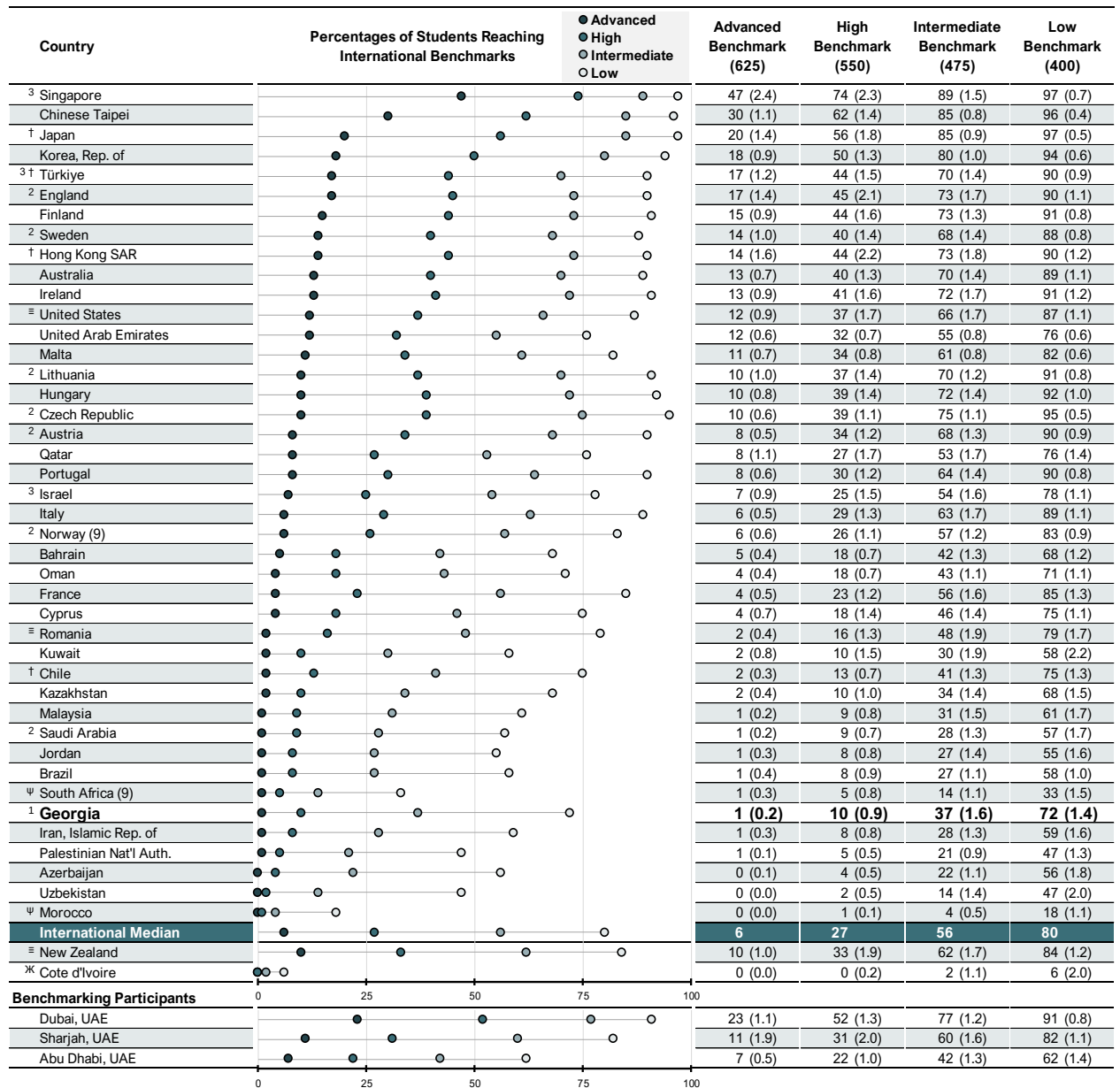
() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

✕ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Illustration 14. Percentages of Students Reaching the TIMSS International Benchmarks of Science Achievement (Grade 8)



() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.

^ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

[✕] Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

New Zealand did not satisfy guidelines for minimum school participation rates. Achievement could not be reliably estimated for Cote d'Ivoire.

Alignment with the National Curriculum: As mentioned earlier, the analysis of curriculum alignment (Test-Curriculum Matching Analysis - TCMA) is an important component of international assessments and determines the extent to which a given country's curriculum aligns with the tasks and content covered in the international test. In Georgian case, TCMA shows that, unlike in mathematics, there is a significant mismatch in science between the national curriculum and the TIMSS international assessment framework. In Grade 4 science, the alignment rate is 62% (compared to 81% in mathematics); in Grade 8, it is 82% (compared to 93% in mathematics). According to international data, alignment of test items with national curricula at the Grade 8 level is generally higher than at Grade 4, both in mathematics and science (see: <https://timss2023.org/results/appendices/#appendixC>).

At first glance, the misalignment with the national curriculum — especially at the primary level in science — can be considered one of the factors contributing to Georgian students' academic performance. However, the relatively low achievement level in Grade 8 (where the curriculum alignment is quite high) suggests that improving alignment alone is not sufficient for ensuring success. What becomes crucial is the quality of instruction, the depth of subject knowledge, and the effective use of educational resources. This is further illustrated by the fact that in Grade 4, several high-achieving countries — such as Singapore and Japan — have relatively low levels of alignment between their national curricula and the TIMSS test content, yet still achieve high results. This is supported by TCMA findings as well: as previously noted, in most cases, the selection of test items does not have a significant effect on countries' relative performance (i.e., their ranking on the performance scale).

These findings clearly demonstrate that mere formal alignment with the national curriculum does not guarantee high student achievement. It is also worth noting that the content misalignment at the primary level may create a systemic barrier to building foundational subject knowledge, which later manifests as pedagogical and methodological challenges. Therefore, an **integrated approach is needed** — one that includes not only a content-adapted curriculum but also mechanisms for monitoring teaching quality, professional support for teachers, and the targeted use of resources that help mitigate academic difficulties.

Trajectory of Achievement: How Have Georgian Students' Results in Science Changed from 2007 to 2023?

As previously noted, Georgia has participated in five TIMSS cycles since 2007. This section evaluates student progress and observable trends over time, analyzing how student achievement in science has evolved from 2007 to 2023.

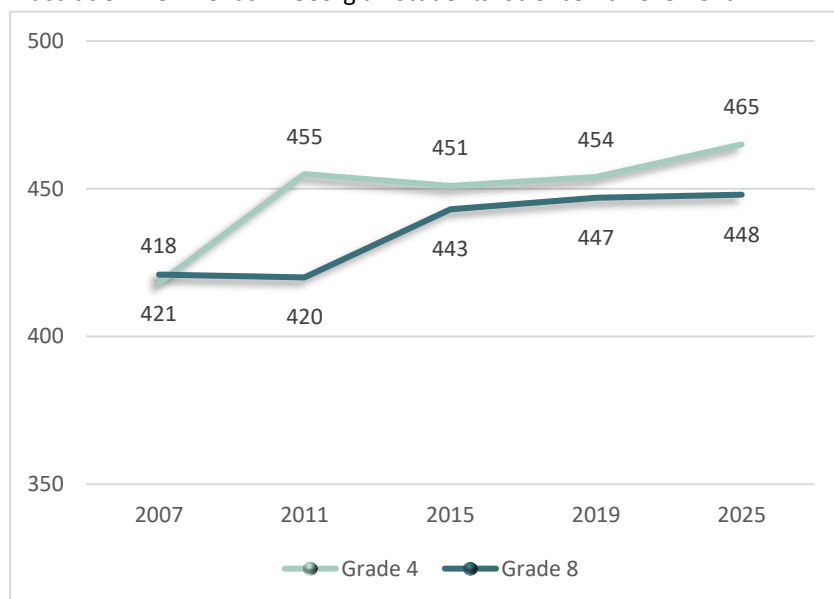
According to TIMSS 2023 data, the average achievement of both Grade 4 and Grade 8 students in science has slightly improved compared to previous cycles.

The trends presented in the illustration show that:

- **In Grade 4**, there was a clear upward trend in achievement between 2007 and 2011, with a statistically significant difference between the scores. Since 2011, however, **no substantial change has been observed**.
- **In Grade 8**, there was a marked improvement in performance between 2011 and 2015. From 2015 onwards, **achievement levels have remained largely unchanged**.

These results suggest that the observed improvements in Grade 4 (2007–2011) and Grade 8 (2011–2015) may not reflect a sustained structural trend. Instead, they could be the result of short-term influences. Therefore, the modest progress observed over certain periods is not necessarily indicative of stable or significant systemic improvements in science education.

Illustration 15. Trends in Georgian Students' Science Achievement

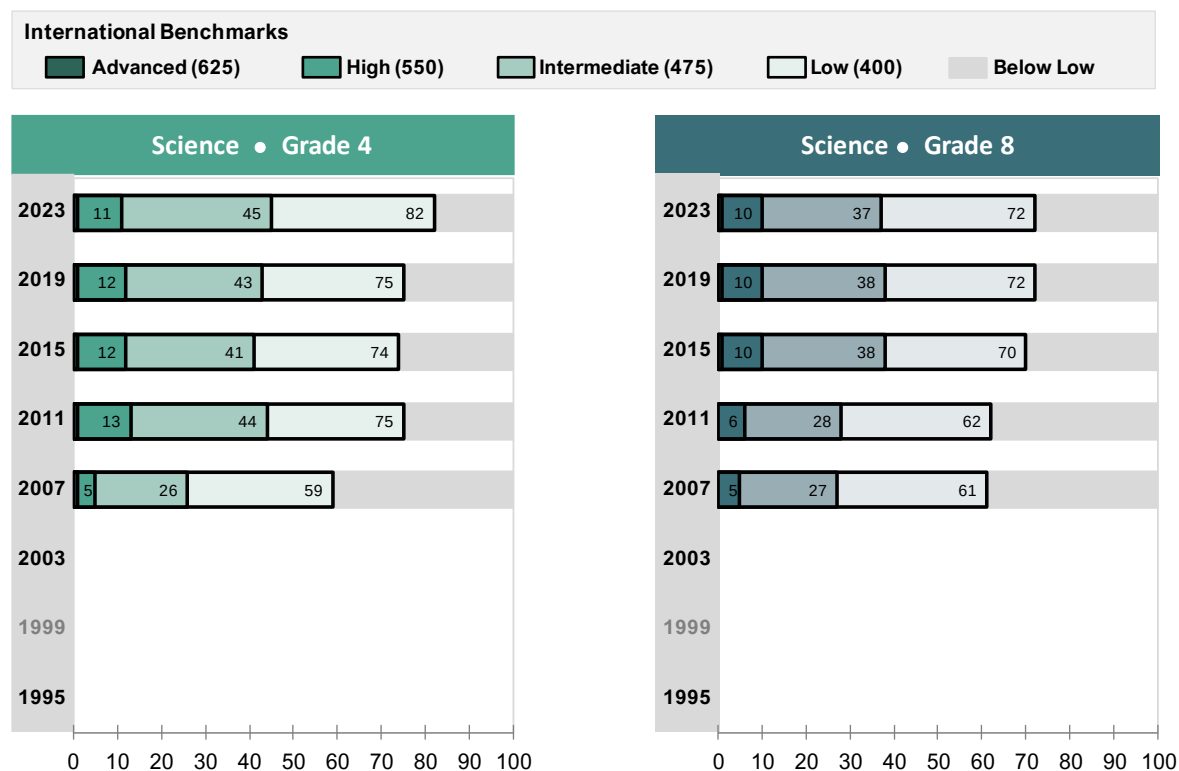


The illustration below presents the cumulative percentages of Georgian fourth- and eighth-grade students in science who, in each study cycle, reached the low, intermediate, high, or advanced benchmark of achievement.

In 2007, 41% of Grade 4 students were in the critical zone (meaning the proportion of students who could not achieve the tasks intended for the low achievement level). By 2023, this percentage decreased to 18%. Consequently, the number of students who reached low, intermediate, and high achievement levels increased. In Grade 8, in 2007, 39% of students could not achieve the low achievement level, but

by 2023, this percentage dropped to 28%. However, this percentage remains very high and indicates serious challenges in the science education process.

Illustration 16. Trends in Distributions of Students Reaching the TIMSS International Benchmarks of Science Achievement (2007-2023)



Only a very small portion of students reach the highest or high achievement levels. A small proportion of students even achieve the intermediate level, meaning that schools do not provide full opportunities for all students to acquire scientific knowledge and develop the necessary skills for effective operation in the 21st century. The comparative stagnation and fluctuating progress in achievement highlight the fact that the teaching and learning process in science is accompanied by serious systemic flaws.

In both mathematics and science education, early identification of learning difficulties and targeted interventions are critically important. This process is essential in order to avoid more complex and long-term problems arising in the teaching and learning of science, especially in the face of existing challenges.

Therefore, the results clearly show that systemic change is required in the teaching and learning process of science. This includes a significant increase in access to the resources necessary for science education, as well as effective measures aimed at improving the qualification of educators. Identifying flaws and responding in a targeted manner is one of the decisive factors in improving science education, students' academic success, and, in general, the improvement and sustainable development of the education system.

Student Achievement by Content Domains

Within the framework of TIMSS assessment, students' achievements in science are evaluated in different content areas. For Grade 4, the assessment covers life sciences, physical science, and earth science-related topics, while for Grade 8, it covers the disciplines of biology, chemistry, physics, and earth science.

The illustrations below present the average scores of the countries participating in the study for each content area and compare these scores with the country's overall average score in science (which was used to compile the countries' ranking list).

Illustration 17. Relative Achievement in Science Content Domains (Grade 4)

Country	Overall Science Average Scale Score	Life Science (79 Items)		Physical Science (61 Items)		Earth Science (33 Items)	
		Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score
³ Singapore	607 (2.8)	614 (3.0)	6 (0.7) ▲	622 (2.9)	14 (1.2) ▲	578 (2.8)	-30 (1.4) ▼
Korea, Rep. of	583 (2.5)	579 (2.8)	-4 (1.5) ▼	595 (2.6)	11 (1.4) ▲	573 (3.5)	-10 (2.2) ▼
Chinese Taipei	573 (1.7)	562 (2.3)	-10 (1.2) ▼	582 (1.7)	9 (0.9) ▲	574 (2.5)	1 (1.6)
³ Türkiye (5)	570 (3.4)	554 (3.6)	-16 (1.0) ▼	589 (3.9)	19 (1.9) ▲	576 (4.5)	6 (2.8)
² England	556 (2.6)	555 (3.0)	-1 (1.7)	558 (3.1)	1 (1.5)	554 (3.5)	-2 (1.8)
Japan	555 (2.4)	544 (3.1)	-11 (2.5) ▼	573 (2.9)	18 (1.7) ▲	542 (2.4)	-13 (1.5) ▼
² Poland	550 (2.2)	550 (2.7)	0 (1.6)	549 (2.4)	-1 (1.0)	552 (2.8)	2 (2.8)
Australia	550 (2.3)	554 (2.6)	5 (2.1)	545 (2.4)	-5 (1.6) ▼	549 (2.7)	-1 (2.7)
[†] Hong Kong SAR	545 (3.8)	541 (4.0)	-4 (1.9)	553 (3.9)	8 (1.7) ▲	539 (4.9)	-6 (3.5)
Finland	542 (2.9)	543 (3.0)	1 (1.5)	537 (2.8)	-5 (0.7) ▼	551 (3.0)	9 (1.8) ▲
² Lithuania	537 (2.9)	531 (2.6)	-6 (1.7) ▼	544 (2.9)	7 (1.7) ▲	535 (3.4)	-2 (1.3)
Macao SAR	536 (1.4)	529 (1.4)	-7 (1.1) ▼	545 (1.3)	10 (1.5) ▲	534 (2.3)	-1 (2.0)
² Sweden	533 (3.2)	532 (3.5)	-1 (1.2)	532 (3.4)	-1 (1.6)	537 (4.2)	5 (1.9)
^{2†} United States	532 (2.8)	541 (2.9)	8 (1.1) ▲	525 (3.2)	-8 (1.4) ▼	528 (3.5)	-5 (1.8) ▼
Ireland	532 (3.2)	535 (3.6)	3 (1.7)	528 (3.4)	-4 (1.5) ▼	534 (4.1)	2 (2.7)
² Norway (5)	530 (2.6)	534 (3.0)	3 (1.5)	520 (2.8)	-10 (1.1) ▼	543 (3.0)	13 (1.5) ▲
Bulgaria	530 (4.8)	530 (5.1)	0 (1.5)	527 (5.0)	-3 (1.3)	535 (6.0)	6 (3.6)
²⁼ Romania	526 (4.8)	524 (5.1)	-3 (1.6)	530 (5.0)	4 (1.9)	526 (5.2)	0 (2.6)
² Czech Republic	526 (2.3)	529 (2.0)	3 (0.9) ▲	525 (2.4)	-1 (1.1)	520 (3.0)	-6 (2.1) ▼
Slovenia	526 (2.3)	520 (2.3)	-6 (0.9) ▼	533 (2.3)	7 (1.7) ▲	523 (2.8)	-2 (1.6)
Latvia	526 (3.0)	518 (3.5)	-7 (1.4) ▼	533 (3.7)	8 (2.0) ▲	522 (3.9)	-4 (1.7)
Hungary	524 (3.2)	527 (3.3)	3 (1.7)	514 (3.1)	-10 (1.1) ▼	534 (3.9)	10 (2.3) ▲
[†] Denmark	522 (2.6)	531 (2.7)	9 (1.5) ▲	510 (2.9)	-12 (1.2) ▼	525 (2.9)	3 (1.4)
^{1,3} Canada	521 (2.0)	526 (2.3)	5 (1.3) ▲	516 (1.8)	-5 (1.2) ▼	520 (2.6)	-1 (1.5)
Slovak Republic	521 (3.3)	519 (3.7)	-2 (1.4)	523 (3.7)	2 (1.1)	519 (3.8)	-2 (2.1)
^{2†} New Zealand	517 (2.8)	520 (3.0)	3 (1.9)	512 (3.0)	-5 (1.5) ▼	520 (2.4)	3 (2.0)
[†] Netherlands	517 (2.9)	518 (3.2)	1 (1.2)	509 (2.5)	-8 (2.4) ▼	527 (2.9)	10 (3.3) ▲
Germany	515 (2.8)	515 (2.8)	0 (1.0)	515 (2.8)	0 (1.5)	512 (3.4)	-4 (2.9)
Portugal	511 (2.3)	511 (2.9)	0 (1.5)	507 (2.7)	-4 (1.6)	516 (2.9)	5 (1.5) ▲
² Italy	511 (2.5)	510 (2.9)	0 (1.2)	510 (2.6)	-1 (1.1)	508 (3.1)	-3 (2.0)
² Serbia	510 (3.2)	505 (4.0)	-5 (2.2)	520 (3.4)	10 (2.5) ▲	498 (3.1)	-12 (2.3) ▼
² Spain	504 (2.1)	502 (2.4)	-2 (1.0)	505 (2.4)	1 (1.4)	505 (2.6)	1 (2.0)
United Arab Emirates	495 (1.8)	486 (1.7)	-9 (0.6) ▼	501 (1.6)	7 (0.7) ▲	503 (1.8)	8 (0.8) ▲
²⁼ Albania	491 (4.5)	488 (5.1)	-3 (2.1)	495 (5.4)	5 (3.1)	490 (5.5)	-1 (2.8)
^{2†} Belgium (Flemish)	488 (2.6)	491 (2.6)	3 (1.0) ▲	483 (2.8)	-6 (1.3) ▼	490 (3.4)	2 (2.8)
² France	488 (3.0)	487 (3.5)	-1 (1.4)	485 (3.0)	-3 (2.0)	489 (4.2)	1 (2.2)
² Cyprus	487 (3.1)	492 (3.2)	5 (1.2) ▲	485 (3.5)	-2 (1.5)	470 (3.8)	-17 (2.0) ▼
² Belgium (French)	481 (2.8)	478 (2.9)	-3 (1.5)	484 (2.3)	4 (2.1)	474 (3.4)	-6 (2.2) ▼
^{2†} Chile	479 (2.7)	487 (2.4)	7 (1.0) ▲	472 (2.7)	-8 (2.1) ▼	472 (3.2)	-7 (1.4) ▼
Bahrain	475 (3.9)	468 (4.2)	-7 (1.0) ▼	483 (4.0)	8 (1.7) ▲	470 (4.0)	-5 (2.1)
Qatar	472 (3.6)	463 (3.7)	-9 (1.7) ▼	480 (4.1)	8 (1.8) ▲	474 (3.9)	2 (2.8)
² Kazakhstan	467 (3.5)	454 (3.5)	-12 (1.8) ▼	477 (3.6)	10 (1.2) ▲	464 (3.8)	-3 (1.4)
¹ Georgia	465 (3.4)	464 (3.5)	-1 (1.7)	464 (3.4)	-1 (1.4)	460 (4.5)	-5 (2.5)
² Montenegro	461 (2.0)	461 (2.0)	1 (0.7)	462 (2.8)	1 (2.0)	451 (2.4)	-10 (1.6) ▼
² Armenia	457 (2.7)	460 (2.6)	2 (1.4)	461 (2.7)	4 (1.0) ▲	437 (3.0)	-21 (1.6) ▼
¹ Bosnia & Herzegovina	448 (3.7)	442 (3.5)	-6 (1.5) ▼	452 (4.2)	3 (3.5)	447 (5.7)	-1 (5.1)
North Macedonia	439 (3.9)	436 (3.4)	-3 (2.2)	442 (3.8)	3 (1.5)	434 (3.5)	-5 (1.8) ▼
Oman	433 (4.2)	426 (4.5)	-7 (1.1) ▼	442 (4.2)	9 (1.9) ▲	428 (4.4)	-5 (1.1) ▼
Iran, Islamic Rep. of	432 (4.5)	425 (4.3)	-7 (1.6) ▼	438 (5.4)	6 (2.1) ▲	426 (4.3)	-6 (1.4) ▼
³ Saudi Arabia	428 (4.0)	414 (4.2)	-14 (2.1) ▼	437 (4.5)	9 (2.4) ▲	442 (4.3)	15 (1.6) ▲
² Brazil	425 (3.5)	429 (3.9)	4 (0.9) ▲	425 (3.2)	0 (1.2)	407 (3.8)	-18 (1.1) ▼
Azerbaijan	422 (3.3)	421 (2.7)	0 (2.4)	419 (3.1)	-3 (2.8)	413 (4.6)	-8 (2.8) ▼
Jordan	418 (4.9)	404 (5.2)	-14 (1.6) ▼	433 (5.8)	16 (2.8) ▲	413 (6.0)	-5 (2.1)
Uzbekistan	412 (3.5)	410 (3.7)	-2 (1.7)	406 (3.9)	-6 (2.7)	422 (4.3)	10 (2.0) ▲
² Kosovo	403 (3.6)	387 (3.4)	-16 (1.3) ▼	416 (4.2)	13 (1.8) ▲	420 (3.8)	17 (1.6) ▲
Morocco	390 (5.3)	386 (5.1)	-4 (1.7)	389 (5.9)	-1 (1.9)	380 (5.7)	-11 (3.4) ▼
^ψ Kuwait	373 (5.5)	372 (5.9)	-2 (2.6)	359 (6.3)	-14 (2.5) ▼	376 (5.8)	3 (2.5)
[✕] South Africa (5)	308 (4.7)	-	-	-	-	-	-
Benchmarking Participants							
Dubai, UAE	562 (1.8)	555 (1.5)	-8 (1.4) ▼	570 (2.1)	8 (1.3) ▲	569 (2.5)	7 (1.6) ▲
³ Ontario, Canada	525 (3.2)	533 (3.4)	8 (1.5) ▲	520 (3.0)	-6 (1.1) ▼	522 (3.9)	-3 (1.7)
² Quebec, Canada	508 (2.7)	508 (3.1)	1 (1.5)	502 (2.5)	-5 (1.3) ▼	511 (3.2)	4 (2.1)
Sharjah, UAE	503 (3.9)	493 (3.9)	-9 (0.9) ▼	512 (4.3)	10 (1.2) ▲	507 (4.2)	4 (1.4) ▲
Abu Dhabi, UAE	446 (2.6)	439 (2.6)	-7 (1.1) ▼	449 (2.2)	3 (1.5)	457 (2.2)	11 (1.5) ▲

▲ ▼ Subscale score significantly different from overall score ($p < 0.01$)

Numbers of items are based on the TIMSS 2023 fourth-grade science items included in scaling.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and =.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

✕ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

Illustration 18. Relative Achievement in Science Content Domains (Grade 8)

Country	Overall Science Average Scale Score	Biology (76 Items)			Chemistry (43 Items)			Physics (48 Items)			Earth Science (45 Items)		
		Average Scale Score	Difference from Overall Score		Average Scale Score	Difference from Overall Score		Average Scale Score	Difference from Overall Score		Average Scale Score	Difference from Overall Score	
³ Singapore	606 (5.7)	622 (6.1)	16 (1.7) ▲		618 (6.5)	11 (2.1) ▲		614 (6.4)	8 (1.9) ▲		572 (5.2)	-34 (1.7) ▼	
Chinese Taipei	572 (2.4)	558 (2.3)	-14 (1.7) ▼		593 (3.0)	21 (1.1) ▲		565 (2.7)	-6 (1.1) ▼		581 (2.7)	9 (1.2) ▲	
[†] Japan	557 (3.1)	549 (3.1)	-8 (2.5) ▼		555 (4.2)	-2 (2.4)		563 (3.3)	6 (1.0) ▲		566 (3.5)	9 (1.8) ▲	
Korea, Rep. of	545 (2.2)	547 (2.5)	1 (1.5)		522 (2.4)	-23 (1.4) ▼		557 (2.9)	12 (1.4) ▲		555 (2.7)	10 (1.5) ▲	
² England	531 (4.3)	531 (4.2)	-1 (1.6)		533 (4.7)	2 (3.0)		532 (4.6)	1 (1.2)		531 (4.7)	0 (2.3)	
Finland	531 (3.2)	524 (3.0)	-7 (2.5) ▼		529 (3.3)	-1 (2.3)		536 (3.4)	5 (1.7) ▲		537 (3.5)	6 (1.8) ▲	
^{3†} Türkiye	530 (3.6)	517 (3.7)	-12 (2.2) ▼		550 (4.7)	20 (2.3) ▲		534 (3.9)	4 (1.7) ▲		525 (3.8)	-4 (1.1) ▼	
[†] Hong Kong SAR	528 (4.7)	527 (5.2)	-1 (1.8)		523 (5.3)	-5 (2.0)		529 (5.1)	1 (2.3)		532 (5.2)	5 (2.4)	
² Czech Republic	527 (2.0)	526 (2.2)	-1 (1.1)		517 (3.3)	-10 (3.0) ▼		533 (3.1)	6 (2.3)		530 (2.3)	3 (1.1) ▲	
Ireland	525 (3.5)	519 (4.1)	-6 (1.6) ▼		528 (3.6)	3 (1.8)		521 (3.7)	-4 (1.9)		536 (3.7)	11 (1.1) ▲	
Hungary	522 (3.3)	521 (3.6)	0 (2.1)		513 (3.8)	-9 (1.5) ▼		524 (3.5)	2 (1.7)		525 (3.8)	4 (2.6)	
² Sweden	521 (2.9)	519 (3.3)	-2 (2.1)		520 (3.6)	-1 (2.0)		520 (2.9)	-1 (1.5)		526 (3.3)	5 (1.6) ▲	
Australia	520 (3.2)	513 (3.1)	-7 (1.1) ▼		515 (3.2)	-5 (1.1) ▼		530 (3.6)	10 (1.9) ▲		527 (3.7)	7 (2.0) ▲	
² Lithuania	519 (3.0)	519 (3.2)	0 (0.8)		524 (3.7)	4 (2.0)		516 (3.2)	-3 (1.5)		517 (3.2)	-3 (1.6)	
[≡] United States	513 (3.9)	516 (3.9)	3 (1.0) ▲		505 (4.1)	-9 (1.5) ▼		517 (4.2)	3 (1.5)		511 (4.3)	-3 (1.1)	
² Austria	512 (2.4)	504 (3.0)	-8 (1.7) ▼		507 (3.0)	-4 (1.7)		523 (2.8)	11 (1.6) ▲		521 (3.5)	10 (2.4) ▲	
Portugal	506 (2.4)	511 (2.6)	6 (1.4) ▲		502 (2.8)	-4 (1.3) ▼		495 (2.2)	-11 (1.2) ▼		507 (3.2)	2 (2.3)	
Malta	501 (1.6)	493 (1.7)	-9 (0.9) ▼		508 (1.8)	7 (0.9) ▲		505 (1.6)	4 (1.3) ▲		506 (1.8)	4 (1.1) ▲	
Italy	501 (3.2)	505 (3.6)	5 (1.2) ▲		490 (3.3)	-11 (1.2) ▼		486 (3.6)	-15 (1.6) ▼		513 (4.1)	12 (2.3) ▲	
² Norway (9)	488 (2.6)	483 (2.9)	-5 (1.3) ▼		478 (3.4)	-10 (1.8) ▼		492 (2.8)	4 (1.2) ▲		503 (2.6)	15 (1.2) ▲	
United Arab Emirates	486 (2.0)	488 (2.3)	1 (0.7)		498 (2.4)	11 (1.0) ▲		483 (2.1)	-3 (0.6) ▼		475 (2.4)	-11 (1.0) ▼	
France	486 (3.2)	477 (3.3)	-9 (1.5) ▼		481 (3.4)	-5 (3.2)		496 (3.3)	9 (1.2) ▲		493 (3.3)	7 (1.7) ▼	
Qatar	481 (4.3)	484 (4.3)	3 (1.6)		481 (5.0)	-1 (1.9)		478 (4.4)	-3 (1.1)		473 (4.7)	-8 (2.1) ▼	
³ Israel	481 (3.6)	477 (3.9)	-3 (2.1)		489 (4.3)	8 (2.0) ▲		489 (3.9)	8 (1.5) ▲		465 (4.3)	-15 (2.1) ▼	
[≡] Romania	466 (4.1)	475 (4.3)	9 (2.3) ▲		465 (4.1)	-1 (2.1)		457 (4.6)	-9 (2.6) ▼		460 (4.4)	-6 (2.5)	
Cyprus	464 (3.0)	468 (3.2)	4 (2.3)		464 (3.7)	0 (2.3)		457 (3.3)	-8 (2.4) ▼		463 (4.5)	-1 (2.5)	
Oman	456 (2.6)	464 (2.3)	8 (1.6) ▲		455 (2.7)	-1 (1.3)		455 (2.3)	-1 (1.2)		435 (2.6)	-21 (0.9) ▼	
[†] Chile	455 (2.7)	463 (3.4)	8 (2.2) ▲		446 (2.8)	-9 (1.6) ▼		445 (2.9)	-10 (1.6) ▼		455 (2.6)	0 (1.7)	
Bahrain	452 (2.6)	453 (2.5)	1 (1.4)		457 (2.9)	5 (1.6) ▲		450 (2.3)	-2 (1.9)		436 (3.0)	-16 (2.6) ▼	
¹ Georgia	448 (2.9)	459 (3.3)	11 (3.3) ▲		448 (3.3)	0 (1.6)		440 (3.2)	-8 (2.7) ▼		427 (3.2)	-21 (2.3) ▼	
Kazakhstan	443 (3.0)	439 (3.4)	-4 (0.9) ▼		453 (3.0)	10 (1.0) ▲		448 (2.7)	6 (1.1) ▲		426 (3.2)	-16 (1.4) ▼	
Malaysia	426 (3.7)	425 (4.0)	-1 (0.9)		428 (3.7)	1 (0.9)		426 (3.5)	0 (1.4)		421 (3.8)	-5 (0.8) ▼	
Brazil	420 (2.5)	428 (2.9)	8 (1.1) ▲		414 (2.4)	-5 (0.7) ▼		405 (2.9)	-15 (1.4) ▼		421 (3.0)	1 (1.3)	
Kuwait	420 (5.8)	414 (5.7)	-6 (2.5)		417 (6.5)	-3 (2.7)		423 (5.4)	3 (2.5)		420 (5.8)	0 (2.8)	
² Saudi Arabia	419 (3.4)	416 (3.8)	-3 (0.9) ▼		423 (3.4)	4 (1.3) ▲		415 (3.2)	-4 (1.8)		419 (3.0)	0 (1.9)	
Iran, Islamic Rep. of	419 (3.6)	421 (3.4)	2 (1.5)		418 (3.9)	-1 (1.8)		408 (3.2)	-11 (1.6) ▼		411 (4.2)	-8 (2.7) ▼	
Jordan	413 (3.6)	411 (3.4)	-2 (1.5)		414 (4.1)	1 (1.5)		415 (3.1)	2 (1.5)		406 (3.4)	-7 (2.1) ▼	
Azerbaijan	411 (3.0)	419 (2.8)	8 (1.7) ▲		413 (3.2)	2 (1.5)		400 (3.7)	-11 (1.9) ▼		398 (3.1)	-14 (1.4) ▼	
Uzbekistan	396 (3.7)	396 (4.3)	0 (1.7)		401 (3.2)	6 (2.0) ▲		388 (3.7)	-8 (1.8) ▼		389 (3.4)	-7 (1.9) ▼	
Palestinian Nat'l Auth.	393 (2.9)	388 (2.9)	-5 (0.9) ▼		409 (3.1)	16 (1.8) ▲		402 (2.8)	9 (1.2) ▲		368 (3.4)	-25 (1.5) ▼	
^ψ South Africa (9)	362 (4.0)	346 (4.2)	-16 (0.8) ▼		368 (4.4)	6 (1.7) ▲		374 (3.8)	12 (0.8) ▲		361 (3.7)	-2 (1.6)	
^ψ Morocco	327 (3.4)	318 (3.8)	-9 (2.1) ▼		333 (3.4)	6 (2.1) ▲		324 (3.9)	-3 (1.6)		327 (3.4)	0 (1.8)	
[≡] New Zealand	502 (4.0)	497 (4.2)	-5 (1.6) ▼		501 (4.2)	-1 (1.9)		508 (4.4)	6 (2.7)		508 (3.8)	6 (2.0) ▲	
[✱] Cote d'Ivoire	183 (8.2)	- -	- -		- -	- -		- -	- -		- -	- -	
Benchmarking Participants													
Dubai, UAE	547 (3.2)	551 (3.5)	4 (1.1) ▲		559 (3.6)	12 (1.6) ▲		542 (3.2)	-5 (1.4) ▼		536 (3.6)	-11 (1.7) ▼	
Sharjah, UAE	499 (4.9)	503 (5.4)	5 (1.5) ▲		513 (5.2)	14 (1.3) ▲		491 (5.0)	-7 (2.2) ▼		485 (5.2)	-13 (2.6) ▼	
Abu Dhabi, UAE	443 (3.8)	441 (4.0)	-2 (1.1)		453 (4.0)	9 (1.3) ▲		443 (3.6)	0 (1.5)		435 (3.9)	-8 (1.6) ▼	

▲ ▼ Subscale score significantly different from overall score ($p < 0.01$)

Numbers of items are based on the TIMSS 2023 eighth-grade science items included in scaling.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

✱ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

New Zealand did not satisfy guidelines for minimum school participation rates. Achievement could not be reliably estimated for Cote d'Ivoire.

Student achievement in science subjects – Georgia (TIMSS, 2003)

I. Grade 4 (Average score: 465):

<i>Content domain</i>	<i>Average score</i>	<i>Difference from the overall score</i>
<i>Life science</i>	464	-1
<i>Physical science</i>	464	-1
<i>Earth science</i>	460	-5

II. Grade 8 (Average score: 448):

<i>Content domain</i>	<i>Average score</i>	<i>Difference from the overall score</i>
<i>Biology</i>	459	+11
<i>Chemistry</i>	448	0
<i>Physics</i>	440	-8
<i>Earth science</i>	427	-21

Primary Level

An analysis of Georgian students' achievements shows that fourth-grade students scored:

- In **Life Science** and **Physical Science**, the average score was 464 points for both (standard errors of 3.5 and 3.4, respectively), which is slightly **below the overall science average of 465** (standard error – 3.4);
- In **Earth Science**, the result is somewhat lower – 460 points (standard error – 4.5), which is 5 points below the overall science score.

Basic Level

For Georgian eighth-grade students, the achievements by content domain are as follows:

- Students **performed better in Biology**, with an average score of 459 (standard error – 3.3), which is 11 points higher than their overall science score of 448 (standard error – 2.9);
- Their **achievement in Chemistry matches** the overall science average (448 points, standard error – 3.3);
- Students performed **lowest in Earth Science**, scoring 427 (standard error – 3.2), which is 21 points below the overall science score;
- **Eighth-grade students also face notable academic challenges in physics:** the average score is 440 (standard error – 3.2), which is 8 points lower than the overall science score.

These results suggest that teaching and learning in science face significant challenges in Georgia, particularly at the lower secondary level and especially in **Physics and Earth Science**.

Content Domains: Georgia's Results in International Context

Grade 4:

- **Life Science:** In this domain, 9 countries had significantly higher average scores (▲) than their overall science score, while 18 countries had significantly lower scores (▼).
- **Physical Science:** Here, 21 countries had higher scores than their overall science score, and 13 had lower scores.
- **Earth Science:** In this domain, 9 countries had higher scores, and 17 had lower scores compared to their overall science score.

In all three domains, difference between **Georgian students' scores and national overall score is not statistically significant.**

Grade 8:

- **Biology:** In this domain, 10 countries (including Georgia) had significantly higher average scores than their overall science score, while 16 countries had lower scores.
- **Chemistry:** 13 countries had higher scores and 10 had lower scores than their overall science score.
- **Physics:** 14 countries had higher and 12 had lower average scores—Georgia among the latter.
- **Earth Science:** 14 countries had higher scores, and 15 had lower scores—Georgia included.

Student Achievement by Cognitive Domains

In addition to content domains, TIMSS also evaluates student performance in science based on three cognitive domains:

- **Knowing:** recall and description of facts, concepts, and procedures;
- **Applying:** use of knowledge in practical situations;
- **Reasoning:** skills in argumentation, problem solving, and academic analysis.

These dimensions help assess not only students' mastery of subject content but also their ability to use and reason with that knowledge — key to academic success and research skills.

The illustrations below show the average score in each cognitive domain across countries and compare each with the respective country's overall science score used for ranking.

Illustration 19. Relative Achievement in Science Cognitive Domains (Grade 4)

Country	Overall Science Average Scale Score	Knowing (69 Items)		Applying (72 Items)		Reasoning (32 Items)	
		Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score
³ Singapore	607 (2.8)	610 (2.9)	3 (1.4)	595 (2.7)	-13 (1.4) ▼	621 (2.8)	14 (1.5) ▲
Korea, Rep. of	583 (2.5)	584 (2.9)	1 (1.6)	584 (2.5)	0 (1.2)	583 (2.4)	0 (1.2)
Chinese Taipei	573 (1.7)	580 (2.0)	7 (1.1) ▲	569 (2.5)	-4 (1.5)	567 (2.0)	-6 (1.2) ▼
³ Türkiye (5)	570 (3.4)	572 (4.1)	2 (2.5)	567 (4.0)	-3 (2.5)	574 (3.9)	4 (2.4)
² England	556 (2.6)	555 (3.1)	-1 (2.1)	558 (3.0)	1 (1.9)	556 (2.8)	-1 (2.0)
Japan	555 (2.4)	538 (3.3)	-17 (2.2) ▼	560 (2.9)	5 (1.2) ▲	568 (2.5)	13 (1.2) ▲
² Poland	550 (2.2)	548 (2.0)	-2 (1.2)	553 (2.3)	3 (1.2)	546 (2.5)	-4 (2.1)
Australia	550 (2.3)	552 (2.8)	3 (2.5)	548 (2.4)	-1 (1.5)	548 (3.6)	-2 (2.3)
[†] Hong Kong SAR	545 (3.8)	548 (4.9)	2 (2.5)	543 (3.8)	-3 (1.6)	542 (4.6)	-3 (2.4)
Finland	542 (2.9)	541 (2.9)	-1 (1.2)	545 (2.9)	3 (0.7) ▲	540 (3.0)	-2 (1.5)
² Lithuania	537 (2.9)	537 (2.7)	0 (1.3)	533 (2.7)	-4 (1.4) ▼	543 (2.5)	6 (2.0) ▲
Macao SAR	536 (1.4)	538 (1.8)	2 (1.4)	534 (1.6)	-2 (0.7) ▼	534 (1.5)	-2 (1.3)
² Sweden	533 (3.2)	523 (3.8)	-10 (1.6) ▼	532 (3.3)	0 (1.3)	546 (3.5)	14 (1.3) ▲
^{2†} United States	532 (2.8)	535 (3.3)	2 (1.3)	530 (3.0)	-2 (0.9)	530 (3.0)	-3 (0.7) ▼
Ireland	532 (3.2)	534 (3.1)	2 (1.6)	530 (3.7)	-2 (2.1)	531 (3.3)	-1 (1.1)
² Norway (5)	530 (2.6)	529 (2.5)	-2 (1.0)	530 (2.4)	0 (1.2)	534 (3.1)	3 (2.2)
Bulgaria	530 (4.8)	535 (5.0)	5 (1.9) ▲	528 (5.0)	-2 (1.6)	523 (5.3)	-6 (2.1) ▼
^{2 =} Romania	526 (4.8)	523 (4.7)	-3 (1.9)	521 (4.9)	-5 (1.7) ▼	540 (4.9)	14 (1.3) ▲
² Czech Republic	526 (2.3)	524 (2.6)	-2 (1.2)	523 (2.3)	-3 (1.3)	529 (2.9)	3 (1.6)
Slovenia	526 (2.3)	524 (2.2)	-2 (2.0)	534 (2.6)	8 (1.6) ▲	512 (2.6)	-13 (2.2) ▼
Latvia	526 (3.0)	522 (3.0)	-4 (1.9)	525 (3.4)	0 (1.3)	529 (3.7)	4 (1.8)
Hungary	524 (3.2)	522 (3.7)	-3 (1.5)	524 (3.6)	-1 (1.3)	526 (3.6)	2 (1.6)
[†] Denmark	522 (2.6)	521 (2.7)	-2 (2.1)	520 (3.3)	-2 (1.6)	528 (2.7)	6 (1.7) ▲
^{1 3} Canada	521 (2.0)	527 (2.3)	6 (1.4) ▲	520 (2.5)	-1 (1.1)	515 (2.9)	-6 (1.7) ▼
Slovak Republic	521 (3.3)	524 (3.4)	4 (1.7)	520 (3.6)	-1 (1.2)	517 (4.6)	-4 (2.9)
^{2†} New Zealand	517 (2.8)	520 (2.2)	3 (1.5)	514 (2.7)	-3 (1.7)	514 (3.1)	-3 (2.2)
[†] Netherlands	517 (2.9)	518 (3.1)	1 (2.2)	513 (2.5)	-4 (1.8)	520 (3.0)	3 (3.1)
Germany	515 (2.8)	515 (2.5)	-1 (1.3)	512 (2.7)	-4 (1.3) ▼	516 (2.9)	0 (2.6)
Portugal	511 (2.3)	506 (2.7)	-5 (1.4) ▼	511 (3.5)	0 (2.3)	512 (2.8)	1 (1.6)
² Italy	511 (2.5)	511 (2.9)	1 (1.3)	508 (2.8)	-2 (1.9)	506 (2.7)	-4 (1.4) ▼
² Serbia	510 (3.2)	501 (3.0)	-8 (1.7) ▼	514 (3.5)	4 (1.8)	514 (3.8)	4 (1.5) ▲
² Spain	504 (2.1)	508 (2.3)	4 (0.6) ▲	502 (2.0)	-3 (1.1)	498 (2.5)	-6 (1.6) ▼
United Arab Emirates	495 (1.8)	507 (1.6)	12 (0.7) ▲	492 (1.7)	-3 (0.5) ▼	481 (1.5)	-14 (0.6) ▼
^{2 =} Albania	491 (4.5)	489 (4.8)	-2 (1.9)	487 (4.5)	-3 (1.6)	496 (5.3)	6 (2.6)
^{2†} Belgium (Flemish)	488 (2.6)	488 (3.3)	0 (1.8)	485 (2.5)	-4 (1.3) ▼	497 (3.4)	9 (1.8) ▲
² France	488 (3.0)	491 (2.9)	3 (2.0)	487 (3.5)	-1 (1.7)	479 (3.5)	-9 (1.7) ▼
² Cyprus	487 (3.1)	480 (3.6)	-7 (2.0) ▼	493 (3.1)	6 (0.9) ▲	487 (2.9)	0 (1.9)
² Belgium (French)	481 (2.8)	478 (2.8)	-2 (1.6)	480 (3.1)	0 (1.7)	483 (2.5)	2 (2.1)
^{2†} Chile	479 (2.7)	479 (3.2)	0 (1.7)	479 (2.5)	-1 (1.9)	477 (2.9)	-3 (2.4)
Bahrain	475 (3.9)	477 (4.4)	2 (1.6)	475 (3.9)	0 (2.0)	465 (4.1)	-10 (1.3) ▼
Qatar	472 (3.6)	476 (3.7)	4 (1.0) ▲	470 (3.7)	-2 (1.0)	464 (3.7)	-8 (1.3) ▼
² Kazakhstan	467 (3.5)	460 (4.1)	-6 (1.7) ▼	466 (3.7)	-1 (1.5)	475 (3.9)	9 (1.6) ▲
¹ Georgia	465 (3.4)	460 (4.5)	-5 (2.7) ▼	461 (3.6)	-4 (2.1)	470 (3.1)	5 (2.1)
² Montenegro	461 (2.0)	454 (2.9)	-7 (1.9) ▼	463 (2.2)	3 (1.0) ▲	461 (2.9)	0 (1.6)
² Armenia	457 (2.7)	458 (3.2)	1 (1.9)	453 (2.4)	-4 (1.0) ▼	461 (2.4)	4 (1.6)
¹ Bosnia & Herzegovina	448 (3.7)	441 (3.3)	-7 (2.6) ▼	454 (3.8)	5 (2.8)	443 (3.9)	-5 (2.2)
North Macedonia	439 (3.9)	434 (4.3)	-5 (1.3) ▼	440 (3.4)	1 (1.6)	442 (4.8)	4 (2.8)
Oman	433 (4.2)	426 (4.4)	-7 (1.4) ▼	435 (4.4)	2 (1.2)	435 (4.0)	3 (1.4)
Iran, Islamic Rep. of	432 (4.5)	435 (4.6)	3 (1.9)	428 (4.5)	-4 (1.3) ▼	431 (4.2)	-1 (1.9)
³ Saudi Arabia	428 (4.0)	430 (4.7)	3 (1.8)	425 (4.1)	-2 (2.0)	424 (4.3)	-4 (1.4) ▼
² Brazil	425 (3.5)	427 (3.5)	2 (0.9)	420 (3.4)	-5 (0.9) ▼	427 (3.6)	2 (1.1)
Azerbaijan	422 (3.3)	425 (3.0)	4 (1.8)	416 (3.3)	-6 (2.8)	421 (3.5)	-1 (2.0)
Jordan	418 (4.9)	423 (5.4)	5 (1.8) ▲	412 (5.5)	-6 (1.9) ▼	409 (4.9)	-9 (2.3) ▼
Uzbekistan	412 (3.5)	415 (4.3)	3 (1.6)	406 (3.6)	-6 (2.4)	406 (3.2)	-6 (1.6) ▼
² Kosovo	403 (3.6)	399 (3.8)	-4 (2.0)	406 (3.6)	3 (2.1)	397 (3.2)	-6 (2.7)
Morocco	390 (5.3)	386 (5.7)	-4 (2.0)	381 (5.5)	-9 (1.7) ▼	398 (5.0)	7 (2.1) ▲
^ψ Kuwait	373 (5.5)	382 (5.6)	9 (1.6) ▲	356 (5.7)	-17 (1.5) ▼	353 (6.0)	-20 (1.8) ▼
[✱] South Africa (5)	308 (4.7)	-	-	-	-	-	-
Benchmarking Participants							
Dubai, UAE	562 (1.8)	578 (1.7)	15 (1.1) ▲	561 (1.7)	-2 (1.0)	546 (1.8)	-16 (1.3) ▼
³ Ontario, Canada	525 (3.2)	532 (3.4)	6 (1.6) ▲	527 (3.5)	2 (1.4)	518 (4.1)	-7 (2.2) ▼
² Quebec, Canada	508 (2.7)	512 (2.8)	4 (1.4) ▲	502 (3.0)	-5 (1.3) ▼	504 (3.5)	-3 (1.9)
Sharjah, UAE	503 (3.9)	518 (4.1)	15 (1.9) ▲	500 (4.2)	-3 (1.7)	485 (3.6)	-18 (1.0) ▼
Abu Dhabi, UAE	446 (2.6)	454 (2.8)	8 (0.9) ▲	443 (2.4)	-3 (0.8) ▼	437 (2.2)	-9 (1.5) ▼

▲ ▼ Subscale score significantly different from overall score ($p < 0.01$)

Numbers of items are based on the TIMSS 2023 fourth-grade science items included in scaling.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and =.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

✱ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

Illustration 20. Relative Achievement in Science Cognitive Domains (Grade 8)

Country	Overall Science	Knowing (68 Items)		Applying (91 Items)		Reasoning (53 Items)	
	Average Scale Score	Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score	Average Scale Score	Difference from Overall Score
³ Singapore	606 (5.7)	610 (5.7)	4 (1.6) ▲	605 (5.8)	-2 (1.0)	608 (5.7)	1 (1.4)
Chinese Taipei	572 (2.4)	592 (2.8)	21 (1.6) ▲	574 (2.5)	2 (0.8)	556 (2.4)	-16 (1.3) ▼
[†] Japan	557 (3.1)	558 (3.5)	1 (2.6)	559 (3.5)	2 (2.1)	555 (3.2)	-2 (2.3)
Korea, Rep. of	545 (2.2)	535 (2.9)	-10 (1.8) ▼	547 (2.2)	2 (1.1)	554 (2.3)	9 (1.4) ▲
² England	531 (4.3)	532 (4.6)	1 (2.4)	528 (4.2)	-3 (1.1) ▼	536 (4.8)	5 (1.7) ▲
Finland	531 (3.2)	529 (2.9)	-1 (1.1)	531 (3.0)	0 (2.1)	533 (3.2)	2 (1.4)
^{3†} Türkiye	530 (3.6)	503 (4.1)	-26 (2.5) ▼	537 (3.7)	7 (1.3) ▲	543 (3.9)	14 (2.3) ▲
[†] Hong Kong SAR	528 (4.7)	528 (4.7)	0 (1.1)	527 (5.0)	-1 (1.5)	528 (5.0)	1 (1.3)
² Czech Republic	527 (2.0)	530 (2.1)	3 (1.0) ▲	529 (2.4)	2 (1.4)	519 (2.4)	-8 (1.1) ▼
Ireland	525 (3.5)	519 (3.8)	-6 (1.0) ▼	524 (3.8)	-1 (1.4)	531 (3.4)	6 (1.4) ▲
Hungary	522 (3.3)	531 (3.5)	9 (1.3) ▲	522 (3.3)	0 (1.4)	512 (3.2)	-9 (1.0) ▼
² Sweden	521 (2.9)	514 (3.1)	-7 (1.2) ▼	521 (3.2)	-1 (1.6)	528 (3.1)	7 (1.2) ▲
Australia	520 (3.2)	513 (3.1)	-7 (1.4) ▼	520 (3.2)	0 (1.0)	526 (3.4)	6 (1.2) ▲
² Lithuania	519 (3.0)	515 (2.9)	-4 (1.8)	520 (3.1)	1 (1.7)	521 (3.2)	2 (1.8)
[≡] United States	513 (3.9)	503 (4.0)	-11 (1.5) ▼	514 (3.9)	0 (1.2)	521 (4.1)	8 (1.0) ▲
² Austria	512 (2.4)	511 (2.7)	-1 (1.4)	512 (2.4)	0 (0.9)	512 (2.6)	0 (1.4)
Portugal	506 (2.4)	510 (3.0)	5 (1.6) ▲	505 (2.4)	-1 (1.0)	500 (3.3)	-5 (2.6)
Malta	501 (1.6)	496 (2.4)	-5 (1.7) ▼	501 (1.6)	0 (1.1)	505 (2.9)	4 (2.6)
Italy	501 (3.2)	510 (4.1)	10 (2.5) ▲	499 (3.8)	-1 (1.6)	490 (3.5)	-10 (1.2) ▼
² Norway (9)	488 (2.6)	485 (3.0)	-3 (1.8)	487 (2.7)	-2 (0.9)	493 (2.9)	5 (1.2) ▲
United Arab Emirates	486 (2.0)	492 (2.4)	6 (0.8) ▲	486 (2.0)	0 (0.8)	478 (2.0)	-8 (0.5) ▼
France	486 (3.2)	487 (3.6)	1 (2.7)	481 (3.2)	-5 (1.5) ▼	491 (3.4)	5 (1.9) ▲
Qatar	481 (4.3)	485 (4.2)	4 (1.3) ▲	481 (4.4)	0 (1.0)	472 (4.6)	-9 (1.9) ▼
³ Israel	481 (3.6)	475 (3.9)	-5 (1.5) ▼	477 (3.6)	-3 (0.9) ▼	489 (4.5)	8 (2.5) ▲
[≡] Romania	466 (4.1)	479 (4.1)	13 (2.0) ▲	462 (4.4)	-4 (1.7)	454 (4.4)	-12 (1.2) ▼
Cyprus	464 (3.0)	472 (3.2)	8 (1.3) ▲	460 (3.0)	-5 (1.1) ▼	461 (3.2)	-3 (1.6)
Oman	456 (2.6)	460 (2.9)	5 (1.2) ▲	457 (2.3)	1 (1.0)	447 (2.4)	-9 (1.6) ▼
[†] Chile	455 (2.7)	461 (2.6)	6 (1.6) ▲	452 (2.7)	-4 (1.1) ▼	454 (2.8)	-1 (1.9)
Bahrain	452 (2.6)	452 (2.6)	0 (1.7)	455 (2.2)	3 (1.7)	441 (3.0)	-11 (1.7) ▼
¹ Georgia	448 (2.9)	461 (3.4)	13 (2.2) ▲	444 (2.6)	-4 (1.1) ▼	434 (2.5)	-14 (1.7) ▼
Kazakhstan	443 (3.0)	429 (3.6)	-14 (1.7) ▼	446 (2.9)	4 (1.0) ▲	446 (3.4)	4 (1.5) ▲
Malaysia	426 (3.7)	413 (4.0)	-14 (0.9) ▼	429 (3.6)	3 (0.7) ▲	433 (3.9)	7 (1.4) ▲
Brazil	420 (2.5)	424 (2.5)	4 (1.0) ▲	418 (2.5)	-2 (1.0)	416 (3.0)	-4 (1.5) ▼
Kuwait	420 (5.8)	430 (6.2)	10 (3.3) ▲	417 (6.0)	-3 (2.2)	406 (5.4)	-14 (1.9) ▼
² Saudi Arabia	419 (3.4)	422 (3.6)	3 (0.8) ▲	419 (3.4)	-1 (1.4)	411 (3.3)	-8 (1.0) ▼
Iran, Islamic Rep. of	419 (3.6)	416 (4.1)	-3 (2.0)	423 (3.4)	4 (1.5) ▲	409 (3.4)	-10 (1.2) ▼
Jordan	413 (3.6)	412 (3.4)	0 (1.3)	414 (3.3)	1 (1.4)	402 (3.7)	-10 (1.4) ▼
Azerbaijan	411 (3.0)	410 (3.6)	-1 (1.9)	415 (2.8)	4 (1.1) ▲	406 (3.9)	-6 (2.5)
Uzbekistan	396 (3.7)	396 (3.5)	0 (1.6)	397 (3.8)	2 (1.9)	387 (4.5)	-8 (1.6) ▼
Palestinian Nat'l Auth.	393 (2.9)	400 (3.0)	7 (1.4) ▲	393 (3.0)	0 (1.4)	376 (3.6)	-17 (1.9) ▼
^ψ South Africa (9)	362 (4.0)	346 (4.1)	-16 (1.3) ▼	372 (3.8)	10 (1.2) ▲	363 (3.9)	0 (1.3)
^ψ Morocco	327 (3.4)	325 (3.9)	-2 (1.3)	324 (3.1)	-3 (1.2) ▼	326 (4.0)	-1 (2.5)
[≡] New Zealand	502 (4.0)	491 (4.4)	-11 (1.6) ▼	501 (3.9)	-1 (1.4)	515 (4.3)	13 (1.7) ▲
[✱] Cote d'Ivoire	183 (8.2)	-	-	-	-	-	-
Benchmarking Participants							
Dubai, UAE	547 (3.2)	557 (3.5)	9 (1.4) ▲	546 (3.2)	-1 (0.8)	540 (3.4)	-7 (1.5) ▼
Sharjah, UAE	499 (4.9)	510 (5.6)	11 (1.3) ▲	498 (5.1)	0 (1.7)	485 (4.8)	-14 (2.0) ▼
Abu Dhabi, UAE	443 (3.8)	440 (4.2)	-4 (1.3) ▼	446 (3.7)	3 (0.9) ▲	441 (3.6)	-2 (1.0)

▲ ▼ Subscale score significantly different from overall score ($p < 0.01$)

Numbers of items are based on the TIMSS 2023 eighth-grade science items included in scaling.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

See Appendix B.7 for population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

✱ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

A dash (-) indicates comparable data not available because average achievement could not be accurately estimated.

New Zealand did not satisfy guidelines for minimum school participation rates. Achievement could not be reliably estimated for Cote d'Ivoire.

TIMSS results show that student achievement varies across different cognitive domains in science subjects. In some cases, students perform better in specific cognitive domains than their overall science score, while in other cases their performance is lower. This indicates that students face different challenges in knowledge, application, and reasoning components.

The data suggest that Georgia's 8th grade students demonstrate significantly better results in theoretical knowledge, but perform very poorly in the reasoning component related to science topics.

Georgia is among the countries where 4th grade students' achievements across cognitive domains do not significantly differ from their overall average score. This means that cognitive skills at the primary level are developing in a relatively balanced way, although the pace of development remains insufficient.

Cognitive Domains: Comparative Analysis of Results in an International Context

Grade 4

- **Knowing:** In this domain, 8 countries scored statistically significantly higher (▲) than their overall science score, while 10 countries scored lower (▼).
- **Applying:** 5 countries scored significantly higher than their overall science score, while 13 countries scored lower.
- **Reasoning:** 10 countries scored significantly higher than their overall science score, while 15 countries scored lower.

Grade 8

- **Knowing:** 17 countries (including Georgia) scored significantly higher than their overall science score, while 12 countries scored lower.
- **Applying:** 6 countries scored significantly higher, and 7 countries (including Georgia) scored lower than their overall science score.
- **Reasoning:** 13 countries scored significantly higher, while 17 countries (including Georgia) scored significantly lower.

Summary: What Do TIMSS Results Tell Us About Georgian Students?

Research findings

An analysis of TIMSS 2023 results shows that in Georgia, student achievement in mathematics—especially at the primary level — has steadily improved over the last decades. The achievement of Georgian 4th graders, now at the international average, signals early signs of progress in the school education system.

The dynamics of student achievement from 2007 to 2023 show an improvement over this 16-year period. Despite the overall progress, the analysis of TIMSS 2023 data clearly reveals several significant challenges for Georgia’s education system:

- The results clearly indicate serious challenges in the teaching and learning of **science subjects** at both the 4th and 8th grade levels. A high proportion of students are at academic risk, failing to demonstrate even minimal competencies (unable to solve low-level tasks). Similar trends are observed in mathematics: although the results are better compared to science, they are still concerning.
- The results also show that the transition from **primary to basic education** is not effectively managed. This is evidenced by:
 - A decline in student achievement from grade 4 to grade 8 in both mathematics and science;
 - A trend of stagnation in grade 8 results (in terms of improvement).

These findings suggest that students move on to the next level and new academic environment without adequate readiness or sufficient subject-specific and methodological support, hindering their continuous and consistent academic development.

- The analysis of Georgian students’ results by **content domains** in mathematics and science reveals certain systemic patterns that are important signals for teachers and schools at both the primary and basic levels.

Mathematics: Georgian students perform relatively better in the *number* content domain in both grades 4 and 8. At the primary level, weaker results are seen in *geometry, measurement, and data display*. At the basic level (grade 8), as with numbers, students perform better in *algebra*, but show very low performance in *data and probability*, which is one of the most critical areas both nationally and internationally.

Science: Primary school students show better results in *life science* and *physical science*, with relatively lower results in *earth science*. At the basic level, the highest achievements are in *biology*, while *physics* and *earth science* remain the most critical areas.

These trends identified through the study require in-depth analysis and targeted support at both the curriculum content and teaching methodology levels, so that schools can strengthen students' strong areas and develop their weaker skills.

- The analysis of Georgian students' results by **cognitive domains** shows that in both mathematics and science, cognitive skills are unevenly developed. At the primary level, progress in cognitive skills is relatively balanced but slow; at the basic level, difficulties are evident in both application and reasoned argumentation.

The data indicate a systemic need to improve teaching approaches to ensure coordinated development of conceptual understanding, critical thinking, and practical reasoning, helping students to build integrated and functional knowledge.

Improving the quality of education requires significant systemic changes to support the teaching and learning processes in mathematics and especially in science. The findings of the study highlight the need for effective implementation of: teacher professional development, early diagnostics of student achievement, targeted interventions, and Inclusive approaches. It is essential to adopt strategies that provide all students — regardless of their social background or place of residence — equal opportunities for meaningful academic development.

The strategic development of Georgia's general education system should be grounded in a thorough analysis of student achievement in both international and national assessments, as well as an evaluation of the factors that support or hinder progress. Evidence-based policies that focus on equity and inclusion represent the most effective way to respond to these challenges and lay a sustainable foundation for improving student outcomes.

Georgia on the Global Educational Map: Positioning, Progress, and Challenges

For almost two decades, Georgia has been participating in international assessments, which makes it possible to evaluate the positioning, progress, and challenges of the country's education system in a global context. TIMSS 2007–2023 data show that Georgia's education system combines both clear signs of progress and achievement, as well as structural challenges and areas that are in need of improvement.

Compared with countries operating under similar economic and demographic conditions, Georgia's place on the international educational map has been steadily improving, and the system is gradually becoming more competitive. However, Georgia still significantly lags behind the global leaders (Singapore, Chinese Taipei, the Republic of Korea, Hong Kong, etc.). It should be noted that these countries substantially outperform even leading European countries and consistently maintain top positions in the global education space. Their high levels of achievement in teaching mathematics and science are based on purposeful education policies, high professional standards for teachers, and a continuous and focused emphasis on teaching quality.

Trends 2007–2023. The long-term TIMSS global trends are as follows — some countries show steady progress, while others demonstrate noticeable regression. Between 2007 and 2023, Georgia recorded one of the most positive dynamics in improving student achievement among post-Soviet countries. Specifically, in mathematics, fourth-grade results improved by 60 points and eighth-grade results by 57 points; in science, the gains were more modest, but improvement is still evident (47 points in grade 4 and 27 points in grade 8). Among post-Soviet countries, Lithuania consistently outperforms Georgia, but its positive dynamics between 2007 and 2023 are less pronounced: in grade 4 mathematics, an improvement of 31 points, in grade 4 science, 23 points, while in grade 8 science Lithuania's results did not change at all. Georgia's improvement indicators are significantly above the global average; however, it is important to note that Georgia **started from a very low baseline**. In 2007, Georgian students' results were substantially below both global and post-Soviet averages.

Trends 2019–2023. Analysis of TIMSS 2019–2023 results shows that internationally, student achievement in both mathematics and science stagnated or declined, particularly at the eighth-grade level. Globally, the average score in grade 8 mathematics dropped by 7.55 points, and in science by nearly 10 points. This may point to systemic global challenges, including the impact of the COVID-19 pandemic and the shift to remote learning.

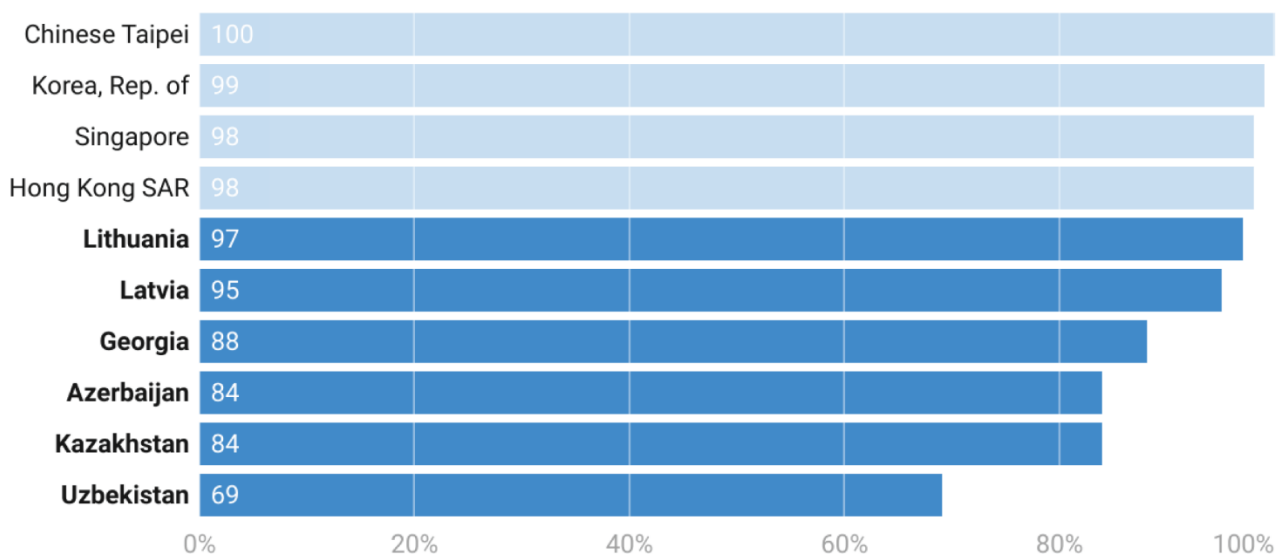
Among post-Soviet countries, differences in trajectories are substantial. Georgia is among the countries that managed to show progress (e.g., Georgia, Lithuania, Armenia), while others experienced significant decline (Kazakhstan, Azerbaijan, Latvia). In particular, Kazakhstan recorded the sharpest regressions in both mathematics and science across both grade levels.

TIMSS and the Impact of COVID-19. TIMSS 2023 results provide insight into how Georgia responded to the challenges of the COVID-19 pandemic and how this unprecedented global event affected the education system and student achievement in mathematics and science. The study confirms that the pandemic had a deep and widespread impact on students' academic performance. However, Georgia's case is different: unlike most participating countries, Georgia's results did not decline compared with TIMSS 2019. On the contrary, Georgia showed mostly positive dynamics: in grade 4, mathematics scores improved by 16 points and science by 11 points. Although changes in grade 8 were minimal, results still indicate stability, which is a positive outcome in the regional context.

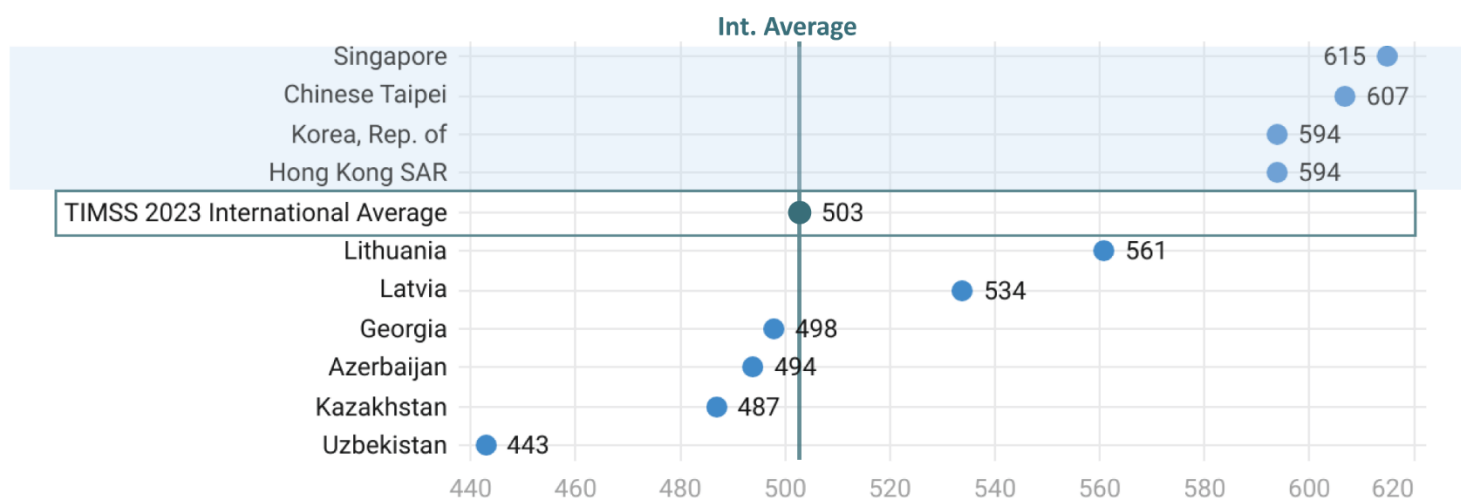
Overall Positioning. Against the backdrop of regional data, Georgia positions itself as a country that, despite its initially weak starting point, manages to achieve some progress. To successfully move through this transitional stage, systemic and targeted interventions in areas that determine equal access to quality education are critically important. TIMSS results demonstrate that many significant steps are still required for Georgia's education system to achieve genuine and systemic transformation. This involves not only improving quality but also effectively adapting the system to global educational trends and challenges. The technological and digital revolution, the shift to the "information economy," the growing importance of artificial intelligence, climate change, and the COVID-19 pandemic have all highlighted the decisive role of scientific knowledge and innovation in ensuring societal security and survival (Sharon & Baram-Tsabari, 2020). For Georgia to nurture a successful, responsible, and innovation-ready young generation, it is critical that education policy focus on high-level teaching of these subjects. Of particular importance is the development of research-based, long-term strategies to support mathematics and science education, along with their gradual and targeted implementation. This will ensure the sustainability, innovativeness, and global competitiveness of the education system.

Grade 4 - Mathematics

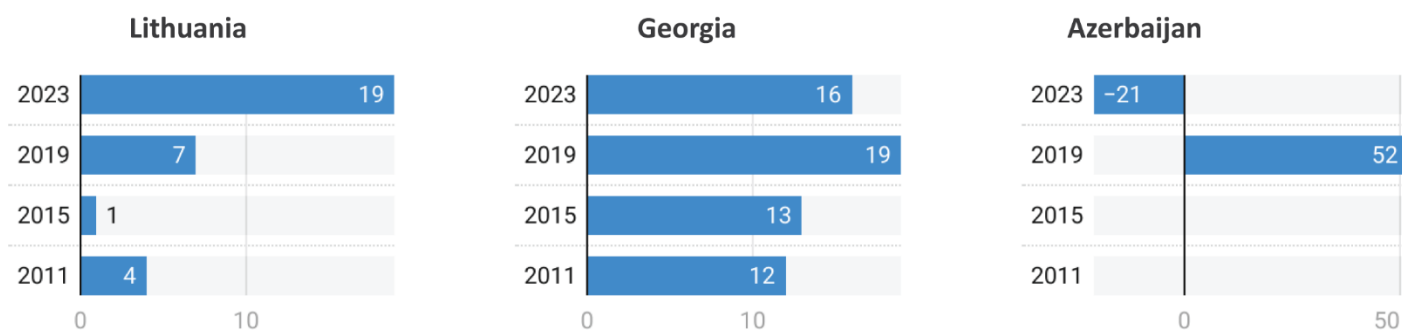
Indicator of Minimum Competence Achievement – Global Leaders vs Post-Soviet Countries



Achievements in Mathematics - Global Leaders vs Post-Soviet Countries

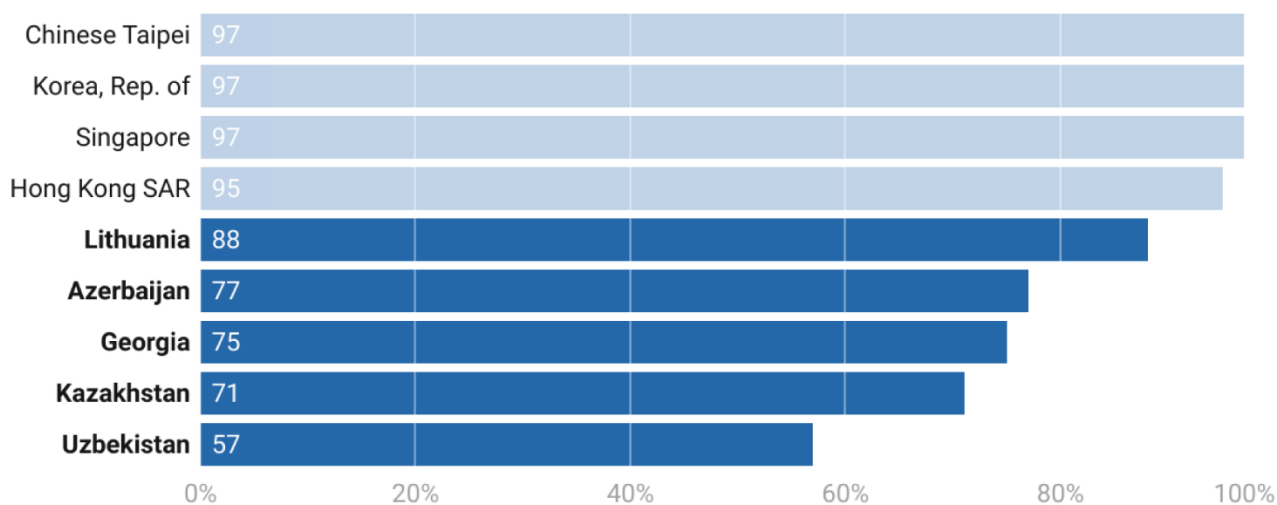


Dynamics of Achievement Improvement 2007-2023

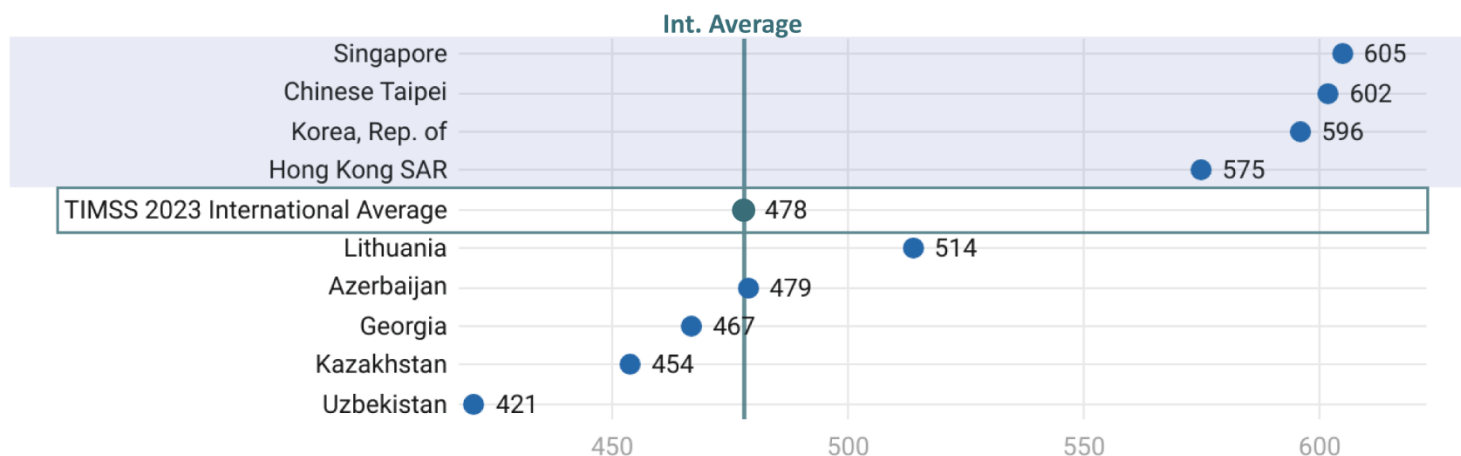


Grade 8 - Mathematics

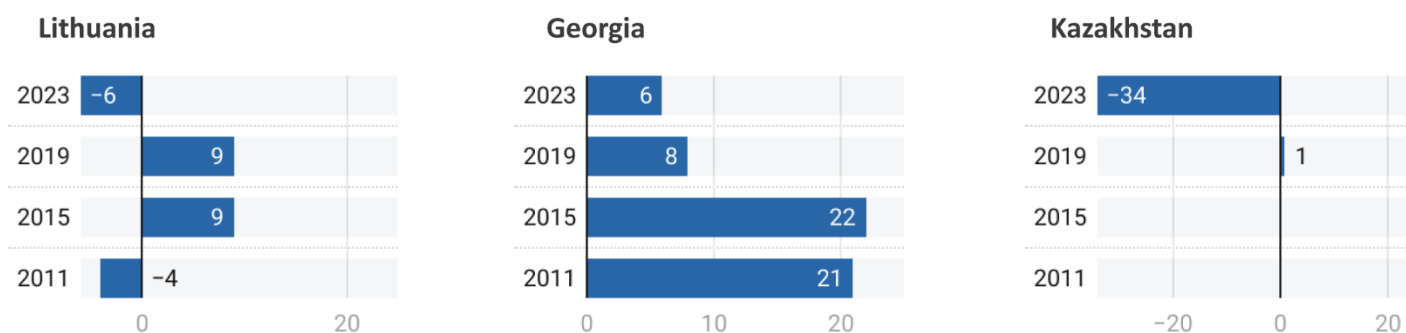
Indicator of Minimum Competence Achievement – Global Leaders vs Post-Soviet Countries



Achievements in Mathematics - Global Leaders vs Post-Soviet Countries

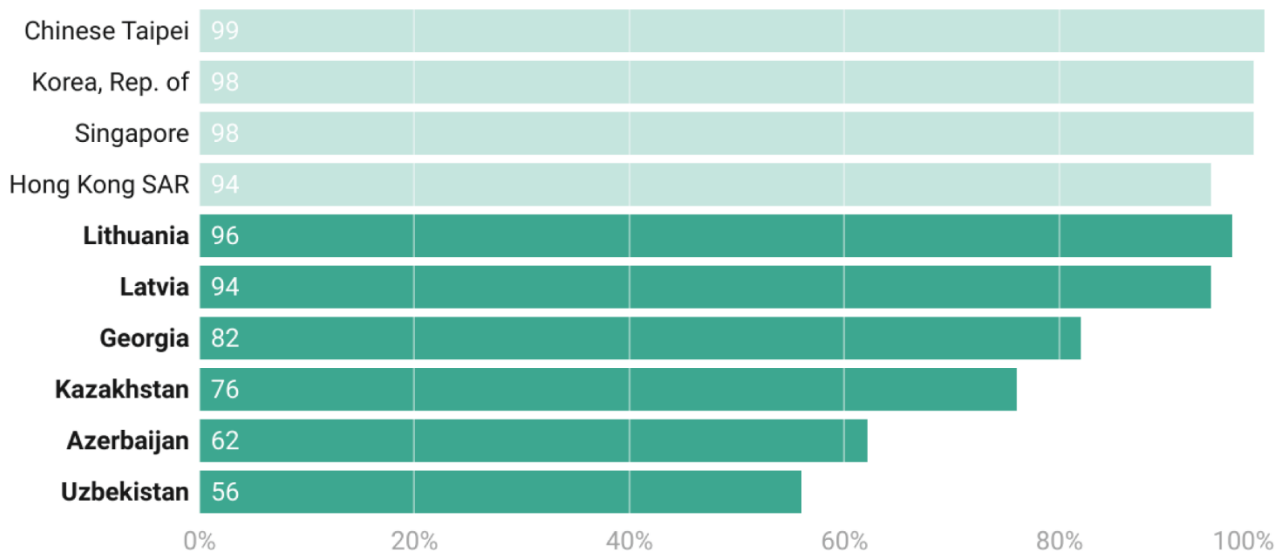


Dynamics of Achievement Improvement 2007-2023

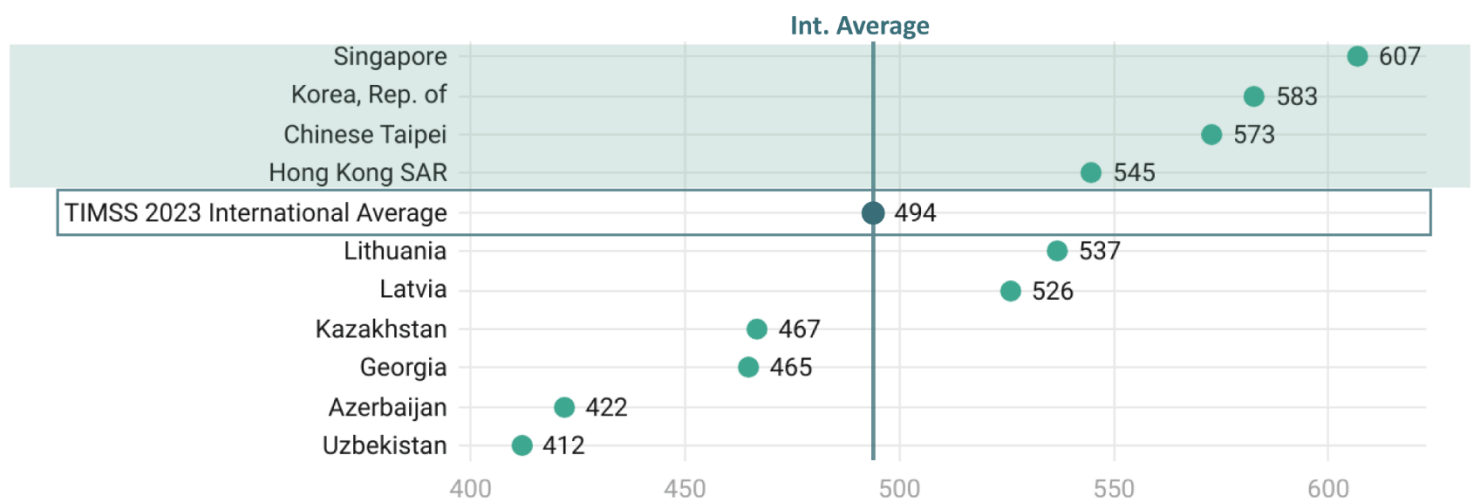


Grade 4 - Science

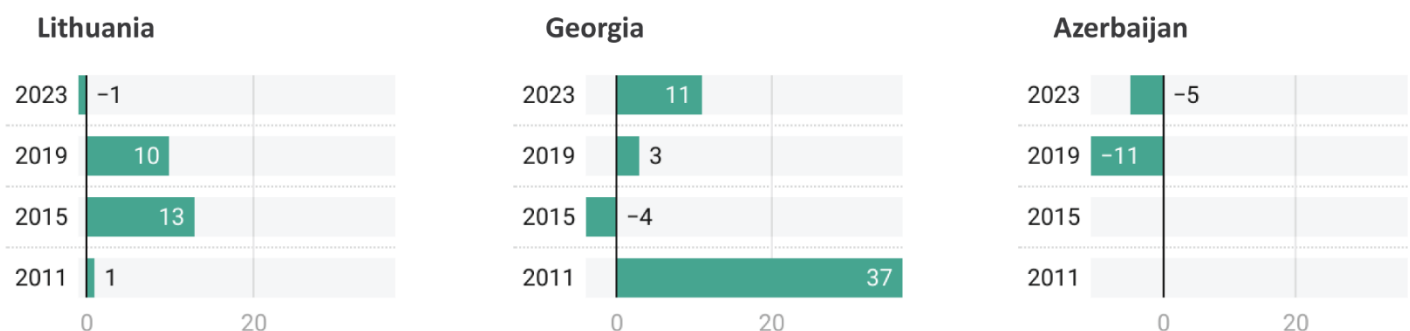
Indicator of Minimum Competence Achievement – Global Leaders vs Post-Soviet Countries



Achievements in Science - Global Leaders vs Post-Soviet Countries

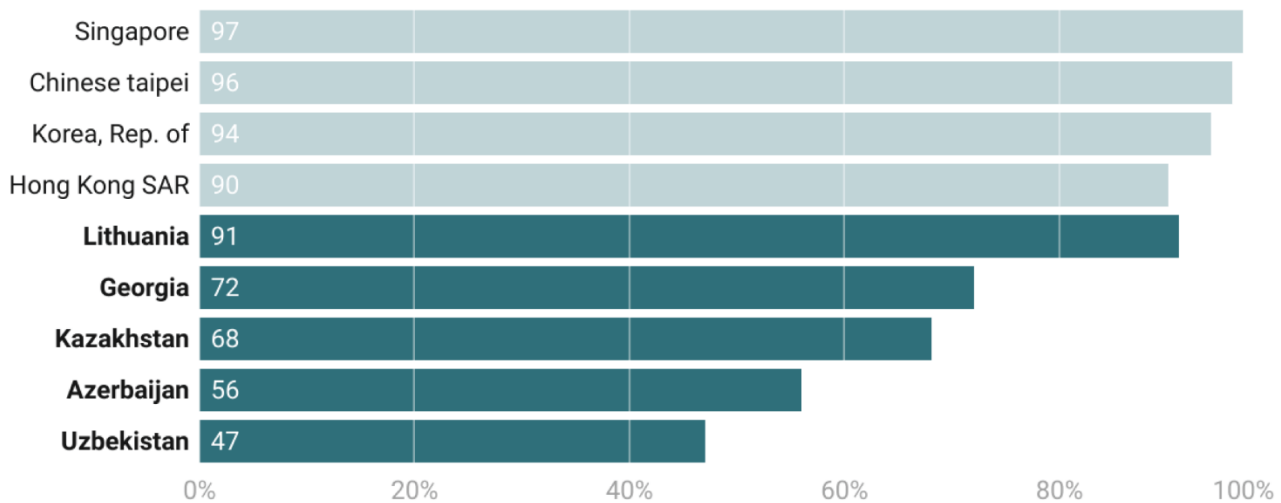


Dynamics of Achievement Improvement 2007-2023

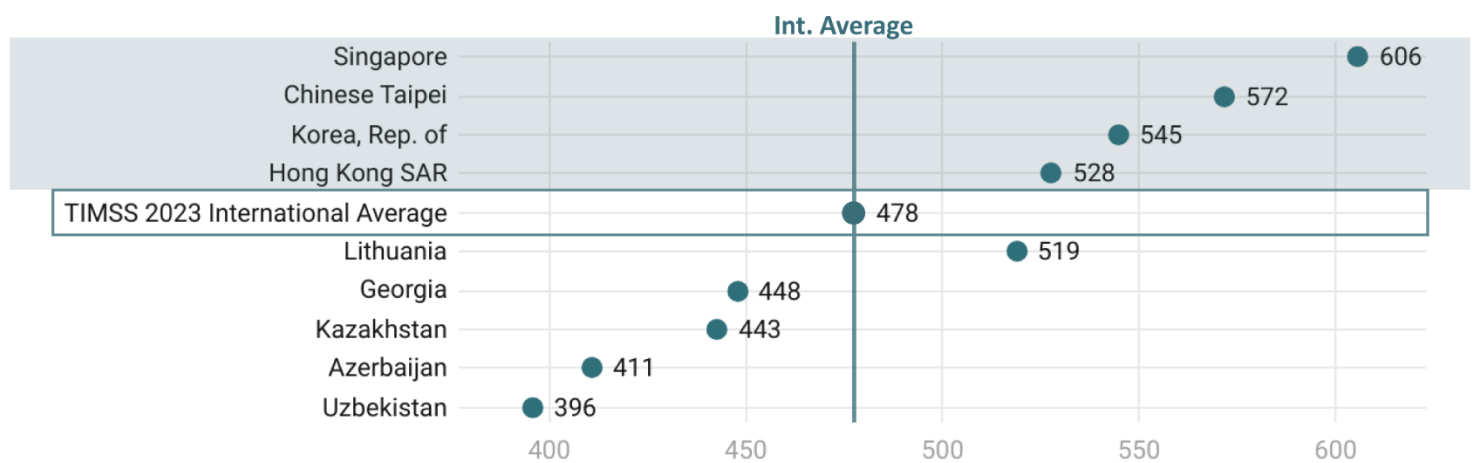


Grade 8 - Science

Indicator of Minimum Competence Achievement – Global Leaders vs Post-Soviet Countries



Achievements in Science - Global Leaders vs Post-Soviet Countries



Dynamics of Achievement Improvement 2007-2023

