Mathematics Curriculum and Instruction

Instructional Time in Mathematics

Though many factors influence the relationship between amount of instructional time and student achievement—primarily, the quality of the instruction and the students' readiness to learn—instructional time remains a crucial component in considering students' opportunity to learn. Instructional time was calculated using principals' reports on the number of school days per year and the number of instructional hours per day and teachers' reports on the weekly number of hours of mathematics instruction, as explained in Exhibit 12.1 (see About the Scale). Exhibits 12.2 and 12.3 present principals' and teachers' reports about the instructional hours per year overall spent on mathematics instruction in fourth grade and eighth grade, respectively. Countries are ordered by the number of hours per year for mathematics instruction.

On average, the fourth grade students across the TIMSS 2019 countries received 895 hours per year of instruction across all subjects, and 154 hours, or about 17 percent of the total, were devoted to mathematics instruction. The number of hours devoted to mathematics instruction ranged from a high of 250 hours in Portugal to 101 in Korea. The amount of mathematics instructional time relative to total instructional time varied considerably across countries, reflecting different approaches to organizing and addressing the mathematics curriculum. As might be anticipated, within-country estimates of instructional time can vary somewhat from the levels of instructional time established by policy (see *TIMSS 2019 Encyclopedia*).

The eighth grade students across the TIMSS 2019 countries received an average of 1,023 hours of instruction across all subjects, and 137 hours, or 13 percent of the total, were devoted to mathematics instruction. The number of hours for mathematics instruction ranged from 200 in Chile to 102 in Cyprus. Of the countries that participated in TIMSS at the fourth and eighth grades, in most countries, the number of annual hours devoted to mathematics instruction decreased between fourth and eighth grades, likely because by eighth grade, the school curriculum covers many more subjects than in fourth grade.

Exhibit 12.1: Instructional Time Spent on Mathematics

Students' Results based on Principals' and Teachers' Reports

About the Scale

Total Instructional Hours Per Year = Principal Reports of School Days per Year × Principal Reports of Instructional Hours per Day

Hours per Year for Mathematics Instruction = $\frac{\text{Teacher Reports of Weekly Mathematics Instructional Hours}}{\text{Principal Reports of School Days per Week}}$ × Principal Reports of School Days per Year

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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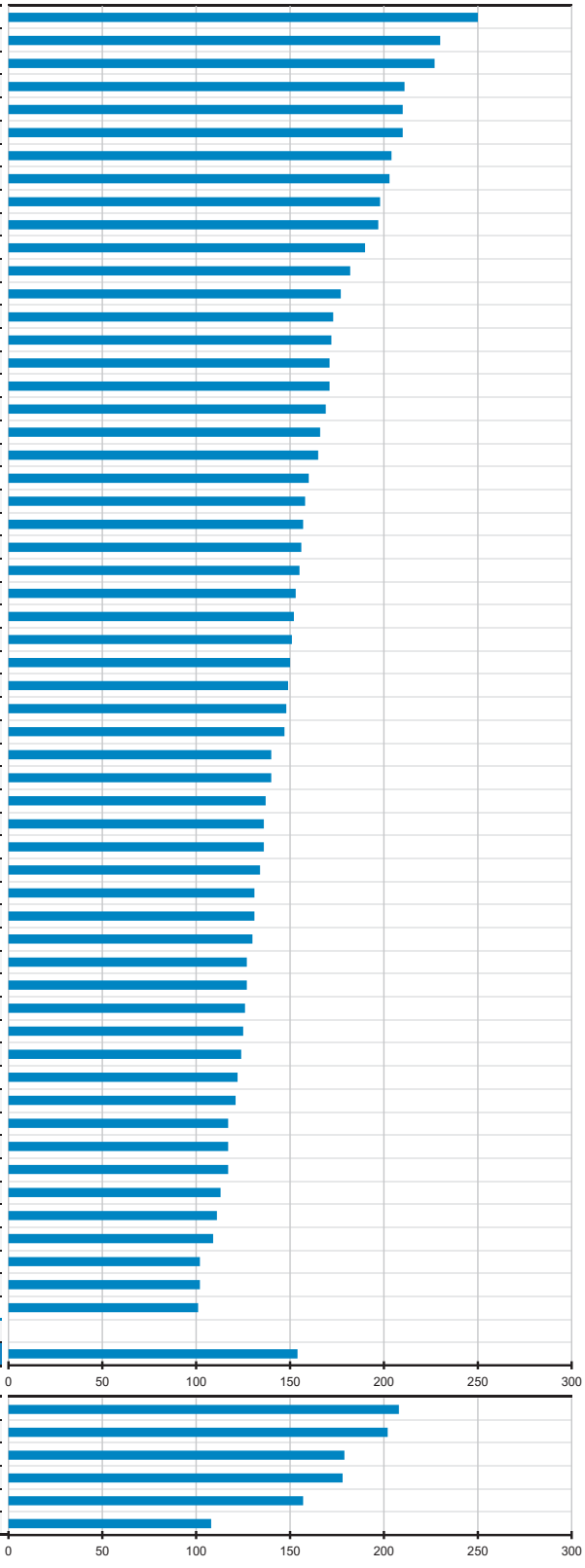
Exhibit 12.2: Instructional Time Spent on Mathematics

Students' Results based on Principals' and Teachers' Reports

Country	Total Instructional Hours per Year	Hours per Year for Mathematics Instruction
Portugal	887 (14.8)	250 (5.3)
Italy	1098 (15.0)	230 (5.3)
South Africa (5)	r 1205 (12.1)	r 227 (4.5)
Singapore	1009 (0.0)	211 (2.7)
United States	1106 (8.4)	210 (3.9)
Belgium (Flemish)	r 951 (14.6)	r 210 (2.9)
Chile	r 1186 (22.3)	r 204 (6.9)
Northern Ireland	r 947 (7.1)	r 203 (3.9)
Canada	951 (3.9)	r 198 (2.7)
Netherlands	s 1049 (10.3)	s 197 (6.4)
Australia	r 1015 (11.8)	r 190 (5.2)
France	r 820 (7.4)	r 182 (2.5)
Bahrain	1012 (8.2)	177 (2.5)
Philippines	1225 (12.6)	173 (3.6)
Qatar	1011 (11.8)	172 (4.7)
Cyprus	849 (10.6)	r 171 (3.1)
Morocco	1081 (20.4)	171 (3.9)
United Arab Emirates	r 1034 (3.9)	s 169 (1.7)
Malta	930 (1.4)	166 (0.4)
Ireland	925 (5.0)	165 (2.6)
New Zealand	917 (5.7)	160 (2.7)
Oman	r 1016 (13.9)	r 158 (3.1)
Pakistan	1218 (22.3)	r 157 (11.2)
Spain	869 (7.1)	156 (2.5)
Denmark	r 1043 (10.4)	s 155 (2.7)
Germany	r 833 (10.1)	r 153 (2.2)
Hong Kong SAR	r 1022 (14.3)	r 152 (3.3)
Japan	904 (4.9)	151 (1.0)
Kosovo	777 (32.0)	r 150 (4.4)
Czech Republic	763 (8.9)	149 (1.5)
Serbia	794 (19.2)	148 (2.5)
Chinese Taipei	953 (8.9)	147 (8.5)
Turkey (5)	1001 (24.2)	140 (5.1)
Hungary	842 (13.8)	140 (2.8)
Sweden	r 854 (10.7)	r 137 (2.7)
Saudi Arabia	1056 (18.0)	r 136 (4.7)
Kuwait	r 899 (24.3)	s 136 (4.3)
Kazakhstan	732 (14.0)	134 (4.6)
North Macedonia	818 (22.0)	131 (2.7)
Georgia	750 (18.7)	131 (2.6)
Austria	759 (3.1)	130 (1.0)
Slovak Republic	784 (9.9)	127 (2.0)
Norway (5)	r 868 (14.4)	s 127 (4.1)
Armenia	752 (6.4)	126 (0.7)
Lithuania	725 (10.0)	125 (2.1)
Azerbaijan	731 (19.4)	124 (1.9)
Bosnia and Herzegovina	851 (35.9)	122 (2.4)
Croatia	859 (26.2)	121 (3.0)
Finland	746 (9.9)	117 (2.0)
Montenegro	653 (1.6)	117 (1.2)
Latvia	689 (8.9)	117 (1.7)
Albania	729 (10.3)	113 (1.4)
Poland	r 737 (10.1)	r 111 (1.4)
Iran, Islamic Rep. of	627 (6.0)	109 (1.6)
Russian Federation	663 (6.8)	102 (1.6)
Bulgaria	700 (14.9)	102 (1.3)
Korea, Rep. of	694 (8.7)	101 (1.9)
England	s 989 (11.2)	y - -
International Average	**895 (1.9)**	**154 (0.5)**
Benchmarking Participants		
Ontario, Canada	954 (7.5)	r 208 (3.9)
Quebec, Canada	922 (8.2)	r 202 (6.2)
Madrid, Spain	909 (12.5)	179 (2.6)
Abu Dhabi, UAE	r 1075 (3.2)	s 178 (2.3)
Dubai, UAE	r 1038 (0.6)	s 157 (2.2)
Moscow City, Russian Fed.	645 (9.6)	108 (2.1)



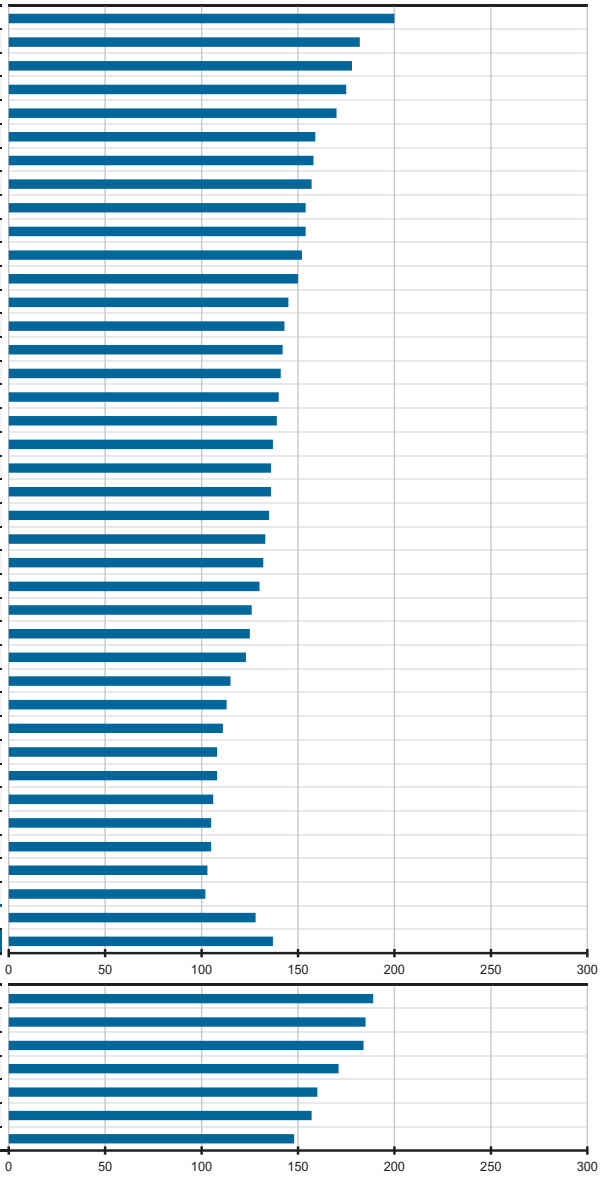
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
A "y" indicates data are available for less than 40% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

Exhibit 12.3: Instructional Time Spent on Mathematics

Students' Results based on Principals' and Teachers' Reports

Country		Total Instructional Hours per Year		Hours per Year for Mathematics Instruction
Chile		1221 (20.5)	r	200 (6.1)
South Africa (9)	s	1212 (13.5)	s	182 (2.7)
Oman	r	1056 (18.9)	r	178 (4.1)
United Arab Emirates	r	1094 (2.7)	s	175 (1.9)
Lebanon		960 (7.3)		170 (3.8)
Bahrain		1115 (0.6)		159 (1.6)
Israel		1118 (13.6)	r	158 (3.2)
Chinese Taipei		1137 (12.3)		157 (1.7)
United States		1148 (9.9)	r	154 (3.3)
Qatar		1090 (9.9)	r	154 (5.8)
Morocco	r	1341 (30.8)	r	152 (3.4)
Turkey		1009 (27.5)		150 (6.4)
Italy		1065 (11.2)		145 (2.8)
Hong Kong SAR		999 (12.6)		143 (4.7)
Russian Federation		868 (13.3)		142 (3.6)
Australia		1013 (6.8)	r	141 (2.4)
Jordan		1020 (13.0)		140 (3.6)
Kuwait	r	982 (21.2)	r	139 (4.1)
New Zealand	r	967 (10.2)	r	137 (2.5)
Egypt	s	1110 (34.6)	s	136 (3.3)
Saudi Arabia	r	1069 (18.9)	r	136 (6.9)
Singapore		1053 (0.0)		135 (2.6)
Romania		926 (19.8)		133 (4.3)
Portugal		1138 (31.4)		132 (3.5)
Malaysia		1165 (18.7)		130 (2.5)
Lithuania		918 (12.6)		126 (2.2)
France	r	1112 (19.3)	s	125 (3.2)
Kazakhstan		886 (15.7)		123 (3.1)
Hungary		899 (11.5)		115 (2.3)
Georgia		850 (14.5)		113 (2.1)
Finland		912 (9.4)		111 (1.9)
Norway (9)	r	949 (8.2)	s	108 (2.2)
Ireland		973 (4.7)	r	108 (1.3)
Korea, Rep. of		933 (10.7)		106 (2.6)
Sweden	r	926 (11.4)		105 (1.6)
Japan		1018 (3.0)		105 (1.0)
Iran, Islamic Rep. of		768 (8.1)		103 (2.6)
Cyprus	r	882 (1.0)	s	102 (2.3)
England	s	995 (13.3)	x	128 (4.9)
International Average		**1023 (2.5)**		**137 (0.6)**
Benchmarking Participants				
Ontario, Canada	r	966 (8.2)	s	189 (3.6)
Gauteng, RSA (9)	s	1193 (21.1)	s	185 (6.5)
Abu Dhabi, UAE	r	1138 (3.5)	s	184 (4.5)
Western Cape, RSA (9)	r	1190 (11.6)	s	171 (3.7)
Dubai, UAE	r	1066 (1.0)	s	160 (3.4)
Moscow City, Russian Fed.		825 (8.2)		157 (3.3)
Quebec, Canada	r	936 (16.4)	r	148 (3.3)



( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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Students Taught the TIMSS Mathematics Topics

The mathematics content domains and underlying topic areas assessed in TIMSS 2019 are documented in the TIMSS 2019 Mathematics Framework, which was developed in collaboration with the participating countries. The mathematics topics included in the TIMSS assessments do not represent the intersection of the topics that are universally taught but rather are a forward looking conception of mathematics teaching and learning.

Exhibit 12.4 shows the TIMSS mathematics content domains—number, measurement and geometry, and data—and the 17 underlying topics in the TIMSS fourth grade mathematics assessment (see About the Scale). There were 7 topics in number, 7 in measurement and geometry, and 3 in data. Exhibit 12.6 shows the same information for the eighth grade mathematics assessment, with its four content domains—number, algebra, geometry, and data and probability and the 22 underlying topics. There were 3 topics in number, 7 in algebra, 6 in geometry, and 6 in data and probability. Teachers were asked to indicate, for each topic, whether it had been "mostly taught before this year" to students in the assessed class or "mostly taught this year," or had been "not taught or just introduced" to students. This information serves as an indicator of the "implemented curriculum." It also can be examined together with information provided by TIMSS National Research Coordinators about whether each of the TIMSS 2019 mathematics topics was included in their countries' intended curriculum through the fourth or eighth grade and, if so, whether the topics were intended to be taught to "all or almost all students" or "only the more able students." This information about the intended curriculum is reported in the *TIMSS 2019 Encyclopedia*.

Exhibit 12.5 presents fourth grade teachers' reports about the TIMSS mathematics topics that had been taught to students in fourth grade classrooms either prior to or during the year of the assessment. The exhibit shows, for each country and the international average, the percentage of students whose teachers reported that the students had been taught each of the topics (before or during the year), averaged across all topics in each mathematics content domain, and also across all topics in all mathematics domains. Exhibit 12.7 presents parallel information for the eighth grade, reported by teachers about the TIMSS mathematics topics in the eighth grade assessment.

In the fourth grade, according to their teachers, 80 percent of students, on average, had been taught the TIMSS mathematics topics overall. This finding ranged from 97 percent in Azerbaijan and Portugal to 62 percent in Morocco. On average, 86 percent of students had been taught the TIMSS number topics, and 76 percent and 78 percent had been taught the measurement and geometry and data topics, respectively. There was, however, considerable variation from content domain to content domain and from country to country, reflecting differing mathematics curricular emphases.

In the eighth grade, on average, 72 percent of students had been taught the TIMSS mathematics topics overall, according to their teachers. Teachers' reports about the degree of implementation ranged from 95 percent of students in Malaysia to 49 percent in Finland. Almost all of the students (98%), on average, had been taught the number topics by the end of eighth grade, according to their teachers, with 100 percent of students in a number of countries. The coverage of algebra and geometry

was lower, with 68 percent of the students having been taught the algebra topics and 76 percent having been taught the geometry topics, on average. The least instructional attention was given to the topics in data and probability, with 60 percent of students having been taught the topics in this domain, on average. There was considerable variation across countries, particularly in the percentages of students taught the data and probability topics.

Exhibit 12.4: Percentages of Students Taught the TIMSS Mathematics Topics

Students' Results based on Teachers' Reports

About the Scale

Exhibit 12.5 reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

Choose the response that best describes when students in this class have been taught each topic.

	Mostly taught before this year	Mostly taught this year	Not yet taught or just introduced
A. Number			
1) Concepts of whole numbers, including place value and ordering	○	○	○
2) Adding, subtracting, multiplying, and dividing with whole numbers	○	○	○
3) Concepts of multiples and factors; odd and even numbers	○	○	○
4) Number sentences (finding the missing number, representing problem situations with number sentences)	○	○	○
5) Number patterns (extending number patterns and finding missing terms)	○	○	○
6) Concepts of fractions, including representing, comparing and ordering, adding and subtracting simple fractions	○	○	○
7) Concepts of decimals, including place value and ordering, adding and subtracting with decimals	○	○	○
B. Measurement and Geometry			
1) Solving problems involving length, including measuring and estimating	○	○	○
2) Solving problems involving mass, volume, and time	○	○	○
3) Finding and estimating perimeter, area, and volume	○	○	○
4) Parallel and perpendicular lines	○	○	○
5) Comparing and drawing angles	○	○	○
6) Elementary properties of common geometric shapes	○	○	○
7) Three-dimensional shapes, including relationships with their two-dimensional representations	○	○	○
C. Data			
1) Reading and interpreting data from tables, pictographs, bar graphs, line graphs, and pie charts	○	○	○
2) Organizing and representing data to help answer questions	○	○	○
3) Drawing conclusions from data displays	○	○	○

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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Exhibit 12.5: Percentages of Students Taught the TIMSS Mathematics Topics

Students' Results based on Teachers' Reports

The exhibit reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

Country	All Mathematics (17 Topics)	Number (7 Topics)	Measurement and Geometry (7 Topics)	Data (3 Topics)
Albania	84 (1.0)	87 (0.6)	86 (1.4)	73 (2.9)
Armenia	81 (1.3)	83 (0.8)	78 (1.8)	82 (2.9)
Australia	89 (0.9)	93 (0.9)	84 (1.4)	92 (1.5)
Austria	78 (0.9)	79 (1.0)	75 (1.4)	84 (2.0)
Azerbaijan	97 (0.4)	97 (0.5)	96 (0.6)	98 (0.8)
Bahrain	89 (0.6)	90 (0.7)	87 (0.7)	90 (1.2)
Belgium (Flemish)	78 (1.0)	93 (0.9)	63 (1.3)	76 (2.4)
Bosnia and Herzegovina	65 (0.9)	70 (0.9)	66 (1.2)	51 (3.0)
Bulgaria	67 (0.8)	71 (0.4)	66 (1.1)	60 (3.2)
Canada	r 82 (0.8)	r 86 (0.9)	r 76 (1.0)	r 89 (1.3)
Chile	81 (1.1)	88 (1.0)	78 (1.8)	73 (3.4)
Chinese Taipei	84 (1.0)	83 (1.1)	84 (1.3)	88 (1.9)
Croatia	71 (1.1)	71 (0.8)	81 (1.4)	46 (3.5)
Cyprus	89 (1.1)	92 (0.8)	86 (1.8)	87 (1.9)
Czech Republic	71 (0.9)	79 (0.6)	67 (1.0)	60 (3.0)
Denmark	r 77 (1.1)	r 84 (1.3)	r 75 (1.5)	r 62 (2.8)
Finland	77 (1.0)	93 (0.8)	69 (1.5)	58 (2.5)
France	79 (1.0)	81 (0.9)	78 (1.2)	74 (2.7)
Georgia	74 (1.3)	75 (1.2)	65 (2.1)	92 (1.9)
Germany	77 (1.0)	75 (1.1)	75 (1.3)	86 (2.2)
Hong Kong SAR	89 (0.8)	95 (0.8)	84 (1.3)	89 (2.6)
Hungary	81 (1.0)	82 (0.6)	82 (1.4)	79 (2.7)
Iran, Islamic Rep. of	80 (1.1)	94 (0.8)	74 (1.5)	61 (3.1)
Ireland	88 (0.8)	94 (0.9)	81 (1.4)	92 (1.9)
Italy	79 (0.9)	89 (0.9)	63 (1.3)	90 (1.8)
Japan	80 (1.2)	82 (1.0)	81 (1.4)	71 (2.9)
Kazakhstan	86 (1.0)	85 (1.2)	92 (0.9)	71 (2.9)
Korea, Rep. of	77 (1.0)	84 (1.3)	70 (1.1)	77 (2.8)
Kosovo	80 (1.0)	75 (1.4)	94 (0.8)	58 (4.0)
Kuwait	90 (1.0)	95 (0.8)	84 (1.7)	92 (1.6)
Latvia	79 (0.9)	86 (0.8)	75 (1.3)	73 (2.5)
Lithuania	89 (0.8)	93 (0.8)	82 (1.3)	96 (1.3)
Malta	78 (0.1)	92 (0.1)	61 (0.2)	82 (0.3)
Montenegro	74 (0.7)	69 (0.5)	75 (0.8)	86 (1.6)
Morocco	62 (1.2)	66 (1.3)	67 (1.4)	39 (3.2)
Netherlands	r 63 (1.3)	r 79 (1.3)	r 40 (2.0)	r 79 (2.8)
New Zealand	83 (0.9)	89 (0.7)	74 (1.4)	89 (1.6)
North Macedonia	90 (0.9)	95 (0.8)	85 (1.4)	90 (2.1)
Northern Ireland	94 (0.8)	98 (0.5)	94 (1.1)	87 (2.4)
Norway (5)	r 70 (1.5)	r 77 (1.7)	r 60 (2.2)	r 78 (3.7)
Oman	92 (0.6)	94 (0.9)	90 (0.8)	92 (1.4)
Pakistan	83 (2.2)	94 (1.3)	78 (3.6)	66 (4.2)
Philippines	93 (0.9)	99 (0.7)	93 (1.0)	78 (3.0)
Poland	68 (1.5)	75 (1.6)	73 (1.7)	40 (3.7)
Portugal	97 (0.3)	98 (0.3)	95 (0.7)	99 (0.5)
Qatar	74 (1.5)	91 (0.9)	60 (2.5)	68 (3.2)
Russian Federation	77 (0.9)	75 (0.9)	76 (1.2)	85 (2.0)
Saudi Arabia	89 (1.0)	r 91 (1.0)	r 85 (1.3)	91 (1.6)
Serbia	83 (1.1)	81 (0.7)	88 (1.3)	75 (3.3)
Singapore	93 (0.3)	99 (0.2)	87 (0.7)	95 (0.7)
Slovak Republic	65 (0.8)	75 (0.6)	50 (1.2)	78 (2.0)
South Africa (5)	88 (1.1)	94 (1.0)	79 (1.6)	96 (1.2)
Spain	76 (1.4)	88 (1.1)	61 (2.3)	80 (2.6)
Sweden	65 (1.5)	72 (1.4)	57 (2.4)	68 (3.7)
Turkey (5)	70 (1.4)	80 (1.7)	61 (1.9)	68 (3.2)
United Arab Emirates	r 84 (0.7)	r 94 (0.8)	r 74 (1.0)	r 84 (1.2)
United States	85 (0.9)	95 (0.5)	76 (1.6)	82 (1.8)
England	x 88 (1.7)	x 94 (1.3)	x 83 (2.9)	x 84 (3.7)
International Average	**80 (0.1)**	**86 (0.1)**	**76 (0.2)**	**78 (0.3)**
Benchmarking Participants				
Ontario, Canada	r 86 (1.1)	r 84 (1.6)	r 81 (1.6)	r 98 (0.8)
Quebec, Canada	89 (1.1)	91 (1.0)	88 (1.2)	84 (3.3)
Moscow City, Russian Fed.	77 (1.0)	76 (1.1)	73 (1.3)	91 (1.9)
Madrid, Spain	76 (1.2)	93 (0.9)	60 (2.4)	72 (3.3)
Abu Dhabi, UAE	r 80 (1.0)	r 94 (0.6)	r 69 (1.7)	r 75 (2.1)
Dubai, UAE	r 89 (0.7)	r 93 (0.6)	r 84 (1.2)	r 93 (0.9)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students.
An "x" indicates data are available for at least 40% but less than 50% of the students—interpret with caution.

Exhibit 12.6: Percentages of Students Taught the TIMSS Mathematics Topics

Students' Results based on Teachers' Reports

About the Scale

Exhibit 12.7 reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

Choose the response that best describes when students in this class have been taught each topic.

	Mostly taught before this year	Mostly taught this year	Not yet taught or just introduced
A. Number			
1) Computing with negative numbers	○	○	○
2) Concepts of fractions and decimals	○	○	○
3) Solving problems involving proportions and percents	○	○	○
B. Algebra			
1) Simplifying and evaluating algebraic expressions	○	○	○
2) Simple linear equations	○	○	○
3) Simple linear inequalities	○	○	○
4) Simultaneous (two variables) equations	○	○	○
5) Representation of linear and quadratic functions in tables, graphs, words, or equations	○	○	○
6) Properties of functions (slopes, intercepts, etc.)	○	○	○
7) Numeric, algebraic, and geometric patterns or sequences (extension, missing terms, generalization of patterns)	○	○	○
C. Geometry			
1) Geometric properties of angles, pairs of lines, and geometric shapes (triangles, quadrilaterals, and other common polygons)	○	○	○
2) Solving problems involving perimeters, circumferences, and areas	○	○	○
3) Solving problems involving the Pythagorean Theorem	○	○	○
4) Translation, reflection, and rotation	○	○	○
5) Congruent figures and similar triangles	○	○	○
6) Solving problems with three-dimensional shapes	○	○	○
D. Data and Probability			
1) Reading and interpreting data from one or more sources to solve problems (interpolating, extrapolating, drawing conclusions)	○	○	○
2) Identifying appropriate procedures for collecting data	○	○	○
3) Organizing and representing data to help answer questions	○	○	○
4) Calculating and interpreting statistics summarizing data distributions	○	○	○
5) Theoretical and empirical probability of simple events	○	○	○
6) Theoretical and empirical probability of compound events	○	○	○

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
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Exhibit 12.7: Percentages of Students Taught the TIMSS Mathematics Topics

Students' Results based on Teachers' Reports

The exhibit reports the percentage of students whose teachers responded "mostly taught before this year" or "mostly taught this year," averaged across topics.

Country	All Mathematics (22 Topics)	Number (3 Topics)	Algebra (7 Topics)	Geometry (6 Topics)	Data and Probability (6 Topics)
Australia	72 (1.2)	97 (0.7)	60 (1.5)	72 (1.3)	72 (2.1)
Bahrain	88 (0.4)	100 (0.0)	80 (0.8)	95 (0.3)	86 (0.8)
Chile	71 (1.4)	98 (0.7)	69 (1.7)	76 (2.3)	53 (2.7)
Chinese Taipei	62 (0.7)	99 (0.2)	85 (0.9)	72 (1.2)	7 (1.3)
Cyprus	s 62 (0.9)	s 97 (0.8)	s 67 (1.0)	s 60 (0.8)	s 40 (2.2)
Egypt	80 (0.8)	97 (1.0)	63 (1.4)	90 (0.9)	82 (1.4)
England	s 76 (1.8)	s 97 (1.1)	s 70 (2.3)	s 75 (2.7)	s 72 (3.0)
Finland	49 (0.9)	94 (0.9)	46 (1.1)	65 (1.5)	13 (2.0)
France	r 57 (0.8)	r 98 (0.7)	r 22 (1.0)	r 76 (1.4)	r 57 (2.0)
Georgia	65 (1.0)	100 (0.0)	66 (1.2)	66 (1.3)	47 (2.4)
Hong Kong SAR	70 (0.9)	100 (0.3)	65 (1.3)	82 (1.1)	49 (2.0)
Hungary	83 (0.9)	100 (0.0)	79 (0.9)	96 (0.8)	66 (2.4)
Iran, Islamic Rep. of	66 (1.0)	98 (0.6)	38 (1.3)	84 (1.2)	62 (2.5)
Ireland	68 (1.1)	99 (0.3)	73 (1.3)	49 (2.3)	66 (2.2)
Israel	80 (0.8)	98 (0.4)	88 (0.8)	76 (1.1)	65 (2.2)
Italy	65 (1.0)	99 (0.4)	34 (1.4)	89 (1.1)	60 (2.4)
Japan	79 (0.8)	100 (0.3)	80 (1.1)	73 (0.9)	72 (2.2)
Jordan	82 (1.0)	100 (0.4)	83 (1.2)	81 (1.5)	75 (2.1)
Kazakhstan	77 (1.1)	100 (0.0)	91 (1.1)	71 (1.6)	56 (2.2)
Korea, Rep. of	78 (0.6)	100 (0.2)	87 (0.8)	71 (0.9)	63 (1.7)
Kuwait	82 (0.7)	100 (0.0)	60 (1.4)	94 (0.8)	86 (1.2)
Lebanon	56 (1.1)	92 (1.0)	50 (1.4)	64 (1.3)	39 (2.8)
Lithuania	58 (0.8)	100 (0.3)	52 (1.3)	62 (1.2)	41 (2.1)
Malaysia	95 (0.7)	100 (0.0)	97 (0.7)	97 (0.8)	89 (1.9)
Morocco	56 (0.9)	97 (0.7)	50 (1.2)	57 (1.1)	41 (1.9)
New Zealand	60 (1.4)	94 (1.1)	52 (2.1)	52 (2.0)	59 (2.8)
Norway (9)	s 54 (1.3)	s 92 (1.5)	s 43 (2.2)	s 54 (1.7)	s 49 (2.8)
Oman	75 (0.7)	100 (0.3)	63 (1.0)	77 (1.1)	76 (1.4)
Portugal	70 (0.9)	100 (0.3)	60 (1.6)	90 (0.9)	46 (2.2)
Qatar	73 (1.4)	100 (0.1)	69 (1.8)	74 (2.2)	65 (2.6)
Romania	86 (0.9)	100 (0.0)	82 (1.1)	90 (0.8)	78 (2.1)
Russian Federation	65 (1.0)	100 (0.3)	78 (1.1)	71 (0.9)	28 (2.6)
Saudi Arabia	89 (0.7)	99 (0.7)	79 (1.4)	96 (0.8)	88 (1.3)
Singapore	85 (0.5)	99 (0.3)	93 (0.8)	85 (0.6)	70 (1.3)
South Africa (9)	76 (1.2)	97 (0.6)	78 (1.1)	86 (1.2)	54 (3.0)
Sweden	53 (1.2)	88 (1.5)	51 (1.8)	53 (1.4)	36 (2.6)
Turkey	81 (0.9)	100 (0.0)	79 (1.5)	63 (1.9)	91 (1.0)
United Arab Emirates	r 82 (0.5)	r 99 (0.2)	r 80 (0.7)	r 87 (0.4)	r 72 (1.1)
United States	83 (0.9)	100 (0.1)	87 (0.9)	84 (1.7)	68 (1.9)
International Average	**72 (0.2)**	**98 (0.1)**	**68 (0.2)**	**76 (0.2)**	**60 (0.3)**
Benchmarking Participants					
Ontario, Canada	r 76 (1.1)	r 92 (1.4)	r 62 (2.0)	r 86 (1.5)	r 75 (2.3)
Quebec, Canada	61 (1.2)	100 (0.3)	44 (1.5)	72 (1.3)	52 (3.4)
Moscow City, Russian Fed.	67 (0.9)	100 (0.0)	76 (1.1)	65 (1.1)	41 (2.6)
Gauteng, RSA (9)	79 (1.5)	98 (0.7)	79 (1.6)	88 (1.5)	59 (3.7)
Western Cape, RSA (9)	74 (1.5)	99 (0.6)	78 (1.5)	80 (1.6)	51 (3.8)
Abu Dhabi, UAE	r 82 (0.8)	r 99 (0.4)	r 81 (0.9)	r 89 (0.7)	r 66 (1.9)
Dubai, UAE	80 (0.8)	99 (0.1)	76 (1.5)	82 (0.7)	r 73 (1.4)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

Instructional Clarity in Mathematics Lessons

The clarity with which teachers convey the curriculum to students has significant implications for student learning. Students were asked about aspects of teachers' mathematics instruction during their mathematics lessons: whether they know what their teacher expects them to do, and whether their teacher is easy to understand, has clear answers to their questions, is good at explaining mathematics, does a variety of things to help the students learn, links new lessons to previous knowledge (eighth grade only), and explains a topic again when the students do not understand. Responses were combined into the TIMSS *Instructional Clarity in Mathematics Lessons* scale, as described in Exhibit 12.8 (see About the Scale). Exhibits 12.9 and 12.10 present students' reports about the clarity of their mathematics lessons, for fourth grade and eighth grade, respectively. Countries are ordered by percentage reporting "high clarity of instruction."

On average, about three-quarters (74%) of fourth grade students reported that their mathematics instruction had "high clarity," 21 percent reported "moderate clarity," and just 5 percent characterized their instruction as having "low clarity." There was a range in views across countries with, interestingly, lower percentages of students characterizing their instruction as having "high clarity" in some of the higher performing countries, such as Korea and Japan. On average, internationally and within most countries, however, more clarity was associated with higher average achievement. Across countries, average achievement was 508 among students reporting that their instruction had "high clarity," 488 among students reporting "moderate clarity," and 466 among students reporting "low clarity," a remarkable 42-point difference between "high clarity" and "low clarity."

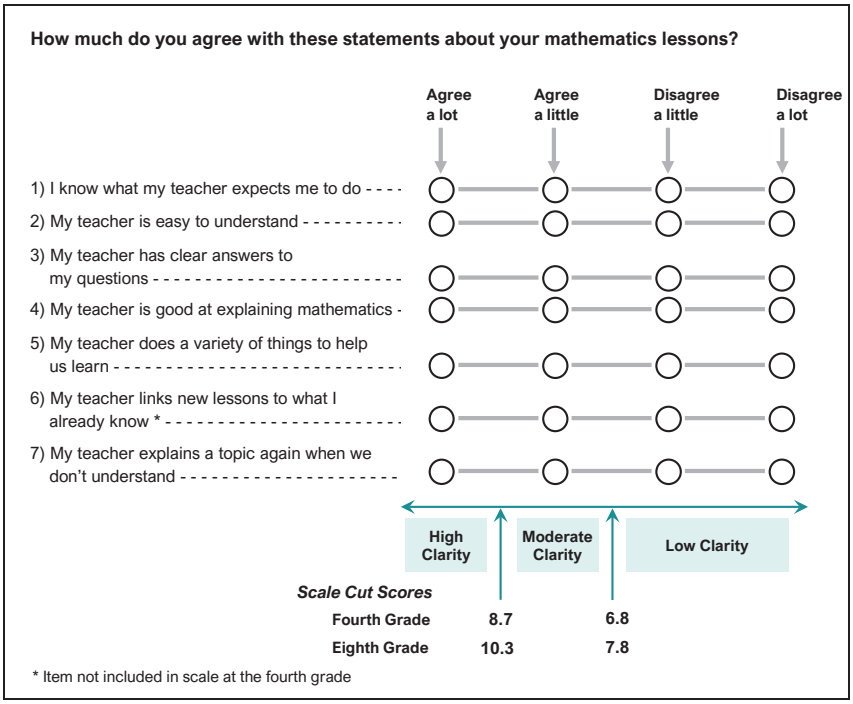
Eighth grade students were less positive about the clarity of their mathematics instruction, with less than half (46%) internationally reporting that their instruction had "high clarity," 41 percent reporting "moderate clarity," and 13 percent reporting "low clarity." As in fourth grade, some of the higher performing countries had the lowest percentages of students reporting that their instruction had "high clarity," including Korea, Japan, and Hong Kong SAR. Also as seen in fourth grade, clarity of instruction was positively associated with achievement. On average, students reporting "high clarity" of instruction had an average score of 504, followed by an average of 482 for "moderate clarity," and 467 for those reporting "low clarity."

Exhibit 12.8: Instructional Clarity in Mathematics Lessons – Students' Reports

Students' Reports

About the Scale

Students were scored according to their responses to seven statements on the *Instructional Clarity in Mathematics Lessons* scale. Cut scores divide the scale into three categories. Students who reported **High Clarity of Instruction** in their mathematics lessons had a score at or above the cut score corresponding to "agreeing a lot" with four of the seven statements and "agreeing a little" with the other three, on average. Students who reported **Low Clarity of Instruction** in their mathematics lessons had a score at or below the cut score corresponding to "disagreeing a little" with four of the seven statements and "agreeing a little" with the other three, on average. All other students reported **Moderate Clarity of Instruction** in their mathematics lessons.



SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

Exhibit 12.9: Instructional Clarity in Mathematics Lessons – Students' Reports

Students' Reports

Country	High Clarity of Instruction		Moderate Clarity of Instruction		Low Clarity of Instruction		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Albania	98 (0.2)	497 (3.4)	2 (0.2)	~ ~	0 (0.1)	~ ~	11.7 (0.04)
Kosovo	95 (0.5)	449 (2.8)	3 (0.4)	402 (11.1)	1 (0.2)	~ ~	11.3 (0.05)
North Macedonia	93 (0.6)	480 (5.1)	6 (0.6)	421 (11.0)	1 (0.2)	~ ~	11.3 (0.05)
Montenegro	90 (0.6)	458 (2.0)	8 (0.5)	432 (5.1)	2 (0.2)	~ ~	11.1 (0.03)
Azerbaijan	88 (0.7)	527 (2.4)	9 (0.6)	493 (5.0)	2 (0.3)	~ ~	10.8 (0.05)
Iran, Islamic Rep. of	88 (0.9)	450 (3.5)	9 (0.7)	416 (8.8)	4 (0.5)	380 (9.6)	10.8 (0.06)
Georgia	88 (1.0)	483 (4.1)	11 (0.9)	473 (6.5)	1 (0.3)	~ ~	10.8 (0.06)
Bosnia and Herzegovina	87 (0.7)	458 (2.2)	10 (0.6)	429 (4.6)	3 (0.3)	385 (7.8)	10.8 (0.04)
Bulgaria	87 (1.1)	520 (3.6)	11 (0.9)	499 (9.4)	2 (0.3)	~ ~	10.7 (0.06)
Armenia	85 (0.6)	505 (2.6)	12 (0.6)	483 (4.2)	3 (0.4)	471 (7.7)	10.8 (0.05)
Portugal	85 (0.9)	528 (2.7)	13 (0.8)	514 (4.6)	2 (0.2)	~ ~	10.4 (0.05)
Malta	82 (0.7)	513 (1.4)	16 (0.7)	495 (3.6)	3 (0.3)	469 (9.8)	10.3 (0.03)
Lithuania	82 (1.1)	543 (2.9)	17 (1.0)	539 (5.2)	1 (0.2)	~ ~	10.2 (0.06)
Cyprus	81 (1.3)	536 (2.8)	15 (1.0)	521 (4.9)	4 (0.4)	504 (7.7)	10.4 (0.07)
Morocco	81 (1.3)	391 (4.6)	15 (1.0)	363 (6.3)	3 (0.3)	310 (12.5)	10.3 (0.07)
Spain	80 (1.1)	508 (2.4)	16 (0.9)	490 (4.2)	4 (0.4)	472 (8.1)	10.2 (0.05)
Northern Ireland	80 (1.2)	571 (2.9)	17 (1.0)	552 (5.3)	3 (0.4)	527 (9.8)	10.2 (0.05)
Oman	78 (1.0)	443 (4.0)	17 (0.8)	404 (4.6)	5 (0.4)	377 (7.0)	10.1 (0.05)
Serbia	78 (1.3)	513 (3.5)	20 (1.1)	493 (6.6)	2 (0.4)	~ ~	10.2 (0.07)
Hungary	77 (1.1)	530 (2.8)	19 (0.9)	503 (4.2)	4 (0.5)	493 (8.0)	10.2 (0.06)
Turkey (5)	77 (1.2)	538 (3.9)	18 (0.9)	485 (7.3)	5 (0.4)	448 (9.0)	10.1 (0.06)
United Arab Emirates	77 (0.6)	493 (1.9)	17 (0.4)	460 (2.7)	6 (0.2)	420 (4.7)	10.2 (0.03)
Ireland	77 (1.2)	551 (2.5)	20 (0.9)	544 (3.9)	3 (0.5)	528 (8.9)	10.1 (0.06)
Bahrain	77 (1.2)	487 (2.6)	18 (0.8)	462 (4.3)	5 (0.6)	450 (5.0)	10.1 (0.07)
Kazakhstan	77 (1.1)	516 (2.7)	22 (1.1)	502 (3.3)	1 (0.2)	~ ~	10.1 (0.06)
Austria	77 (1.2)	542 (2.1)	20 (1.0)	535 (3.1)	3 (0.3)	512 (6.6)	10.0 (0.05)
United States	76 (0.9)	543 (2.6)	19 (0.7)	524 (4.0)	4 (0.3)	488 (6.4)	10.1 (0.04)
Belgium (Flemish)	76 (1.0)	534 (2.0)	22 (0.9)	529 (2.8)	2 (0.3)	~ ~	9.8 (0.04)
England	76 (1.1)	561 (3.6)	21 (0.9)	548 (4.5)	4 (0.5)	524 (9.4)	10.0 (0.05)
Canada	75 (0.8)	514 (2.1)	21 (0.7)	505 (3.0)	4 (0.3)	481 (4.8)	10.0 (0.04)
Slovak Republic	75 (1.2)	511 (3.7)	21 (0.9)	512 (4.8)	4 (0.4)	491 (8.8)	9.9 (0.06)
Australia	74 (1.2)	522 (2.9)	21 (0.9)	505 (3.4)	5 (0.5)	473 (7.6)	9.9 (0.06)
Saudi Arabia	74 (1.0)	413 (3.7)	19 (0.8)	374 (5.0)	7 (0.5)	355 (7.9)	10.1 (0.06)
Pakistan	74 (2.9)	342 (12.1)	18 (2.2)	285 (12.4)	8 (1.3)	310 (13.3)	10.2 (0.14)
Russian Federation	74 (1.1)	570 (3.8)	24 (0.9)	563 (3.5)	3 (0.4)	540 (8.0)	9.8 (0.05)
Netherlands	73 (1.1)	540 (2.2)	23 (1.0)	536 (3.1)	4 (0.4)	506 (8.9)	9.8 (0.05)
Czech Republic	71 (1.2)	536 (3.0)	24 (0.9)	533 (3.0)	5 (0.5)	504 (8.0)	9.8 (0.05)
Germany	71 (1.1)	528 (2.3)	24 (0.9)	517 (3.7)	5 (0.5)	500 (8.2)	9.7 (0.05)
Qatar	71 (1.2)	465 (3.4)	21 (0.9)	427 (6.0)	8 (0.5)	401 (6.9)	9.8 (0.06)
Norway (5)	70 (1.3)	547 (2.6)	25 (1.1)	540 (3.5)	5 (0.7)	523 (9.5)	9.6 (0.06)
Italy	70 (1.1)	519 (2.6)	26 (0.8)	508 (3.3)	3 (0.5)	478 (7.5)	9.6 (0.05)
Kuwait	70 (1.3)	402 (5.5)	22 (1.0)	368 (5.8)	8 (0.7)	337 (8.1)	9.9 (0.08)
New Zealand	70 (1.3)	491 (2.7)	25 (1.0)	487 (3.7)	5 (0.5)	465 (7.9)	9.7 (0.05)
South Africa (5)	70 (1.4)	396 (3.6)	21 (1.0)	344 (4.1)	10 (0.6)	306 (4.1)	9.8 (0.07)
Latvia	68 (1.2)	551 (2.7)	27 (1.0)	541 (3.6)	5 (0.5)	520 (5.8)	9.5 (0.05)
Singapore	66 (1.0)	637 (3.7)	28 (0.8)	608 (4.6)	6 (0.4)	582 (6.4)	9.6 (0.05)
Chile	66 (1.1)	450 (2.9)	27 (1.0)	436 (3.4)	7 (0.5)	397 (7.4)	9.6 (0.05)
Croatia	65 (1.2)	513 (2.1)	32 (1.2)	503 (4.0)	3 (0.3)	506 (8.5)	9.6 (0.05)
Finland	65 (1.1)	538 (2.4)	30 (1.0)	526 (3.6)	5 (0.4)	506 (5.8)	9.5 (0.05)
Sweden	64 (1.6)	524 (3.5)	31 (1.3)	522 (3.3)	5 (0.6)	491 (7.7)	9.5 (0.06)
France	62 (1.1)	486 (3.5)	34 (0.9)	487 (3.8)	4 (0.5)	459 (8.7)	9.4 (0.04)
Chinese Taipei	62 (1.2)	608 (2.2)	30 (0.9)	590 (2.3)	8 (0.7)	564 (5.9)	9.4 (0.05)
Poland	60 (1.1)	527 (3.0)	32 (0.9)	517 (3.1)	8 (0.5)	498 (4.9)	9.2 (0.05)
Denmark	58 (1.4)	533 (2.3)	35 (1.2)	520 (3.2)	7 (0.6)	492 (5.5)	9.1 (0.06)
Hong Kong SAR	55 (1.5)	613 (3.9)	33 (1.0)	592 (3.5)	12 (1.0)	573 (7.6)	9.2 (0.07)
Philippines	48 (2.0)	333 (7.2)	37 (1.3)	280 (6.6)	15 (1.0)	245 (5.9)	8.8 (0.09)
Japan	43 (1.3)	597 (2.4)	47 (1.0)	591 (2.1)	10 (0.7)	587 (4.9)	8.5 (0.05)
Korea, Rep. of	43 (1.4)	614 (2.5)	50 (1.1)	592 (2.6)	7 (0.7)	570 (5.8)	8.5 (0.05)
International Average	**74 (0.2)**	**508 (0.5)**	**21 (0.1)**	**488 (0.7)**	**5 (0.1)**	**466 (1.2)**	
Benchmarking Participants							
Madrid, Spain	83 (0.9)	521 (2.2)	15 (0.8)	508 (3.7)	2 (0.3)	~ ~	10.3 (0.04)
Dubai, UAE	82 (0.7)	548 (1.8)	15 (0.7)	532 (3.2)	3 (0.3)	504 (9.5)	10.4 (0.04)
Ontario, Canada	75 (1.1)	517 (3.7)	21 (0.9)	502 (4.5)	4 (0.4)	482 (8.0)	10.0 (0.05)
Quebec, Canada	74 (1.5)	533 (2.7)	22 (1.3)	530 (4.7)	4 (0.5)	496 (8.2)	9.9 (0.07)
Abu Dhabi, UAE	71 (0.9)	454 (2.5)	21 (0.6)	425 (3.4)	9 (0.5)	391 (5.9)	9.8 (0.05)
Moscow City, Russian Fed.	69 (1.3)	597 (2.4)	27 (1.1)	588 (2.8)	5 (0.4)	565 (7.3)	9.6 (0.05)

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

A tilde (~) indicates insufficient data to report achievement.

Exhibit 12.10: Instructional Clarity in Mathematics Lessons – Students' Reports

Students' Reports

Country	High Clarity of Instruction		Moderate Clarity of Instruction		Low Clarity of Instruction		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Jordan	70 (1.5)	431 (3.5)	24 (1.1)	404 (7.1)	6 (0.6)	395 (9.4)	11.0 (0.07)
Turkey	68 (1.4)	510 (4.4)	26 (1.0)	469 (5.5)	6 (0.7)	452 (10.2)	10.9 (0.07)
Egypt	66 (1.2)	424 (5.2)	27 (0.8)	401 (6.0)	6 (0.6)	391 (8.5)	10.8 (0.06)
Georgia	63 (1.8)	470 (4.6)	30 (1.4)	447 (5.1)	6 (0.8)	449 (10.0)	10.8 (0.08)
Lebanon	61 (1.9)	441 (3.2)	32 (1.6)	416 (4.3)	7 (0.6)	403 (6.4)	10.7 (0.07)
Saudi Arabia	60 (1.2)	404 (2.8)	32 (1.0)	382 (3.1)	8 (0.5)	374 (5.4)	10.6 (0.05)
Romania	60 (1.6)	491 (4.9)	27 (1.1)	468 (5.7)	12 (1.3)	457 (6.6)	10.5 (0.08)
Iran, Islamic Rep. of	60 (1.2)	457 (4.1)	30 (0.8)	432 (4.5)	10 (0.8)	424 (6.4)	10.6 (0.06)
Oman	56 (1.4)	433 (3.0)	35 (0.9)	390 (3.6)	9 (0.9)	380 (8.3)	10.3 (0.06)
United States	55 (1.4)	531 (4.7)	33 (0.9)	510 (5.0)	12 (1.0)	491 (6.1)	10.4 (0.07)
United Arab Emirates	55 (0.7)	494 (2.1)	33 (0.5)	460 (2.4)	12 (0.4)	429 (3.6)	10.3 (0.03)
Morocco	52 (1.5)	396 (3.1)	34 (0.9)	380 (2.2)	14 (0.9)	382 (3.8)	10.1 (0.07)
South Africa (9)	52 (0.9)	395 (2.2)	38 (0.7)	386 (2.8)	10 (0.5)	387 (4.3)	10.2 (0.04)
Bahrain	52 (1.4)	493 (2.5)	35 (0.8)	473 (2.6)	13 (0.9)	457 (4.0)	10.2 (0.07)
Kuwait	51 (1.5)	413 (5.8)	35 (0.9)	398 (5.2)	14 (1.1)	386 (5.9)	10.1 (0.07)
Israel	50 (1.6)	529 (5.6)	36 (1.0)	516 (4.6)	14 (1.0)	505 (6.7)	10.1 (0.07)
Malaysia	47 (1.5)	470 (3.6)	46 (1.2)	455 (3.8)	7 (0.8)	439 (6.3)	10.1 (0.06)
Portugal	46 (2.2)	509 (4.1)	39 (1.3)	495 (3.6)	15 (1.8)	488 (7.5)	9.9 (0.11)
England	45 (1.7)	528 (5.5)	40 (1.3)	512 (7.1)	15 (1.1)	507 (6.8)	9.9 (0.08)
Qatar	45 (1.6)	456 (4.7)	39 (1.2)	445 (5.4)	17 (1.3)	413 (5.6)	9.8 (0.08)
Cyprus	45 (1.5)	519 (2.7)	38 (1.2)	494 (2.6)	18 (1.1)	475 (3.3)	9.8 (0.07)
Ireland	44 (1.4)	527 (3.1)	38 (1.1)	523 (3.3)	18 (1.2)	522 (5.1)	9.8 (0.07)
Kazakhstan	44 (1.3)	502 (4.1)	52 (1.2)	477 (3.7)	4 (0.6)	474 (11.1)	10.1 (0.05)
Finland	42 (1.3)	526 (3.0)	45 (1.0)	502 (2.8)	13 (1.0)	481 (4.3)	9.9 (0.06)
Russian Federation	42 (1.3)	557 (5.7)	49 (1.0)	536 (4.3)	9 (0.8)	526 (6.5)	9.9 (0.05)
Italy	42 (1.7)	504 (3.7)	46 (1.3)	495 (2.9)	12 (1.2)	486 (4.7)	9.8 (0.07)
Lithuania	41 (1.8)	538 (4.7)	47 (1.1)	511 (3.0)	12 (1.2)	502 (5.1)	9.8 (0.08)
Singapore	40 (1.2)	632 (4.0)	48 (0.9)	609 (4.4)	11 (0.8)	586 (7.6)	9.9 (0.05)
Norway (9)	40 (1.7)	521 (3.2)	45 (1.1)	501 (2.5)	15 (1.0)	468 (5.6)	9.8 (0.07)
Australia	40 (1.5)	540 (4.3)	42 (1.0)	511 (3.8)	18 (1.3)	487 (4.4)	9.7 (0.08)
New Zealand	39 (1.4)	495 (3.6)	43 (0.9)	480 (3.7)	18 (1.3)	464 (6.5)	9.7 (0.07)
Hungary	38 (1.6)	539 (3.8)	42 (1.0)	508 (3.4)	20 (1.5)	492 (5.8)	9.6 (0.08)
Chinese Taipei	38 (1.2)	639 (3.4)	50 (1.0)	604 (3.2)	12 (0.8)	565 (5.7)	9.8 (0.06)
Sweden	35 (1.7)	511 (3.2)	48 (1.2)	503 (3.5)	17 (1.4)	490 (4.4)	9.5 (0.08)
Chile	33 (1.3)	451 (3.7)	54 (1.0)	440 (3.4)	13 (1.2)	424 (4.7)	9.6 (0.06)
France	32 (1.8)	491 (3.9)	55 (1.5)	483 (2.7)	14 (1.3)	464 (4.1)	9.5 (0.08)
Hong Kong SAR	28 (1.6)	601 (5.3)	51 (1.4)	578 (5.3)	21 (1.5)	554 (6.5)	9.2 (0.08)
Japan	18 (1.0)	618 (3.8)	60 (1.1)	596 (3.4)	22 (1.5)	573 (3.3)	8.8 (0.06)
Korea, Rep. of	18 (1.0)	650 (3.8)	63 (1.1)	608 (3.2)	19 (1.1)	564 (4.8)	8.8 (0.05)
International Average	**46 (0.2)**	**504 (0.6)**	**41 (0.2)**	**482 (0.7)**	**13 (0.2)**	**467 (1.0)**	
Benchmarking Participants							
Dubai, UAE	61 (0.9)	549 (2.5)	31 (0.9)	522 (2.9)	8 (0.5)	501 (4.5)	10.6 (0.04)
Ontario, Canada	59 (2.2)	542 (5.0)	33 (1.5)	516 (4.1)	8 (1.0)	507 (7.2)	10.6 (0.10)
Western Cape, RSA (9)	54 (1.7)	441 (5.0)	36 (1.1)	441 (4.8)	10 (0.9)	450 (8.7)	10.3 (0.07)
Gauteng, RSA (9)	50 (1.7)	425 (3.6)	38 (1.1)	416 (3.3)	13 (1.3)	424 (5.2)	10.1 (0.08)
Abu Dhabi, UAE	47 (1.1)	464 (3.4)	37 (0.8)	422 (3.2)	15 (0.8)	396 (5.5)	10.0 (0.06)
Quebec, Canada	46 (2.1)	551 (3.8)	43 (1.4)	542 (4.1)	11 (1.1)	521 (8.5)	10.1 (0.09)
Moscow City, Russian Fed.	41 (1.7)	588 (4.9)	49 (1.4)	569 (4.5)	10 (1.0)	555 (7.7)	9.8 (0.07)

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

Disorderly Behavior During Mathematics Lessons

Good classroom management and having students who pay attention and focus on the lessons help create a classroom environment conducive to student learning. Students were asked about the frequency of disorderly behavior during mathematics lessons, including whether students do not listen to what the teacher says, there is disruptive noise, it is too disorderly for students to work well, the teacher has to wait a long time for students to quiet down, students interrupt the teacher, and the teacher has to keep telling students to follow the classroom rules. These responses were combined into the *Disorderly Behavior During Mathematics Lessons* scale, described in Exhibit 12.11 (see About the Scale). Exhibits 12.12 and 12.13 present students' reports about disorderly behavior for fourth and eighth grades, respectively. Countries are ordered by the percentage reporting disorderly behavior in "few or no lessons."

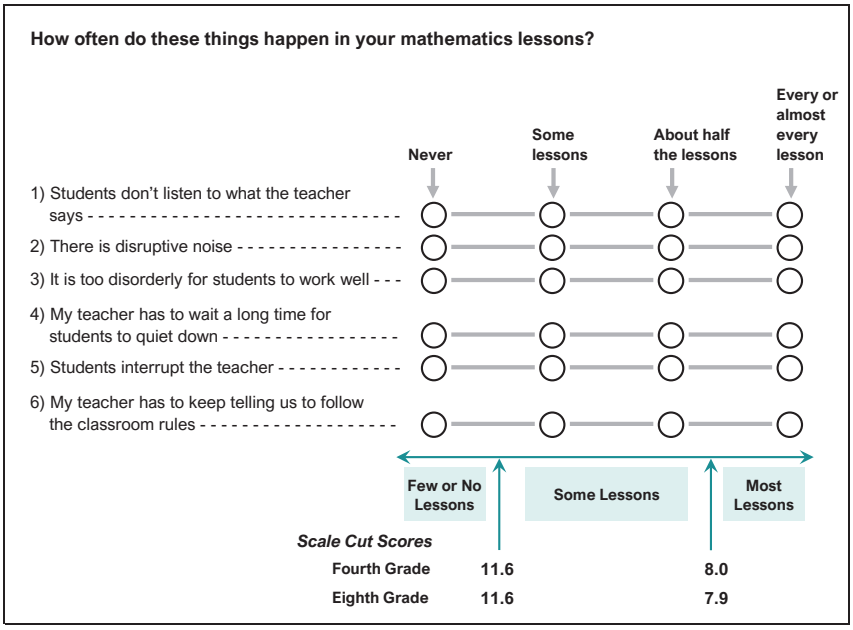
In fourth and eighth grades, about two-third of students (68% in fourth grade and 65% in eighth grade) reported disorderly behavior in "some lessons," on average, and about one-fifth (18% in fourth grade and 21% in eighth grade) reported it in "few or no lessons." Fourteen percent of fourth grade students and 13 percent of eighth grade students reported disorderly behavior in "most lessons." Internationally and in most countries, there was a clear negative association between the frequency of disorderly behavior and average student achievement, with average achievement decreasing with higher frequencies of disorderly behavior. For example, in eighth grade, students reporting disorderly behavior in "few or no lessons" had an average score of 502, followed by 485 for students reporting it in "some lessons," and 466 for students reporting it in "most lessons."

Exhibit 12.11: Disorderly Behavior During Mathematics Lessons

Students' Reports

About the Scale

Students were scored according to their responses to six statements on the *Disorderly Behavior During Mathematics Lessons* scale. Cut scores divide the scale into three categories. Students who reported disorderly behavior in **Few or No Lessons** had a score at or above the cut score corresponding to reporting that three of the six situations "never" happened in their mathematics lessons and the other three happened in "some lessons," on average. Students who reported disorderly behavior in **Most Lessons** had a score at or below the cut score corresponding to reporting that three of the six situations happened in "every or almost every lesson" and the other three happened in "about half the lessons," on average. All other students reported disorderly behavior in **Some Lessons**.



SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019
Downloaded from http://timss2019.org/download

Exhibit 12.12: Disorderly Behavior During Mathematics Lessons

Students' Reports

Country	Few or No Lessons		Some Lessons		Most Lessons		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Japan	41 (1.8)	598 (2.4)	54 (1.6)	592 (2.3)	5 (0.5)	570 (6.9)	11.3 (0.09)
Armenia	37 (1.7)	504 (3.5)	52 (1.4)	505 (2.7)	11 (0.7)	479 (4.4)	11.0 (0.10)
Albania	35 (2.5)	503 (5.4)	59 (2.4)	496 (3.7)	6 (1.0)	446 (11.3)	10.9 (0.12)
Kazakhstan	33 (1.9)	524 (3.7)	60 (1.6)	509 (2.7)	7 (0.7)	492 (5.0)	10.8 (0.10)
Georgia	33 (1.8)	490 (5.2)	57 (1.6)	481 (4.1)	9 (1.0)	451 (7.8)	10.8 (0.10)
Kosovo	32 (1.5)	447 (3.8)	58 (1.4)	454 (3.1)	9 (0.8)	400 (7.1)	10.7 (0.07)
Bulgaria	30 (2.1)	532 (4.3)	60 (1.5)	519 (3.3)	10 (1.8)	461 (16.2)	10.6 (0.14)
North Macedonia	29 (2.1)	488 (6.8)	59 (2.1)	480 (5.6)	12 (0.9)	424 (8.8)	10.5 (0.09)
Azerbaijan	29 (1.9)	522 (3.5)	62 (1.7)	524 (3.0)	9 (0.7)	510 (5.9)	10.6 (0.08)
Saudi Arabia	27 (1.3)	418 (5.4)	62 (1.2)	398 (3.8)	11 (0.6)	367 (5.3)	10.4 (0.07)
Lithuania	26 (2.0)	551 (4.1)	67 (1.7)	542 (3.1)	7 (0.7)	516 (7.4)	10.6 (0.09)
Montenegro	26 (1.0)	457 (2.7)	62 (0.9)	459 (2.2)	12 (0.8)	424 (6.0)	10.4 (0.05)
Morocco	25 (2.2)	384 (8.2)	65 (2.1)	389 (4.6)	10 (0.8)	357 (6.6)	10.4 (0.11)
Serbia	24 (1.6)	511 (5.4)	65 (1.5)	512 (3.7)	11 (1.1)	485 (6.0)	10.3 (0.08)
United Arab Emirates	24 (0.9)	498 (2.6)	61 (0.8)	482 (1.9)	15 (0.4)	463 (3.3)	10.2 (0.05)
Russian Federation	24 (1.8)	576 (5.3)	60 (1.4)	570 (3.6)	16 (1.2)	546 (4.4)	10.1 (0.11)
Oman	23 (1.6)	449 (6.4)	64 (1.5)	431 (4.1)	13 (0.7)	413 (7.1)	10.2 (0.09)
Pakistan	23 (3.6)	356 (16.5)	67 (2.7)	326 (11.7)	10 (1.6)	292 (12.3)	10.3 (0.24)
Iran, Islamic Rep. of	22 (1.6)	430 (9.0)	61 (1.5)	450 (4.3)	17 (1.0)	443 (4.6)	10.1 (0.08)
Hong Kong SAR	21 (1.3)	607 (4.1)	67 (1.4)	602 (3.6)	12 (1.1)	591 (8.0)	10.2 (0.08)
Bosnia and Herzegovina	20 (1.4)	456 (3.8)	62 (1.2)	458 (2.6)	18 (1.1)	432 (3.8)	9.9 (0.08)
Turkey (5)	20 (1.3)	540 (6.3)	67 (1.0)	523 (4.6)	13 (0.9)	505 (7.5)	10.1 (0.07)
Hungary	19 (1.3)	537 (3.9)	70 (1.1)	524 (2.8)	11 (0.9)	498 (5.6)	10.2 (0.07)
Korea, Rep. of	19 (1.6)	601 (4.3)	73 (1.3)	600 (2.3)	8 (0.8)	596 (5.0)	10.3 (0.08)
Bahrain	19 (1.3)	491 (4.4)	65 (1.1)	480 (2.7)	16 (0.8)	467 (4.0)	10.0 (0.07)
Austria	18 (1.4)	556 (3.2)	65 (1.1)	541 (2.2)	16 (1.1)	516 (4.6)	9.9 (0.09)
Ireland	18 (1.3)	565 (4.1)	74 (1.3)	549 (2.5)	8 (0.7)	515 (6.9)	10.2 (0.06)
Chinese Taipei	18 (1.3)	602 (3.6)	72 (1.1)	599 (2.3)	10 (0.8)	598 (3.9)	10.1 (0.07)
Slovak Republic	17 (1.6)	523 (6.5)	66 (1.7)	512 (3.5)	17 (1.4)	489 (5.9)	9.8 (0.09)
Croatia	17 (1.3)	516 (4.3)	68 (1.5)	511 (2.3)	15 (1.6)	496 (4.9)	9.9 (0.09)
Qatar	17 (1.2)	460 (4.7)	66 (1.2)	455 (3.8)	17 (0.9)	429 (4.8)	9.8 (0.07)
Czech Republic	16 (1.7)	552 (5.1)	67 (1.6)	535 (2.6)	17 (1.2)	508 (4.8)	9.9 (0.09)
Latvia	15 (1.3)	561 (3.3)	72 (1.0)	547 (2.8)	12 (0.9)	526 (5.5)	10.0 (0.08)
Finland	15 (1.1)	538 (4.0)	77 (1.0)	532 (2.6)	8 (0.7)	525 (5.1)	10.2 (0.05)
Northern Ireland	14 (1.2)	592 (5.4)	77 (1.2)	566 (2.8)	9 (0.9)	527 (7.2)	10.0 (0.06)
Kuwait	14 (1.5)	393 (8.0)	68 (1.6)	393 (5.1)	18 (0.9)	375 (6.6)	9.6 (0.07)
Poland	13 (1.1)	527 (5.3)	67 (1.1)	525 (2.7)	19 (1.2)	505 (4.1)	9.6 (0.08)
England	11 (1.1)	587 (8.2)	74 (1.1)	558 (3.3)	14 (1.1)	530 (5.1)	9.8 (0.07)
Cyprus	11 (0.8)	552 (4.8)	73 (1.0)	535 (3.0)	15 (1.2)	507 (4.0)	9.7 (0.06)
Belgium (Flemish)	11 (1.2)	547 (4.3)	80 (1.2)	533 (1.9)	9 (0.7)	514 (5.3)	9.9 (0.06)
Norway (5)	11 (1.0)	549 (6.2)	79 (0.9)	545 (2.3)	10 (0.8)	532 (6.1)	10.0 (0.06)
Portugal	11 (0.8)	533 (4.9)	72 (0.9)	529 (2.5)	17 (1.0)	503 (4.9)	9.7 (0.05)
France	10 (0.9)	509 (6.1)	74 (1.2)	488 (3.1)	16 (1.1)	455 (5.1)	9.6 (0.06)
Sweden	10 (1.3)	537 (5.9)	75 (1.3)	523 (2.8)	15 (1.3)	507 (4.6)	9.7 (0.09)
United States	9 (0.6)	558 (5.3)	70 (0.7)	542 (2.7)	21 (0.8)	511 (3.2)	9.4 (0.04)
South Africa (5)	9 (0.7)	387 (7.7)	68 (0.8)	374 (3.7)	23 (0.7)	378 (4.5)	9.2 (0.05)
Netherlands	8 (0.9)	539 (4.9)	80 (1.0)	539 (2.2)	11 (1.0)	530 (4.9)	9.7 (0.06)
Canada	7 (0.5)	531 (6.0)	77 (0.6)	514 (2.0)	16 (0.6)	491 (3.3)	9.5 (0.03)
Malta	7 (0.4)	511 (4.3)	73 (0.7)	513 (1.6)	19 (0.6)	493 (3.0)	9.4 (0.02)
Germany	7 (0.7)	534 (6.1)	72 (1.1)	527 (2.4)	20 (1.1)	512 (4.0)	9.3 (0.06)
Australia	7 (0.8)	542 (6.4)	76 (0.9)	522 (2.6)	17 (1.1)	479 (5.5)	9.5 (0.06)
Denmark	7 (1.0)	533 (6.6)	80 (1.2)	527 (1.9)	13 (1.0)	512 (5.6)	9.7 (0.06)
Spain	7 (0.6)	513 (6.5)	77 (1.0)	508 (2.0)	16 (1.0)	478 (4.2)	9.4 (0.05)
Italy	7 (0.8)	518 (4.8)	72 (1.1)	518 (2.7)	22 (1.1)	506 (3.8)	9.2 (0.05)
New Zealand	6 (0.5)	525 (6.6)	73 (1.1)	495 (2.9)	21 (1.0)	455 (4.0)	9.3 (0.05)
Philippines	6 (0.9)	309 (8.9)	78 (1.4)	305 (6.5)	16 (1.4)	274 (8.5)	9.3 (0.07)
Chile	5 (0.5)	449 (6.4)	61 (1.1)	448 (2.9)	34 (1.3)	433 (3.7)	8.7 (0.05)
Singapore	- -	- -	- -	- -	- -	- -	- -
International Average	**18 (0.2)**	**511 (0.8)**	**68 (0.2)**	**502 (0.5)**	**14 (0.1)**	**478 (0.8)**	
Benchmarking Participants							
Dubai, UAE	24 (1.4)	549 (3.2)	62 (1.3)	545 (2.1)	14 (0.9)	531 (4.0)	10.3 (0.09)
Abu Dhabi, UAE	18 (1.1)	456 (5.5)	65 (1.1)	444 (2.4)	17 (0.7)	420 (3.9)	9.9 (0.06)
Moscow City, Russian Fed.	18 (1.3)	613 (2.9)	65 (1.2)	593 (2.4)	17 (1.2)	573 (3.6)	9.9 (0.08)
Quebec, Canada	10 (1.2)	546 (5.2)	76 (1.1)	532 (2.7)	14 (1.0)	517 (3.9)	9.7 (0.07)
Madrid, Spain	7 (0.9)	524 (6.5)	79 (1.1)	523 (1.9)	14 (1.0)	494 (5.0)	9.5 (0.07)
Ontario, Canada	6 (0.7)	539 (13.5)	77 (1.0)	515 (3.4)	17 (1.0)	493 (5.1)	9.4 (0.05)

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

A dash (-) indicates comparable data not available.

Exhibit 12.13: Disorderly Behavior During Mathematics Lessons

Students' Reports

Country	Few or No Lessons		Some Lessons		Most Lessons		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Japan	60 (1.8)	599 (3.0)	38 (1.7)	588 (3.3)	2 (0.3)	~ ~	11.8 (0.09)
Kazakhstan	42 (1.4)	499 (4.1)	55 (1.3)	480 (3.7)	3 (0.4)	476 (12.2)	11.2 (0.05)
Ireland	35 (1.4)	548 (2.9)	55 (1.3)	516 (3.1)	10 (0.8)	490 (5.5)	10.6 (0.06)
Russian Federation	33 (1.8)	556 (5.8)	58 (1.5)	540 (4.8)	9 (0.8)	521 (6.2)	10.6 (0.09)
Chinese Taipei	32 (1.5)	615 (3.4)	60 (1.2)	612 (3.1)	9 (0.8)	607 (6.5)	10.6 (0.08)
Romania	31 (1.8)	506 (6.5)	60 (1.5)	473 (4.3)	9 (0.8)	438 (7.8)	10.5 (0.08)
Oman	26 (1.1)	423 (3.8)	66 (0.9)	411 (3.2)	8 (0.6)	400 (6.9)	10.3 (0.06)
United Arab Emirates	25 (0.9)	501 (3.5)	62 (0.7)	472 (1.8)	13 (0.5)	440 (3.7)	10.2 (0.04)
Lithuania	25 (1.5)	534 (4.0)	65 (1.3)	518 (3.2)	10 (1.0)	508 (7.1)	10.4 (0.08)
Turkey	25 (1.7)	513 (6.4)	64 (1.2)	490 (4.8)	11 (0.9)	490 (7.6)	10.3 (0.09)
France	25 (2.0)	489 (3.9)	64 (1.6)	482 (2.8)	11 (1.1)	475 (5.4)	10.2 (0.10)
Iran, Islamic Rep. of	25 (1.1)	461 (5.4)	65 (0.9)	443 (3.5)	11 (0.7)	429 (6.5)	10.2 (0.06)
Korea, Rep. of	25 (1.8)	600 (4.7)	66 (1.4)	608 (3.3)	9 (0.9)	620 (5.2)	10.3 (0.09)
Israel	24 (1.3)	548 (6.5)	63 (1.3)	519 (4.6)	12 (0.7)	483 (6.5)	10.2 (0.06)
Georgia	23 (1.6)	474 (6.9)	68 (1.6)	460 (4.2)	9 (0.8)	446 (10.8)	10.2 (0.08)
Hungary	23 (1.5)	533 (5.0)	66 (1.3)	516 (3.2)	11 (0.9)	488 (6.4)	10.2 (0.08)
United States	23 (1.2)	555 (5.3)	63 (1.0)	514 (4.8)	14 (0.8)	482 (5.3)	10.0 (0.07)
Jordan	22 (1.1)	437 (6.0)	65 (1.1)	424 (3.8)	12 (0.8)	391 (6.1)	10.0 (0.06)
Saudi Arabia	21 (0.9)	403 (4.6)	66 (1.0)	395 (2.7)	12 (0.7)	382 (4.6)	10.0 (0.05)
Finland	21 (1.4)	509 (3.6)	69 (1.2)	511 (2.8)	10 (0.8)	499 (4.9)	10.1 (0.07)
Hong Kong SAR	21 (1.5)	577 (5.6)	64 (1.2)	583 (4.0)	16 (1.1)	563 (7.8)	9.9 (0.09)
Lebanon	21 (1.3)	438 (4.3)	64 (1.4)	429 (3.2)	15 (1.2)	426 (7.0)	9.9 (0.07)
Egypt	18 (1.0)	427 (7.0)	69 (1.0)	418 (4.8)	13 (0.7)	389 (8.9)	9.8 (0.05)
England	18 (1.5)	554 (6.9)	63 (1.2)	519 (5.6)	19 (1.2)	481 (7.1)	9.7 (0.08)
Norway (9)	17 (1.4)	509 (4.4)	72 (1.4)	504 (2.7)	10 (0.9)	496 (6.1)	10.1 (0.07)
Qatar	16 (1.1)	465 (8.6)	67 (1.1)	446 (4.1)	16 (0.9)	415 (5.7)	9.7 (0.07)
Bahrain	16 (0.8)	494 (5.9)	68 (0.8)	480 (2.5)	16 (0.9)	473 (4.4)	9.6 (0.05)
Italy	15 (1.6)	513 (4.5)	67 (1.5)	497 (3.1)	18 (1.5)	487 (4.3)	9.5 (0.09)
Kuwait	15 (0.9)	407 (7.0)	69 (0.9)	408 (4.9)	16 (1.1)	387 (5.3)	9.6 (0.07)
Cyprus	14 (1.3)	524 (5.6)	69 (1.2)	500 (1.9)	17 (1.2)	491 (6.0)	9.6 (0.08)
Morocco	12 (0.7)	405 (5.6)	73 (0.8)	388 (2.3)	15 (0.8)	382 (3.1)	9.5 (0.05)
Sweden	11 (0.9)	506 (5.7)	72 (1.1)	505 (2.7)	17 (1.3)	495 (4.5)	9.5 (0.07)
Australia	11 (0.9)	565 (7.5)	65 (1.1)	520 (3.9)	24 (1.1)	493 (4.2)	9.2 (0.06)
Portugal	11 (1.5)	510 (6.5)	64 (1.7)	499 (3.8)	25 (1.8)	499 (5.2)	9.2 (0.10)
South Africa (9)	9 (0.5)	421 (5.0)	71 (0.5)	388 (2.3)	19 (0.5)	384 (3.0)	9.2 (0.04)
New Zealand	9 (0.9)	514 (7.4)	69 (1.6)	485 (3.2)	23 (1.8)	464 (6.5)	9.2 (0.09)
Chile	8 (0.9)	452 (6.6)	72 (1.2)	442 (3.1)	20 (1.3)	435 (3.8)	9.3 (0.07)
Malaysia	7 (0.5)	507 (6.0)	85 (0.5)	460 (3.1)	8 (0.5)	428 (6.4)	9.6 (0.04)
Singapore	- -	- -	- -	- -	- -	- -	- -
International Average	**21 (0.2)**	**502 (0.9)**	**65 (0.2)**	**485 (0.6)**	**13 (0.2)**	**466 (1.0)**	
Benchmarking Participants							
Moscow City, Russian Fed.	29 (1.6)	586 (5.0)	62 (1.4)	574 (4.6)	10 (0.8)	553 (7.8)	10.4 (0.08)
Dubai, UAE	28 (1.3)	558 (3.5)	63 (1.2)	533 (2.4)	10 (0.6)	500 (5.1)	10.4 (0.06)
Abu Dhabi, UAE	19 (1.0)	472 (5.6)	64 (0.9)	434 (3.4)	17 (0.8)	414 (4.6)	9.8 (0.06)
Quebec, Canada	17 (1.7)	554 (4.7)	68 (1.6)	546 (3.9)	15 (1.3)	525 (7.4)	9.7 (0.10)
Ontario, Canada	17 (1.6)	553 (6.2)	66 (1.8)	531 (4.2)	17 (1.9)	504 (8.5)	9.7 (0.10)
Western Cape, RSA (9)	13 (1.5)	495 (8.7)	65 (1.4)	442 (4.5)	22 (1.5)	413 (5.1)	9.3 (0.09)
Gauteng, RSA (9)	11 (1.0)	464 (7.9)	68 (1.1)	420 (3.0)	20 (1.1)	403 (4.3)	9.3 (0.07)

This TIMSS context questionnaire scale was established in 2019 based on the combined response distribution of all countries that participated in TIMSS 2019. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study TIMSS 2019