

Trends in International Mathematics and Science Study (TIMSS) International Data Explorer Help Guide

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TIMSS International Data Explorer Help Guide

I. Background on the Trends in International Mathematics and Science Study (TIMSS), TIMSS Advanced, and the TIMSS International Data Explorer

The TIMSS International Data Explorer (IDE) is a web-based application for accessing Trends in International Mathematics and Science Study (TIMSS) data supported by the U.S. National Center for Education Statistics (NCES). Developed and implemented at the international level by the International Association for the Evaluation of Educational Achievement (IEA), TIMSS is an international comparative study of the mathematics and science achievement of students.

The TIMSS IDE includes data from both TIMSS and TIMSS Advanced, the latter of which assesses the advanced mathematics and physics knowledge and skills of students in their final year of secondary school (12th grade in the United States) who were taking or had taken courses in advanced mathematics and physics.

What is TIMSS?

TIMSS, which was first administered in 1995, is used to measure the mathematics and science knowledge and skills of fourth- and eighth-graders over time. Since 1995, TIMSS has been administered in 1999, 2003, 2007, 2011 and, most recently, in 2015. TIMSS is designed to align broadly with mathematics and science curricula in the participating countries and education systems. The results, therefore, suggest the degree to which students have learned mathematics and science concepts and skills likely to have been taught in school. TIMSS also collects background information on students, teachers, and schools in order to allow cross-national comparisons of educational contexts that may be related to student achievement. The 2015 assessment was administered in a total of 63 education systems, which includes 6 benchmarking education systems and 2 countries that only administered the fourth- and/or eighth-grade assessment to students not at the target grade level. TIMSS 2015, 2011, 2007, 2003, 1999, and 1995 results are now available through the IDE. The next TIMSS administration is scheduled for 2019, where for the first TIMSS will be administered on computers and tablets, and will be known as eTIMSS.

In TIMSS, an overall mathematics scale and an overall science scale are used to report achievement for each grade in each year. The overall scales can be used for trend analyses across years. Subscales in both mathematics and science are used to report student performance in various topic areas.

What is TIMSS Advanced?

In addition to TIMSS, the IEA also administered the TIMSS Advanced assessment in 2015, which is used to measure the advanced mathematics and physics achievement of students in their final year of high school (12th grade in the U.S.) who are taking or have taken advanced courses. TIMSS Advanced was administered previously, in 1995 and in 2008, and most recently in 2015. The United States participated in the 1995 and 2015 administrations. Like TIMSS, TIMSS Advanced is designed to align broadly with curricula in the participating education systems and, therefore, to reflect students' school-based learning of advanced mathematics and physics. TIMSS Advanced also collects information about educational contexts (such as schools and teachers) that may be related to advanced students' achievement. The 2015 assessment was administered in a total of 9 education systems, and only 2015 data are currently available in the IDE.

In TIMSS Advanced, an overall advanced mathematics scale and an overall physics scale are used to report achievement at the end of high school. Subscales in both advanced mathematics and physics are used to report student performance in various topic areas.

What aspects of mathematics achievement can I explore in TIMSS and TIMSS Advanced?

Overall mathematics scale, grade 4—The TIMSS mathematics achievement scale for grade 4 summarizes student performance on test items designed to measure understanding of content in number, geometric shapes and measures, and data display, as well as a range of processes within the knowing, applying, and reasoning cognitive domains.

Mathematics content domains, grade 4—In grade 4, there are subscales for three content domains in 2015, 2011 and 2007, five content domains in 2003, and four content domains in 1995:

- **Number (2015, 2011, 2007), fractions and number (2003)**—The *number* content domain includes understanding of computing with whole numbers of reasonable size, fractions as the basis for many calculations, comparisons of familiar fractions and decimals, the concept of variables in simple equations, and initial understandings of relationships between quantities.
- **Geometric Shapes and Measures (2015, 2011, 2007, 2003, 1995)**—The *geometric shapes and measures* content domain includes identifying properties and characteristics of lines, angles, and a variety of geometric figures, including two- and three-dimensional shapes, describe and draw a variety of geometric figures, analyze geometric relationships and use these relationships to solve problems, use instruments and tools to measure physical attributes such as length, angle, area, and volume, and use simple formulas to calculate areas and perimeters of squares and rectangles.
- **Data display (2015, 2011, 2007)**—The *data display* content domain includes reading and recognizing various forms of data analysis, organizing and representing the data in graphs and charts that address the questions that prompted the data collection, comparing characteristics of data and drawing conclusions based on data displays.

- **Patterns and relationships (2003)**—The *patterns and relationships* content domain includes understanding patterns, simple equations, and the idea of functions as they apply to pairs of numbers.
- **Data and probability (2003, 1995)**—The *data and probability* content domain includes understanding simple data-gathering, data representation and interpretation.
- **Measurement (2003)**—The *measurement* content domain includes the understanding of attributes and units and the use of basic instruments and formulas for measurement of area, length, volume, weight, and time.
- **Fractions and proportions (1995)**—The *fractions and proportions* content domain includes recognizing the pictorial representation of common fractions and decimal fractions as well as the relationships between common and decimal fractions.
- **Whole numbers (1995)**—The *whole numbers* content domain includes understanding place value, ordering and comparing numbers, and solving single- as well as multistep problems involving the operations of addition, subtraction, and multiplication.

Overall mathematics scale, grade 8—The TIMSS mathematics achievement scale for grade 8 summarizes student performance on test items designed to measure understanding of content in number, algebra, geometry, and data and chance, as well as a range of processes within the knowing, applying, and reasoning cognitive domains.

Mathematics content domains, grade 8—In grade 8 there are subscales for four content domains in 2015, 2011 and 2007 and five content domains in 2003, 1999, and 1995:

- **Number (2015, 2011, 2007), fractions and number (2003, 1999, 1995)**—The *number* content domain includes demonstrating proficiency with more complex whole number concepts and procedures as well as extending mathematical understanding of rational numbers, computing with fractions and decimals, computing with integers through various models, understanding various representations of rational numbers and recognizing the distinctions among interpretations of rational numbers, construct relations among them and reason with them.
- **Algebra (2015, 2011, 2007, 2003, 1999, 1995)**—The *algebra* content domain includes solving real-world problems using algebraic models and explain relationships involving algebraic concepts, given a formula for two quantities, if one quantity is known, the other can be found, using linear equations for constant rates and quadratic expressions to study motion, and using functions to understanding what will happen to a variable over time.
- **Geometry (2015, 2011, 2007, 2003, 1999, 1995)**—The *geometry* content domain includes analyzing the properties and characteristics of a variety of two- and three-dimensional geometric figures, understanding geometric measurement, and solving problems and providing explanations based on geometric relationships.
- **Data and chance (2015, 2011, 2007), data and probability (2003, 1999, 1995)**—The *data* content domain includes reading and extracting the important meaning from a

variety of visual displays, being familiar with the statistics underlying data distributions and how these relate to the shape of data graphs, understanding how the creators of charts and graphics can misinterpret the truth, and having an initial grasp of some concepts related to probability.

- **Measurement (2003, 1999, 1995)**—The *measurement* content domain includes the use of instruments and tools to measure physical attributes, conversions, and application of formulas for measuring rate, surface area, etc.

Overall advanced mathematics scale, end of high school—The TIMSS Advanced mathematics achievement scale for students at the end of high school who have taken or are taking advanced courses summarizes student performance on test items designed to measure understanding of content in algebra, calculus, and geometry, as well as a range of processes within the knowing, applying, and reasoning cognitive domains.

Advanced mathematics content domains, end of high school—In advanced mathematics at the end of high school there are subscales for three content domains in 2015:

- **Algebra (2015)**—The *algebra* content domain includes operating with and evaluating a variety of algebraic expressions, working with arithmetic and geometric series, equations and inequalities, and systems of equations and inequalities to solve problems. In addition, this content area also includes interpreting, relating, and generating various representations and properties of functions.
- **Calculus (2015)**—The calculus content domain includes understanding limits and finding the limit of a function, differentiation, and integration of a range of functions, and using these skills in solving problems.
- **Geometry (2015)**—The geometry content domain includes using the properties of geometric figures to solve problems in two and three dimensions, solving problems with coordinate geometry in two dimensions, and vectors. In addition, this content area includes triangle trigonometry and trigonometric functions.

Mathematics (and advanced mathematics) cognitive domains—There are subscales for three cognitive domains in both grades 4 and 8, as well as in advanced mathematics at the end of high school, but the balance of testing time differs, reflecting the difference in age and experience of students at the different grade levels. These subscales are shown in the IDE for 2015, 2011, 2007, and 2003 for grade 4 and grade 8, and for 2015 for advanced mathematics at the end of high school.

- **Knowing**—The *knowing* cognitive domain includes applying mathematics, reasoning about mathematical situations, familiarity with mathematical concepts, and fluency in mathematical skills.

- **Applying**—The *applying* cognitive domain focuses on the application of mathematics in a range of contexts, and applying mathematical knowledge of facts, skills, and procedures or understanding of mathematical concepts to create representations.
- **Reasoning**—The *reasoning* cognitive domain goes beyond the solution of routine problems to encompass unfamiliar situations, complex contexts, and multistep problems including intuitive and deductive reasoning based on patterns and regularities that can be used to arrive at solutions to problems set in novel or unfamiliar situations.

Which aspects of science achievement can I explore in TIMSS and TIMSS Advanced?

Overall science scale, grade 4—The TIMSS science achievement scale for grade 4 summarizes student performance on test items designed to measure understanding of content in the life, physical, and Earth sciences, as well as a range of processes within the knowing, applying, and reasoning cognitive domains.

Science content domains, grade 4—In grade 4 there are subscales for three content domains in 2015, 2011, 2007, 2003, and 1995:

- **Life science (2015, 2011, 2007, 2003, 1995)**—The *life science* content domain includes understanding of how organisms function, and fundamental concepts in reproduction, heredity, and human health.
- **Physical Science (2015, 2011, 2007, 2003, 1995)**—The *physical science* content domain includes an understanding of physical states of matter, common changes in the state and form of matter, common forms and sources of energy and their practical uses, and an understanding of light, sound, electricity, and magnetism. Also included is an understanding of forces and motion.
- **Earth science (2015, 2011, 2007, 2003, 1995)**—The *Earth science* content domain is concerned with the study of Earth and its structure and physical characteristics, and about the use of Earth's most important resources. An understanding of Earth's processes, the time frame in which processes occur and the Earth's place in the solar system are also included.

Overall science scale, grade 8—The TIMSS overall science achievement scale for grade 8 summarizes student performance on test items designed to measure understanding of content in the biological, chemical, physical, and Earth sciences, as well as a range of processes within the knowing, applying, and reasoning cognitive domains.

Science content domains, grade 8—In grade 8 there are subscales for four content domains in 2015, 2011, 2007, and 1995; five content domains in 2003; and six content domains in 1999:

- **Biology (2015, 2011, 2007)**—The *biology* content domain emphasizes students' understanding of how structure relates to function in organisms and how organisms respond physiologically to changes in environmental conditions, build an understanding

of cell structure and function and photosynthesis and cellular respiration, the concepts of adaptation and natural selection, interactions in an ecosystem, and developing a science-based understanding of human health.

- **Chemistry (2015, 2011, 2007, 2003, 1999, 1995)**—The *chemistry* content domain assesses students' understanding of distinguishing between physical and chemical properties of matter and understanding the properties of mixtures and solutions and acids and bases.
- **Physics (2015, 2011, 2007, 2003, 1999, 1995)**—The *physics* content domain assesses students' understandings of changes in state and how states of matter is related to distance between particles, different forms of energy, energy conservation, concepts of heat and temperature, light and sound, electrical conductivity, currents in circuits, forces and motion, simple machines, pressure and density, and qualitative changes in motion based on the forces acting.
- **Earth science (2015, 2011, 2007, 2003, 1999, 1995)**—The *Earth science* content domain is concerned with the study of Earth and its structure and physical features, soils and the atmosphere, geological processes, the water cycle, patterns of weather and climate, and conservation of resources.
- **Life science (2003, 1999, 1995)**—The *life science* content domain assesses understandings of the nature and function of living organisms, the relationships between them, and their interaction with the environment.
- **Environmental science (2003, 1999)**—The *environmental science* content domain emphasizes students' understanding of limiting resources and the impact of science and technology on the use and conservation of these resources.
- **Nature science (1999)**—The *nature science* content domain includes the nature of scientific knowledge, the scientific enterprise, interactions of science, technology, mathematics, and society, and the tools and process used in conducting investigations.

Overall physics scale, end of high school—The TIMSS Advanced physics achievement scale for students at the end of high school summarizes student performance on test items designed to measure understanding of content in mechanics and thermodynamics, electricity and magnetism, and wave phenomena and atomic/nuclear physics, as well as a range of processes within the knowing, applying, and reasoning cognitive domains.

Physics content domains, end of high school—In physics at the end of high school there are subscales for three content domains in 2015:

- **Mechanics and Thermodynamics (2015)**—The *mechanics and thermodynamics* content domain includes kinematics, Newton's three laws of motion (dynamics), law of gravitation, conservation of certain physical quantities such as energy and momentum, mechanisms of heat transfer and how properties of matter change with temperature.

- **Electricity and Magnetism (2015)**—The *electricity and magnetism* content domain includes the relationship between electricity and magnetism, the interaction of charged particles with magnetic fields, the production of magnetic fields from current-carrying wires, and induction.
- **Wave Phenomena and Atomic/Nuclear Physics (2015)**—The *wave phenomena and atomic/nuclear physics* content domain includes mechanical wave phenomena, electromagnetic radiation, as well as refraction, interference, and diffraction.

Science (and physics) cognitive domains—There are subscales for three cognitive domains in both grades 4 and 8, as well as in physics at the end of high school, but the balance of testing time differs, reflecting the difference in age and experience of students at the different grade levels. These subscales are shown in the IDE for 2015, 2011, 2007, and 2003 for grade 4 and grade 8, and for 2015 for physics at the end of high school.

- **Knowing**—The *knowing* cognitive domain covers the facts, procedures, concepts, and equipment that students need to know.
- **Applying**—The *applying* cognitive domain focuses on the ability of students to apply knowledge and conceptual understanding to solve problems or answer questions likely to be familiar in the teaching and learning of science.
- **Reasoning**—The *reasoning* cognitive domain goes beyond the solution of routine problems and requires students to engage in reasoning that encompasses unfamiliar situations, complex contexts, and multistep problems.

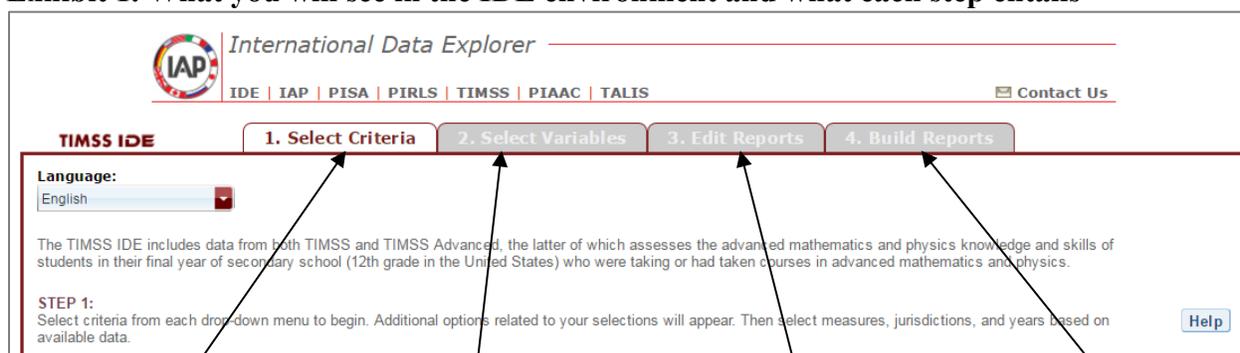
For more information on the TIMSS mathematics and science domains from the 2015 TIMSS assessment, see Mullis, I.V.S. & Martin, M.O. (Eds.). (2013). [*TIMSS 2015 Assessment Frameworks*](#). Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College. For further information on the TIMSS mathematics and science domains from previous years, visit timssandpirls.bc.edu.

For more information on the TIMSS advanced mathematics and physics domains from the 2015 TIMSS Advanced assessment, see Mullis, I.V.S. & Martin, M.O. (Eds.). (2014). [*TIMSS Advanced 2015 Assessment Frameworks*](#). Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College. For further information on the TIMSS advanced mathematics and physics domains from previous years, visit timssandpirls.bc.edu.

II. General Overview

There are four general steps for exploring TIMSS and TIMSS Advanced data using the TIMSS International Data Explorer (IDE) (see exhibit 1). Each step is described in more detail starting on page 12.

Exhibit 1. What you will see in the IDE environment and what each step entails



1. Select Criteria:

Choose your subject, grade, years, measure(s), and jurisdiction(s).

2. Select Variables:

Select at least one variable from the selection of categories and subcategories.

3. Edit Reports:

Preview how your data will look and edit your report format options and statistics options as desired.

4. Build Reports:

Retrieve the data, make charts and graphs, and save and print reports.

III. Computer Requirements for the International Data Explorer (IDE)

- Screen resolution should be 1024 x 768 pixels.
- Browsers: Internet Explorer (IE) version 10 or higher, FireFox 3.0 or higher, Google Chrome, and Apple Safari.
- Enable JavaScript and pop-ups in your browser.
- The TIMSS IDE requires Flash version 9.0.115 or higher (download Adobe Flash Player at <http://get.adobe.com/flashplayer/>).
- Exports of files to Microsoft Office requires Office 2003 or later.
- Exports of files to PDF can be read with Adobe Acrobat Reader.
- Screen reader software should be Jaws 8.0 or higher.

If you encounter an error, please send us the details through the **Contact Us** button (located in the upper-right portion of the screen on each page of the IDE website). When writing, include your browser version and operating system version, and as many other details as possible. Be sure to provide an e-mail address so that we can contact you.

IV. Steps to Explore Data

To create your own custom tables, charts, graphs, and maps, follow these steps when using the TIMSS International Data Explorer (IDE).

1. Select criteria
2. Select variables
3. Edit reports
4. Build reports

Each of these steps is discussed in detail throughout the remainder of this guide, beginning with the selection of criteria.

1. Select Criteria

1.A. Overview

Your data query in the IDE begins on the **Select Criteria** screen (see exhibit 2).

Choose one **Subject**, one **Grade**, and one or more **Measures**, **Years**, and **Jurisdictions** for the data you wish to view or compare.

Use the **Reset** button, located in the upper-right portion of the screen (just below the **Help** button), to cancel your selections and begin again.

Click on a red sideways-facing arrow (▶) to open up a category and click on a red downward-facing arrow (▼) to close a category.

Exhibit 2. Selecting criteria

TIMSS IDE 1. Select Criteria 2. Select Variables 3. Edit Reports 4. Build Reports

Language: English

The TIMSS IDE includes data from both TIMSS and TIMSS Advanced, the latter of which assesses the advanced mathematics and physics knowledge and skills of students in their final year of secondary school (12th grade in the United States) who were taking or had taken courses in advanced mathematics and physics.

STEP 1:
Select criteria from each drop-down menu to begin. Additional options related to your selections will appear. Then select measures, jurisdictions, and years based on available data. [Help](#)

Subject: Mathematics and Science Grade: Grade 4 [Reset](#)

[View all \(302\)](#) [View Selected \(1\)](#) Search: [Go](#)

Category	Sub Category	Measure	All Years	2015	2011	2007	2003	1995
▼ Scale Scores	▼ Scale Score	<input checked="" type="checkbox"/> TIMSS Mathematics Scale: Overall Mathematics details	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/> TIMSS Science Scale: Overall Science details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		▶ Subscale Scores						
		▶ Subscale Scores: 2003						
		▶ Subscale Scores: 1995						

Group	Jurisdiction	All Years	2015	2011	2007	2003	1995
▼ <input type="checkbox"/> International	<input type="checkbox"/> International Average	<input type="checkbox"/>					
	<input type="checkbox"/> Average of the Selected Jurisdictions	<input type="checkbox"/>					
	▼ <input type="checkbox"/> Country						
	<input type="checkbox"/> Algeria	<input type="checkbox"/>	NO DATA	NO DATA	<input type="checkbox"/>	NO DATA	NO DATA
	<input type="checkbox"/> Armenia	<input type="checkbox"/>	NO DATA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NO DATA
	<input type="checkbox"/> Australia	<input type="checkbox"/>					
	<input type="checkbox"/> Austria	<input type="checkbox"/>	NO DATA	<input type="checkbox"/>	<input type="checkbox"/>	NO DATA	<input type="checkbox"/>
	<input type="checkbox"/> Azerbaijan	<input type="checkbox"/>	NO DATA	<input type="checkbox"/>	NO DATA	NO DATA	NO DATA
	<input type="checkbox"/> Bahrain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NO DATA	NO DATA	NO DATA
	<input type="checkbox"/> Belgium (Flemish)-BEL	<input type="checkbox"/>	<input type="checkbox"/>	NO DATA	NO DATA	NO DATA	NO DATA
	<input type="checkbox"/> Bulgaria	<input type="checkbox"/>	<input type="checkbox"/>	NO DATA	NO DATA	NO DATA	NO DATA

[2. Select Variables](#)

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1.B. Choose Subject

Under **Subject**, you have the choice of **Mathematics and Science**, **TIMSS Advanced: Advanced Mathematics**, or **TIMSS Advanced: Physics**.

1.C. Choose Grade

Under **Grade**, choose **Grade 4**, **Grade 8**, or **End of High School**. Once a grade is chosen, the screen resets and you can select **Year(s)**, **Measure(s)**, and **Jurisdiction(s)**.

1.D. Choose Year

At the top of the **Measure** and **Jurisdiction** sections, you have the choice of selecting 2015, 2011, 2007, 2003, 1999, and/or 1995 by checking the appropriate box. To include data from all years, check the “All Years” box to the left of the individual years. Mathematics and science data are available for 2015, 2011, 2007, 2003, 1999, and 1995. In 1999, no data for grade 4 were collected in mathematics or science. Advanced mathematics and physics data are available for 2015 only.

1.E. Choose Measure

After choosing a subject, you can choose between the overall scale and/or any of the subject’s subscales. The overall scale and subscales can be used for trend analyses across years where applicable.

In addition, there are a number of continuous variables other than scale scores that you may choose as a measure of analysis. These variables fall under different categories, such as Student and Family Characteristics and Teacher Background Characteristics, and include variables such as age, teaching experience, and class size.

1.F. Choose Jurisdiction

With your **Measure(s)** and **Year(s)** selected, next choose at least one **Jurisdiction**.

Jurisdictions are found under the following groups: **Countries**, **Benchmarking Participants**, and **Off-Grade Participants**. There is also a group category called **International**, with options to display the **Average of Countries** and the **Average of the Selected Jurisdictions**. **Average of Countries** displays the average statistic for all available jurisdictions under the “**Countries**” group, except when “**All students**” is selected at step 2, in which case **Average of Countries** displays the TIMSS scale centerpoint of 500.

The general procedures for selecting one or more jurisdictions are as follows:

1. To open or close jurisdictions, click on the arrow. Jurisdictions in the group are open and can be selected when the red arrow points down (see exhibit 3).
2. Click the checkboxes next to the specific jurisdictions that you are interested in, or uncheck those jurisdictions that you wish to deselect. If you click the checkbox next to the group name (e.g., “Country”), you will select all the jurisdictions within that group. If desired, uncheck the group name to deselect all.
3. If you want to close a group (e.g., close the list of countries in order to readily see the benchmarking participants), click the red arrow next to the group name. The closed group’s arrow points to the right. Be advised that closing the group will not deselect your choices.

Exhibit 3. Choosing jurisdictions

TIMSS IDE 1. Select Criteria 2. Select Variables 3. Edit Reports 4. Build Reports

Language:
English

The TIMSS IDE includes data from both TIMSS and TIMSS Advanced, the latter of which assesses the advanced mathematics and physics knowledge and skills of students in their final year of secondary school (12th grade in the United States) who were taking or had taken courses in advanced mathematics and physics.

STEP 1:
Select criteria from each drop-down menu to begin. Additional options related to your selections will appear. Then select measures, jurisdictions, and years based on available data. [Help](#)

Subject: Mathematics and Science **Grade:** Grade 4 [Reset](#)

[View all \(360\)](#) [View Selected \(0\)](#) **Search:** AC6DG08HY [Go](#)

Category	Sub Category	Measure	All Years	2015	2011	2007	2003	1995
▼ Scale Scores	▼ Scale Score	<input type="checkbox"/> TIMSS Mathematics Scale: Overall Mathematics details	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/> TIMSS Science Scale: Overall Science details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▶ Subscale Scores							
	▶ Subscale Scores: 2003							
	▶ Subscale Scores: 1995							

Group	Jurisdiction	All Years	2015	2011	2007	2003	1995
▼ <input type="checkbox"/> Average	<input type="checkbox"/> Average of Countries details	<input type="checkbox"/>					
	<input type="checkbox"/> Average of Selected Countries/Participants	<input type="checkbox"/>					
▼ <input checked="" type="checkbox"/> Countries	<input checked="" type="checkbox"/> Algeria	<input type="checkbox"/>	NO DATA				
	<input checked="" type="checkbox"/> Armenia	<input type="checkbox"/>	NO DATA				
	<input checked="" type="checkbox"/> Australia	<input type="checkbox"/>	NO DATA				
	<input checked="" type="checkbox"/> Austria	<input type="checkbox"/>	NO DATA				
	<input checked="" type="checkbox"/> Azerbaijan	<input type="checkbox"/>	NO DATA				
	<input checked="" type="checkbox"/> Bahrain	<input type="checkbox"/>	NO DATA				
	<input checked="" type="checkbox"/> Belgium (Flemish)-BEL	<input type="checkbox"/>	NO DATA				
	<input checked="" type="checkbox"/> Bulgaria	<input type="checkbox"/>	NO DATA				

[2. Select Variables](#)

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To continue in the IDE, click the **Select Variables** button at the bottom right of the page or the tab at the top of the page to go to the next screen (see exhibit 3).

2. Select Variables

2.A. Overview

Step 2, **Select Variables**, can only be accessed after choosing criteria at step 1, **Select Criteria**.

To continue your data query and edit a report, you must choose at least one variable on this screen. You can browse for variables using the **Category** and **Sub Category** lists or by using the **Search** function (see exhibit 4). You can return to this screen to change variable selections at any time.

Exhibit 4. Selecting variables overview

TIMSS IDE 1. Select Criteria 2. Select Variables 3. Edit Reports 4. Build Reports

STEP 2:
Select at least one variable from the category list below. View the list of all available variables, view by selected variables only, or search variables by keywords. Years selected will override previous selections. [Help](#)

Subject, Grade: Mathematics and Science, Grade 4
Jurisdictions: International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States
Measure: TIMSS Mathematics Scale: Overall Mathematics
Year: 2015 [Reset](#)

[View all \(2166\)](#) View Selected (0) Search: [Go](#)

Category	Sub Category	Variable	All Years	2015	2011	2007	2003	1995
▼ Total	▼ Total	<input type="checkbox"/> All students details	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
▶ Benchmarks								
▶ Student and Family Characteristics								
▶ Student Computer Use								
▶ Student Activities Outside of School								
▶ Student Perception/Valuing of Mathematics/Science								
▶ Teacher Background Characteristics, Formal Education, and Training								
▶ Teacher Perception of Mathematics/								

[3. Edit Reports](#)

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2.B. Search Using Category and Sub Category Lists

On the **Select Variables** screen, choose at least one variable for your report. One way to do this is to search for variables using the **Category** and **Sub Category** lists. If you don't wish to choose from any of the specified categories and subcategories, select **All students** in the **Total** category.

The variables shown are tied to the criteria you selected at step 1 (**Subject, Grade, Measure, Year, and Jurisdiction**), which are indicated at the top of the screen. To change any of these criteria, return to step 1, **Select Criteria**.

To browse for variables, get details about them, select them, and view them:

1. Click the red arrows to open and close categories and subcategories of variables (see exhibit 5).
2. Click **details** or **hide details** to show or hide the full title of a given variable, the TIMSS ID, and the values (i.e., value labels). Note that some variables have the same or similar short titles, but comparing details will show you how they differ. See the example in exhibit 5 below, which shows **Speak language of test at home (2011)** and **Gen speak language of test at home (2015, 2007, 2003)**. “Gen” refers to variables that are general cross-subject variables. The differences between these two variables are described in the details.
3. Click the checkbox next to a variable to select it for your analysis/report. You will see the count increase next to **View Selected**.
4. Click the **View Selected** tab to see the variables you have chosen. To return to the full list of variables by category, click the **View All** tab.
5. Remember to select the year for which you wish to build a report and make sure that data are available for your chosen year and variables.
6. Searching variables is an option from the **Search** box. See Section 2.C Search Function for more details about this function.

Exhibit 5. Select variables using category and sub category lists

TIMSS IDE 1. Select Criteria 2. Select Variables 3. Edit Reports 4. Build Reports

STEP 2:
Select at least one variable from the category list below. View the list of all available variables, view by selected variables only, or search variables by keywords. Years selected will override previous selections. [Help](#)

Subject, Grade: Mathematics and Science, Grade 4
Jurisdictions: International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States
Measure: TIMSS Mathematics Scale: Overall Mathematics
Year: 2015 [Reset](#)

[View all \(2166\)](#) [View Selected \(0\)](#) Search: [Go](#)

Category	Sub Category	Variable	All Years	2015	2011	2007	2003	1995
	▶ Age		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▶ Race/Ethnicity		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	▼ Language and Family Characteristics	<input type="checkbox"/> Speak language of test at home (2011) hide details	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		How often do you speak [language of test] at home? ID: AS5BG004 Always; Sometimes; Never	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/> Language speak at home (U.S. only) details	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/> Gen speak language of test at home (2015, 2007, 2003) hide details	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		How often do you speak [language of test] [U.S. version: English] at home? For additional details, see Glossary in Help Guide. ID: AS4GOLAN Always; Almost always; Sometimes; Never	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/> Language of testing (2007) Grade 4 details	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/> Gen how many people in your home details	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/> Gen speak language of test at home (1995) details	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[3. Edit Reports](#)

When you have selected the variable(s) you want to include, continue by clicking the **Edit Reports** button at the bottom of the page or the tab at the top of the page to go to the next screen.

2.C. Search Function

The second way to search for variables is to use the **Search** function on the **Select Variables** screen.

Type a term in the **Search** box and click **Go** (or hit “Enter” on your keyboard) to find variables by keywords in the question and/or details for the variable (see exhibit 6). If you use multiple keywords, “and” is assumed. You can narrow your search by using “or,” “not,” or “and not.” The search function operates on an exact phrase if it is contained in quotes. The variable(s) that include the search term(s) in the question or its details will be listed.

Exhibit 6. Select variables using the search function

TIMSS IDE 1. Select Criteria 2. Select Variables 3. Edit Reports 4. Build Reports

STEP 2:
Select at least one variable from the category list below. View the list of all available variables, view by selected variables only, or search variables by keywords. Years selected will override previous selections. [Help](#)

Subject, Grade: Mathematics and Science, Grade 4
Jurisdictions: International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States
Measure: TIMSS Mathematics Scale: Overall Mathematics
Year: 2015 [Reset](#)

View all (2166) View Selected (0) Search: (17) interest or enjoyment Go

Category	Sub Category	Variable	All Years	2015	2011	2007	2003	1995
▼ Student Activities Outside of School	▼ Activities Outside of School	<input type="checkbox"/> Gen \ spend time \ read book for enjoyment (2007, 2003) details	<input checked="" type="checkbox"/>					
		<input type="checkbox"/> Gen outside school reading a book details		NO DATA				
▼ Student Perception/Valuing towards of Mathematics/ Science	▼ Attitudes Mathematics	<input type="checkbox"/> Mat \ agree \ learn interesting things details		NO DATA				
		<input type="checkbox"/> Mat \ agree \ interested in what teacher says details		NO DATA				
		<input type="checkbox"/> Mat \ agree \ interesting things to do details		NO DATA				
▼ Teacher Perception of Mathematics/ Science Teaching/Learning	▼ Teacher Perception of Teaching/Learning	<input type="checkbox"/> Mat \ confident \ engage students interest details		NO DATA				
		<input type="checkbox"/> Sci \ confident \ engage students interest details		NO DATA				
▼ Classroom Characteristics	▼ Teacher Perception of Factors that May Limit Teaching	<input type="checkbox"/> Mat class parents interested in progress details		NO DATA				

[3. Edit Reports](#)

When you have selected the variable(s) you want to include, continue by clicking the **Edit Reports** button at the bottom of the page or the tab at the top of the page to go to the next screen.

3. Edit Reports

3.A. Overview

You can access step 3, **Edit Reports**, after choosing criteria at step 1, **Select Criteria**, and choosing variables at step 2, **Select Variables**. The IDE will automatically build reports based on your selections from steps 1 and 2. However, at step 3, the **Edit Reports** phase, you may modify your selections for each report.

At this step, you can

- preview and edit the layout of your reports;
- copy reports or create new reports based on the variables selected;
- change formatting options, such as number of decimal places to display, for all reports (these may also be changed in individual reports, but format options can overwrite previous edits);

- change statistics options, such as averages, for all reports (these may also be changed in individual reports, but statistics options can overwrite previous edits);
- select reports to be built into tables and charts at step 4, **Build Reports**; and
- delete reports.

Using your chosen criteria, the IDE will return a separate data report for each variable you have chosen. If you have selected two or three variables (not counting **All students**), you will also see a cross-tabulated report for these variables. If you have chosen four or more variables, you will get tables for each variable, but you will not get the cross-tabulation. If your selected criteria include more than one measure (e.g., overall science scale and one or more science subscales or continuous variables), a separate set of data reports will be generated for each measure (see exhibit 7).

Exhibit 7. Edit reports overview

TIMSS IDE
1. Select Criteria
2. Select Variables
3. Edit Reports
4. Build Reports

STEP 3:
Preview and edit existing reports using the action links next to each report name. Create new reports, set format and statistic options. (New and copied reports will appear at the bottom of the report list.) [Help](#)

Subject, Grade: Mathematics and Science, Grade 4
Jurisdictions: International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States [Reset](#)
Measures: TIMSS Mathematics Scale: Overall Mathematics, TIMSS Mathematics Scale: Number
Variables: Sex of student, Gen speak language of test at home (2015, 2007, 2003)
Years: 2015, 2011, 2007, 2003, 1995

Create New Report		Format Options		Statistics Options		
Report	All <input checked="" type="checkbox"/> Action	Measure	Variable	Year	Jurisdiction	Statistic
Report 1	<input checked="" type="checkbox"/> Preview Edit Delete Copy	TIMSS Mathematics Scale: Overall Mathematics	Sex of student	2015, 2011, 2007, 2003, 1995	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages
Report 2	<input checked="" type="checkbox"/> Preview Edit Delete Copy	TIMSS Mathematics Scale: Overall Mathematics	Gen speak language of test at home (2015, 2007, 2003)	2015, 2007, 2003	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages
Cross-Tabulated Report 1	<input checked="" type="checkbox"/> Preview Edit Delete Copy	TIMSS Mathematics Scale: Overall Mathematics	Sex of student, Gen speak language of test at home (2015, 2007, 2003)	2015, 2007, 2003	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages
Report 3	<input checked="" type="checkbox"/> Preview Edit Delete Copy	TIMSS Mathematics Scale: Number	Sex of student	2015, 2011, 2007, 2003, 1995	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages
Report 4	<input checked="" type="checkbox"/> Preview Edit Delete Copy	TIMSS Mathematics Scale: Number	Gen speak language of test at home (2015, 2007, 2003)	2015, 2007, 2003	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages
Cross-Tabulated Report 2	<input checked="" type="checkbox"/> Preview Edit Delete Copy	TIMSS Mathematics Scale: Number	Sex of student, Gen speak language of test at home (2015, 2007, 2003)	2015, 2007, 2003	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages

4. Build Reports

The **Edit Reports** step shows detailed information on the layout of your reports. The **Report** column indicates the report, or cross-tabulation report, number based on the variable(s) chosen during the criteria selection. Under the **All** tab, reports may be chosen for the report-building phase, either by selecting **All** or selecting individual reports. The **Action** column gives you the option to **Preview**, **Edit**, **Delete**, or **Copy** the report. The **Measure** column shows which measure the report will portray. The **Variable** column indicates the variable(s) included in the report. The **Year** column shows which years you have selected for comparison. The **Jurisdiction** column shows the countries and subnational education systems selected for comparison, and the **Statistic** column provides the type of statistic output that will be generated in the report-building phase.

3.B. Preview Report

Select **Preview**, in the **Action** column (see exhibit 7), to see how your report will be laid out. The preview will not provide actual data, but will show how the data will be arranged in rows and columns (see exhibit 8). You can select **Preview** at any time to see how your changes will affect the report's final layout.

Exhibit 8. Using preview report

		Gen speak language of test at home (2015, 2007, 2003)							
		Always		Almost always		Sometimes		Never	
Years	Jurisdictions	Averages	Standard Errors	Averages	Standard Errors	Averages	Standard Errors	Averages	Standard Errors
2015	International Average								
	Australia								
	Bahrain								
	Belgium (Flemish)-BEL								
	Japan								
	Kuwait								
	United States								
2007	International Average								
	Australia								

3.C. Edit Report

To edit the report, select the **Edit** command, in the **Action** column, next to the report number. (Another way to edit a report is to select the **Edit** tab when you are previewing a report.) The following can be done using the edit function (see exhibit 9):

1. Name your report. You have the option of giving each report a distinctive name, up to a limit of 50 characters, using only letters, numbers, spaces, underscores, and hyphens. (Otherwise, by default, the report is named Report 1, Report 2, etc., or Cross-Tabulated Report 1, Cross-Tabulated Report 2, etc.)
2. Select a measure. You can choose a measure if more than one was selected at step 1.
3. Select which jurisdictions, variables, years (if applicable), and statistics to include (out of the selections previously made at steps 1 and 2). You can select up to two statistics options from the following: averages, percentages, standard deviations, and percentiles. (For further information, see Section 3.G. Statistics Options.)
4. To create a new variable while editing a report, click on **Create New...** under the **Variable** heading. Section 3.D below explains the process for creating a new variable.
5. Change the table layout by dragging elements to determine which items will appear in rows and which will appear in columns. Some of the arrangements will not be permissible, but a pop-up alert will explain this.

Exhibit 9. Editing reports

Edit Report

1. Create a name and select a measure for the new report. Help

Name: Measure:

2. Select available options from each of the columns below, then preview results.

Jurisdiction	Variable Create new ...	Year	Statistic
<input type="checkbox"/> Select All <input checked="" type="checkbox"/> International Average <input checked="" type="checkbox"/> Australia <input checked="" type="checkbox"/> Bahrain <input checked="" type="checkbox"/> Belgium (Flemish)-BEL <input checked="" type="checkbox"/> Japan <input checked="" type="checkbox"/> Kuwait <input checked="" type="checkbox"/> United States	<input type="checkbox"/> Sex of student <input checked="" type="checkbox"/> Gen speak language of test at home (2015, 2007, 2003)	<input type="checkbox"/> Select All <input checked="" type="checkbox"/> 2015 <input type="checkbox"/> 2011 <input checked="" type="checkbox"/> 2007 <input checked="" type="checkbox"/> 2003 <input type="checkbox"/> 1995	<input checked="" type="checkbox"/> Averages <input type="checkbox"/> Percentages <input type="checkbox"/> Standard deviations <input type="checkbox"/> Percentiles

3. Drag and drop header elements between Row and Column to custom design the report.

TABLE LAYOUT	
Row	Column
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px;">Years</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px;">Jurisdictions</div>	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px;">Gen speak language of test at home (2015, 2007, 2003)</div>

To save changes, make sure to select **Done** in the upper-right portion of the screen before closing the **Edit Report** window.

3.D. Create New Variables

To create a new variable, select **Edit**, in the **Action** column, and select **Create new...** under **Variable** (see exhibit 9 above). The new variable is created by collapsing values for an existing variable. The steps are as follows:

1. Click **Create new...** under the **Variable** heading.
2. Select the variable for which you wish to collapse values.
3. Select the values you want to collapse by checking the boxes to the left of the values. In the example below (see exhibit 10a), “Always” and “Almost always” are checked
4. Create a name for the new value, and press **Create**. The collapsed values will appear in gray to indicate that they have already been used.
5. Repeat steps 3 and 4 to collapse other values if applicable. In the example below (see exhibit 10b), “Sometimes” and “Never” will be collapsed into “Sometimes or Never”.

Note that it is also possible to leave “Sometimes” and “Never” uncollapsed, thus skipping step 5.

6. Wait for the screen to refresh, and press **Done**.
7. The new variable will appear in the **Variable** list in the **Edit Report** window or **Create New Report** window, designated as “collapsed.”
8. Check the box next to the new variable to view it in the report. You can click **Preview** to see how the table will be laid out before retrieving data.

Exhibit 10a. Creating new variables

The screenshot shows the 'Create Variables' dialog box with the following steps:

1. Select a Variable group: **Gen speak language of test at home (2015, 2007, 2003)**
2. Select values to create new Variable:
 - Always
 - Almost always
 - Sometimes
 - Never
3. Create a name for the new Value:

Name: **Create**

Buttons at the bottom: **Reset**, **Cancel**, **Done**

Exhibit 10b. Creating new variables

The screenshot shows the 'Create Variables' dialog box with the following steps:

1. Select a Variable group: **Gen speak language of test at home (2015, 2007, 2003)**
2. Select values to create new Variable:
 - Sometimes
 - Never
 - Always or Almost Always (collapsed) [Always, Almost always]
3. Create a name for the new Value:

Name: **Create**

Buttons at the bottom: **Reset**, **Cancel**, **Done**

A new variable that you create is applicable only to a specific report; it does not apply to the other reports listed on the **Edit Reports** screen. For example, if you selected multiple measures of science literacy for analysis, then you would need to create the new variable for each measure, or create a copy of the report and edit it accordingly. To do the latter, click on **Copy** report on the **Edit Reports** screen (copied reports appear at the end of the list of reports) and then, for the new copy, click on **Edit** (using the above example, you can change the measure and give the report a new name).

You can repeat the process and combine different values of a variable to create additional new variables. Using the **Create New Report** function, you can create a new report for each new variable that you create. (For further information, see section 3.E. Create New Report.)

If you selected two or three variables from which to create new variables, you can repeat the process for each of them. Using the **Create New Report** or **Edit Report** function, these collapsed variables will be listed and available for cross-tabulation (see exhibit 11). If you have chosen four or more variables (not counting **All Students**), you won't get the cross-tabulation. You can click **Preview** to see how the table will be laid out before retrieving data.

Exhibit 11. Edit reports with collapsed variables

The screenshot shows the 'Edit Report' window with the following configuration:

- Name:** Report 2
- Measure:** TIMSS Mathematics Scale: Overall Mathematics
- Step 1:** Create a name and select a measure for the new report.
- Step 2:** Select available options from each of the columns below, then preview results.

Jurisdiction	Variable	Year	Statistic
<input type="checkbox"/> Select All <input checked="" type="checkbox"/> International Average <input checked="" type="checkbox"/> Australia <input checked="" type="checkbox"/> Bahrain <input checked="" type="checkbox"/> Belgium (Flemish)-BEL <input checked="" type="checkbox"/> Japan <input checked="" type="checkbox"/> Kuwait <input checked="" type="checkbox"/> United States	<input type="checkbox"/> Sex of student <input type="checkbox"/> Gen speak language of test at home (2015, 2007, 2003) <input checked="" type="checkbox"/> Gen speak language of test at home (2015, 2007, 2003) (collapsed)	<input type="checkbox"/> Select All <input checked="" type="checkbox"/> 2015 <input type="checkbox"/> 2011 <input checked="" type="checkbox"/> 2007 <input checked="" type="checkbox"/> 2003 <input type="checkbox"/> 1995	<input checked="" type="checkbox"/> Averages <input type="checkbox"/> Percentages <input type="checkbox"/> Standard deviations <input type="checkbox"/> Percentiles
- Step 3:** Drag and drop header elements between Row and Column to custom design the report.

TABLE LAYOUT	
Row	Column
<div style="border: 1px solid black; padding: 2px; text-align: center;">Years</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">Jurisdictions</div>	<div style="border: 1px solid black; padding: 2px; text-align: center;">Gen speak language of test at home (2015, 2007, 2003) (collapsed)</div>

3.E. Create New Report

From the main **Edit Reports** screen, clicking on **Create New Report** brings up the same options as **Edit Report**, but with no checkboxes marked and without any new variables you may have created. Thus, **Create New Report** provides a clean slate for your selections from the first two steps, **Select Criteria** and **Select Variables** (see exhibit 12). Each new report you create will appear at the end of the list of reports. If you do not give the report a specific name, it will be called “New Report.”

Exhibit 12. Creating new reports

New Report

1. Create a name and select a measure for the new report. Help

Name: Measure: ▼

2. Select available options from each of the columns below, then preview results.

Jurisdiction	Variable Create new ...	Year	Statistic
<input type="checkbox"/> Select All <input type="checkbox"/> International Average <input type="checkbox"/> Australia <input type="checkbox"/> Bahrain <input type="checkbox"/> Belgium (Flemish)-BEL <input type="checkbox"/> Japan <input type="checkbox"/> Kuwait <input type="checkbox"/> United States	<input type="checkbox"/> Sex of student <input type="checkbox"/> Gen speak language of test at home (2015, 2007, 2003)	<input type="checkbox"/> Select All <input type="checkbox"/> 2015 <input type="checkbox"/> 2011 <input type="checkbox"/> 2007 <input type="checkbox"/> 2003 <input type="checkbox"/> 1995	<input type="checkbox"/> Averages <input type="checkbox"/> Percentages <input type="checkbox"/> Standard deviations <input type="checkbox"/> Percentiles

3. Drag and drop header elements between Row and Column to custom design the report.

TABLE LAYOUT	
Row	Column
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 2px;">Jurisdictions</div> <div style="border: 1px solid black; padding: 2px; width: fit-content;">Years</div>	

3.F. Format Options

From the main **Edit Reports** screen, clicking on **Format Options** will allow you to make formatting changes applicable to all the reports listed. The following formatting options are available using this function (see exhibit 13):

1. **Variable Labels (Long)** displays a more detailed description of the variables selected in a query than the default short label. For variables from questionnaires, the full text of the

question is displayed. Be advised that the length of the extra detail may sometimes interfere with table formatting.

2. **Show data for values categorized as “missing”** will include the percentage of students in the total sample or in a reporting group for whom membership in a particular response category is unknown because no response was given by the students, their teacher, or their school. The percentage of “missing” will be shown in the right-most table column. Missing data are available only for queries that involve percentages as the statistic type. Unless you check this option, the default is for missing responses not to be included in the percentage distribution shown.
3. **Decimal Places** allows you to specify the level of precision for a particular statistic. Depending on the value range of the dependent variable (for example, the dependent variable “TIMSS Mathematics Scale: Overall Mathematics” ranges from 0 to 1000; the dependent variable “Students like learning mathematics scale [AS5BG071]” ranges from 4 to 13), the default decimal places for a report could be from zero to three. Also, standard errors will be shown to one more decimal place than is shown for a particular statistic. For example, if you request that average scores be displayed to one decimal place (by default, the average scores are displayed as whole numbers), the corresponding standard errors will be displayed to two decimal places. If you export to Excel, you will be able to increase the number of decimal places in most cases. Note that only integer-level precision is allowed for percentages; that is, the number of decimal places is fixed at “none” for percentages and the corresponding standard errors are shown to one decimal place.
4. **Include** gives you the option of showing standard errors. By default, standard errors are shown inside parentheses, but you have the option of choosing to show them without parentheses. You can preview the effects of your selection in the **Sample Display** area (see the blue-shaded box at the bottom of exhibit 13).

Exhibit 13. Format options

Format Options X

Choose options that will apply to all reports. View selected format in Sample Display. [Help](#)

Variable Labels:

Short (e.g. Education-Highest qualification-Level)

Long (e.g. What is the highest level of education you have completed?)

Show data for values categorized as Missing (this applies only when percentages are displayed).

Show variable name in titles (e.g. [BQ01AUS])

Decimal Places: None 1 2 Default
(For row percents, the number of decimal places is fixed at "None")

Include:

Standard Errors none

Use parentheses/brackets

Sample Display: ### (#.##)

[Cancel](#) [Done](#)

Be advised that the choices you make in the **Format Options** window will apply to all reports and cannot be changed for individual reports. Use the **Reset** button, located in the upper-right portion of the main **Edit Reports** screen (just below the **Help** button), to restore the **Format Options** to the default settings (although caution is advised, as this will also delete any new reports that you have created).

3.G. Statistics Options

Available only from the main **Edit Reports** screen, clicking on **Statistics Options** allows you to designate up to two statistics. The selections you make are applicable to all the reports listed, although you can also change the statistics for an individual report when you edit it. (For further information, see Section 3.C. Edit Report.)

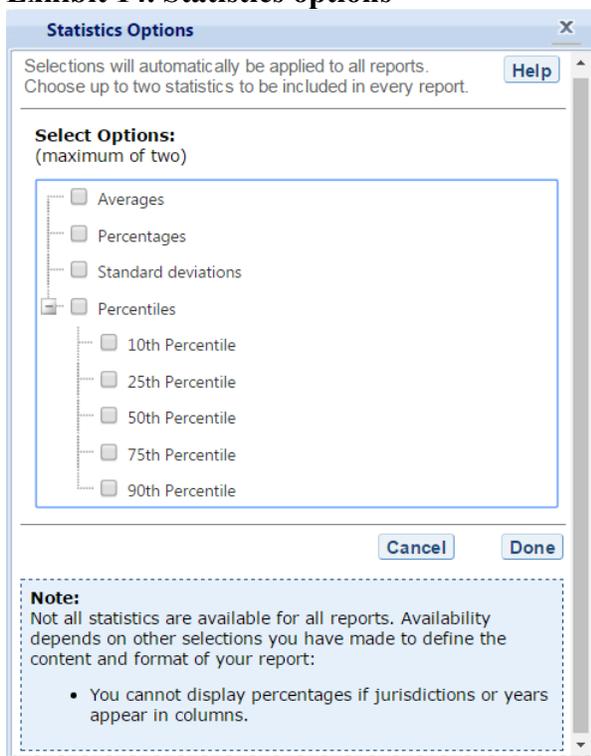
The following statistics options are available (see exhibit 14):

1. **Averages.** This statistic provides the average value for a selected continuous variable or score (i.e., overall score or subscale score). For the TIMSS assessment, student performance is reported on scales that range from 0 to 1,000. By default, the standard errors of the scores are shown in parentheses.
2. **Percentages.** This statistic shows the percentage of students as a row percentage. For example, if the first column lists countries, then each country will display its own

percentage distribution across its row. By default, percentage distributions do not include missing data. For information on how to show data for values categorized as missing, see Section 3.F. Format Options.

3. **Standard deviations.** The standard deviation is a measure of how widely or narrowly dispersed scores are for a particular variable. Under general normality assumptions, 95 percent of the scores are within two standard deviations of the mean. For example, if the average score of a variable is 500 and the standard deviation is 100, it means that 95 percent of the scores in this variable fall between 300 and 700. The standard deviation is the square root of the variance.
4. **Percentiles.** This statistic shows the threshold (or cutpoint) score for the following:
 - 10th percentile—the bottom 10 percent of students
 - 25th percentile—the bottom quarter of students
 - 50th percentile—the median (half the students scored below the cutpoint and half scored above it)
 - 75th percentile—the top quarter of students
 - 90th percentile—the top 10 percent of students

Exhibit 14. Statistics options



As previously noted, the selections you make in **Statistics Options** will be applied automatically to all reports, although you can change the statistics for an individual report when you edit it. Be advised that if you use **Statistics Options** after editing the statistics in one or more of your individual reports, the statistics options selected will overwrite your previously edited selections. If you wish to use the same criteria and variables in a report with a different selection of

statistics, consider using the **Create New Report** function to generate a new report with different statistics. (For further information, see Section 3.E. Create New Report.) You can also make a copy of an individual report.

You can use the **Reset** button, located in the upper-right portion of the main **Edit Reports** screen (just below the **Help** button), to restore the **Statistics Options** to the default setting, which is averages for all reports (this will also delete any new reports that you created).

Not all statistics are available for all reports. Their availability depends on other selections you have made to define the content and format of your report:

- Percentages will not display if jurisdictions or years appear in columns.
- If benchmarks are selected in the variable section, only average scores and percentages will be displayed.

Please note that results obtained from the IDE might not always match those published by the International Association for the Evaluation of Educational Achievement (IEA). This is due to the use of different reporting standards, such as suppression rules related to sample size, and suppression due to response rates. In addition, results published by the IEA using teacher data make use of all available teacher data for any one student, whereas results obtained from the IDE make use of only one teacher per student. In other words, in IEA published data, when a student has more than one teacher, the individual student weight is distributed evenly across all responding teachers of that student. In the IDE, under the same circumstances, the response of a single teacher is selected at random and assigned to the student. While the results are expected to be the same, there is some small variation due to the random selection of the teacher response. This affects results for teacher data, calculated for 4th and 8th graders, and only noticeable in cases where students have multiple teachers.

3.H. Select Reports to Build

As you edit your reports, you can give them distinct names (up to 50 characters) to differentiate them, as well as make changes to the jurisdictions and variables previously selected, the statistics, and the layout of the rows and columns. (For further information, see section 3.C. Edit Report.) You may make copies of reports with these changes. In order to proceed to step 4, **Build Reports**, each report for which you want to retrieve data should be previewed using the **Preview** function. To decrease processing time as you move to step 4, you can uncheck any reports for which you do not wish to retrieve data. By default, all reports are checked. To uncheck one or more reports, you can either uncheck the reports individually or click on the **All** box. (Doing the latter will uncheck all of the reports and allow you to check only those for which you wish to retrieve data.) In the example that follows (see exhibit 15), data will be retrieved for all reports.

Exhibit 15. Selecting reports to build

TIMSS IDE 1. Select Criteria 2. Select Variables 3. Edit Reports 4. Build Reports

STEP 3:
Preview and edit existing reports using the action links next to each report name. Create new reports, set format and statistic options. (New and copied reports will appear at the bottom of the report list.) [Help](#)

Subject, Grade: Mathematics and Science, Grade 4
Jurisdictions: International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States
Measures: TIMSS Mathematics Scale: Overall Mathematics, TIMSS Mathematics Scale: Number
Variables: Sex of student, Gen speak language of test at home (2015, 2007, 2003)
Years: 2015, 2011, 2007, 2003, 1995

2 → [Reset](#)

Create New Report		Format Options		Statistics Options			
Report	All <input checked="" type="checkbox"/>	Action	Measure	Variable	Year	Jurisdiction	Statistic
Report 1	<input checked="" type="checkbox"/>	Preview Edit Delete Copy	TIMSS Mathematics Scale: Overall Mathematics	Sex of student	2015, 2011, 2007, 2003, 1995	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages
Report 2	<input checked="" type="checkbox"/>	Preview Edit Delete Copy	TIMSS Mathematics Scale: Overall Mathematics	Gen speak language of test at home (2015, 2007, 2003)	2015, 2007, 2003	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages
Cross-Tabulated Report 1	<input checked="" type="checkbox"/>	Preview Edit Delete Copy	TIMSS Mathematics Scale: Overall Mathematics	Sex of student, Gen speak language of test at home (2015, 2007, 2003)	2015, 2007, 2003	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages
Report 3	<input checked="" type="checkbox"/>	Preview Edit Delete Copy	TIMSS Mathematics Scale: Number	Sex of student	2015, 2011, 2007, 2003, 1995	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages
Report 4	<input checked="" type="checkbox"/>	Preview Edit Delete Copy	TIMSS Mathematics Scale: Number	Gen speak language of test at home (2015, 2007, 2003)	2015, 2007, 2003	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages
Cross-Tabulated Report 2	<input checked="" type="checkbox"/>	Preview Edit Delete Copy	TIMSS Mathematics Scale: Number	Sex of student, Gen speak language of test at home (2015, 2007, 2003)	2015, 2007, 2003	International Average, Australia, Bahrain, Belgium (Flemish)-BEL, Japan, Kuwait, United States	Averages

3 → [4. Build Reports](#)

If you wish to delete a report from the list of reports, click **Delete** (see 1 above) in the **Action** column. Use the **Reset** button (see 2 above), located in the upper-right portion of the screen (just below the **Help** button), to restore the deleted reports (although caution is advised, as this will also delete any new reports that you created and restore the **Format Options** and **Statistics Options** to the default settings).

To continue to the last step in the IDE, click the **Build Reports** button at the bottom of the page (see 3 above) or the tab at the top of the page to go to the next screen.

4. Build Reports

4.A. Overview

You can access step 4, **Build Reports**, after choosing criteria at step 1, **Select Criteria**, in which case the default report built will provide data for just averages and for the **All Students** variable. After step 1, you may also go on to steps 2 and 3, where you can select additional variables and edit reports, before moving on to **Build Reports**. In **Build Reports**, you can do the following:

1. Generate a data table for each report, as shown in the **Select Report** drop-down feature (see 1 in exhibit 16). By default, all reports are checked, although you can uncheck any reports for which you do not wish to retrieve data. (For further information, see section 3.H. Select Reports to Build.)

2. Export and save data tables into various formats using the **Export Reports** button (see 2 in exhibit 16). The output formats include HTML (print-friendly), Microsoft Excel, Microsoft Word, and Adobe PDF.
3. Select the **Chart** tab (see 3 in exhibit 16) to create and customize charts for each report and save them for export in the above formats.
4. Select the **Significance Test** tab (see 4 in exhibit 16) to run a significance test on your results, customize it, and export it.

4.B. View Reports as Data Tables

Some reports will take longer than others to process, so please do not hit the “Back” button on your browser once you click on **Build Reports** (see exhibit 17). Your table will appear once the processing is complete. To select a different table to view, go to the **Select Report** drop-down menu (see 1 in exhibit 16) and choose the table of interest. To change the formatting or statistics options of a table or to generate a table from a report not included in your selection, return to step 3, **Edit Reports**.

Exhibit 16. Building reports overview

TIMSS IDE | 1. Select Criteria | 2. Select Variables | 3. Edit Reports | 4. Build Reports | Help

STEP 4: View each report table by selecting the report name from the drop-down menu. Create report types to edit and preview, each tab created represents one report type to export.

Subject, Grade: Mathematics and Science, Grade 4
Jurisdictions: International Average, Algeria, Armenia, Australia, Austria, Azerbaijan, Bahrain, Belgium (Flemish)-BEL, Bulgaria, Canada, Chile, Chinese Taipei-CHN, Colombia, Croatia, Cyprus, Czech Republic, Denmark, El Salvador, England-GBR, Finland, France, Georgia, Germany, Greece, Hong Kong-CHN, Hungary, Iceland, Indonesia, Iran, Islamic Rep. of, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Rep. of, Kuwait, Latvia, Lithuania, Malta, Moldova, Rep. of, Mongolia, Morocco, Netherlands, New Zealand, Northern Ireland-GBR, Norway, Oman, Norway (Grade 4), Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Serbia, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United States, Yemen

Measure: TIMSS Mathematics Scale: Overall Mathematics
Variable: All students
Year: 2015

Select Report: Report 1 | Link to this Page | Export Reports

Table | Chart | Significance Test | Gap Analysis | Regression Analysis

Averages for TIMSS mathematics scale: overall mathematics, grade 4 by All students [TOTAL], year and jurisdiction: 2015

Year	Jurisdiction	Average	All students	Standard Error
2015	International Average	500		(0.0)
	Algeria	—		(†)
	Armenia	—		(†)
	Australia	517		(3.1)
	Austria	—		(†)
	Azerbaijan	—		(†)
	Bahrain	451		(1.6)
	Belgium (Flemish)-BEL	546		(2.1)
	Bulgaria	524		(5.3)
	Canada	511		(2.3)
	Chile	459		(2.4)
	Chinese Taipei-CHN	597		(1.9)
	Colombia	—		(†)
	Croatia	502		(1.8)
	Cyprus	523		(2.7)
Czech Republic	528		(2.2)	

Exhibit 17. Processing data

TIMSS IDE 1. Select Criteria 2. Select Variables 3. Edit Reports 4. Build Reports

STEP 4:
View each report table by selecting the report name from the drop-down menu. Create report types to edit and preview, each tab created represents one report type to export. [Help](#)

Subject, Grade: Mathematics and Science, Grade 4
Jurisdictions: International Average, Algeria, Armenia, Australia, Austria, Azerbaijan, Bahrain, Belgium (Flemish)-BEL, Bulgaria, Canada, Chile, Chinese Taipei-CHN, Colombia, Croatia, Cyprus, Czech Republic, Denmark, El Salvador, England-GBR, Finland, France, Georgia, Germany, Greece, Hong Kong-CHN, Hungary, Iceland, Indonesia, Iran, Islamic Rep. of, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Rep. of, Kuwait, Latvia, Lithuania, Malta, Moldova, Rep. of, Mongolia, Morocco, Netherlands, New Zealand, Northern Ireland-GBR, Norway, Oman, Norway (Grade 4), Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Scotland, Serbia, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United States, Yemen
Measure: TIMSS Mathematics Scale: Overall Mathematics
Variable: All students
Year: 2015

Select Report: Report 1 [Link to this Page](#) [Export Reports](#)

Table Chart Significance Test Gap Analysis Regression Analysis

Progress: 98%

Cancel

Some queries may take up to two minutes to process.
Please do not hit the "Back" button while processing.

4.C. Charts

To create a chart, go to **Select Report** on the **Build Reports** screen to choose the report of interest from the drop-down menu, and then click the **Chart** link (see exhibit 18).

You will be able to create many types of charts and customize them. Section 4.E. Create Charts—Chart Options provides a summary of the available features and how they can be customized.

Exhibit 18. Viewing reports as charts

TIMSS IDE 1. Select Criteria 2. Select Variables 3. Edit Reports 4. Build Reports

STEP 4:
View each report table by selecting the report name from the drop-down menu. Create report types to edit and preview, each tab created represents one report type to export. [Help](#)

Subject, Grade: Mathematics and Science, Grade 4
Jurisdictions: International Average, Algeria, Armenia, Australia, Austria, Azerbaijan, Bahrain, Belgium (Flemish)-BEL, Bulgaria, Canada, Chile, Chinese Taipei-CHN, Colombia, Croatia, Cyprus, Czech Republic, Denmark, El Salvador, England-GBR, Finland, France, Georgia, Germany, Greece, Hong Kong-CHN, Hungary, Iceland, Indonesia, Iran, Islamic Rep. of, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Rep. of, Kuwait, Latvia, Lithuania, Malta, Moldova, Rep. of, Mongolia, Morocco, Netherlands, New Zealand, Northern Ireland-GBR, Norway, Oman, Norway (Grade 4), Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Scotland, Serbia, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United States, Yemen
Measure: TIMSS Mathematics Scale: Overall Mathematics
Variable: All students
Year: 2015

Select Report: Report 1 [Link to this Page](#) [Export Reports](#)

Table Chart Significance Test Gap Analysis Regression Analysis

4.D. Create Charts—Data Options

When you click **Chart**, your screen will present **Data Options** pertaining to **Statistic**, **Year**, and **Jurisdiction** (see exhibit 19). Only the statistics option(s) used to report data in the previous step will be presented, and only one statistics option can be selected at a time. For example, **Percentiles** will appear as the only data option to build the chart if the table created in the previous step is reporting data with only percentiles selected as the statistics option.

Once you are finished with the Data Options, click the **Chart Options** button in the lower-right corner of the screen.

Exhibit 19. Data options for charts

TIMSS IDE 1. Select Criteria 2. Select Variables 3. Edit Reports 4. Build Reports

STEP 4:
View each report table by selecting the report name from the drop-down menu. Create report types to edit and preview, each tab created represents one report type to export. [Help](#)

Subject, Grade: Mathematics and Science, Grade 4
Jurisdictions: International Average, Average of the Selected Jurisdictions, Algeria, Armenia, Australia, Austria, Azerbaijan, Bahrain, Belgium (Flemish)-BEL, Bulgaria, Canada, Chile, Chinese Taipei-CHN, Colombia, Croatia, Cyprus, Czech Republic, Denmark, El Salvador, England-GBR, Finland, France, Georgia, Germany, Greece, Hong Kong-CHN, Hungary, Iceland, Indonesia, Iran, Islamic Rep. of, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Rep. of, Kuwait, Latvia, Lithuania, Malta, Moldova, Rep. of, Mongolia, Morocco, Netherlands, New Zealand, Northern Ireland-GBR, Norway, Norway (4), Oman, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Scotland, Serbia, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United States, Yemen
Measure: TIMSS Mathematics Scale: Overall Mathematics
Variable: All students
Year: 2015

Select Report: Report 1 [Link to this Page](#) [Export Reports](#)

Table Chart 1 X

Chart Significance Test Gap Analysis Regression Analysis

Data Options

Select a single statistic and any combination of jurisdictions and Years. Continue to Chart Options.

Statistic	Year	Jurisdiction
<input checked="" type="radio"/> Averages <input type="radio"/> Percentages <input type="radio"/> achievement level (cumulative) <input type="radio"/> achievement level (discrete) <input type="radio"/> Percentiles	<input checked="" type="checkbox"/> Year <input checked="" type="checkbox"/> 2015	<input checked="" type="checkbox"/> International <input checked="" type="checkbox"/> International Average <input checked="" type="checkbox"/> Average of the Selected Jurisdictions <input checked="" type="checkbox"/> Country <input checked="" type="checkbox"/> Algeria <input checked="" type="checkbox"/> Armenia <input checked="" type="checkbox"/> Australia <input checked="" type="checkbox"/> Austria <input checked="" type="checkbox"/> Azerbaijan

[Chart Options](#)

4.E. Create Charts—Chart Options

On the **Chart Options** screen, select **Bar Chart**, **Column Chart**, or **Line Chart** (see exhibit 20). If all of the percentiles are chosen as the statistics option, you also have the option of selecting a **Percentile Chart**.

After selecting a chart type, change any data dimensions from the drop-down menus for **Bar**, **Column**, or **Line Values** and **Values Grouped by**. Any new variables that you created at step 3, **Edit Reports**, will be available for selection, but only if you selected the variables (by clicking the checkbox next to them) and pressed **Done** after you edited the report.

You can enter a **Chart Name** limited to 25 characters, using only letters, numbers, spaces, underscores, and hyphens (otherwise, by default, the chart is named “Chart 1”).

Preview your chart by clicking the **Preview** button in the lower-right corner, or go back to the data options and make different selections by clicking the **Data Options** button in the lower-left corner.

Exhibit 20. Chart options

TIMSS IDE 1. Select Criteria 2. Select Variables 3. Edit Reports 4. Build Reports

STEP 4:
View each report table by selecting the report name from the drop-down menu. Create report types to edit and preview, each tab created represents one report type to export. [Help](#)

Subject, Grade: Mathematics and Science, Grade 4
Jurisdictions: International Average, Algeria, Armenia, Australia, Austria, Azerbaijan, Bahrain, Belgium (Flemish)-BEL, Bulgaria, Canada, Chile, Chinese Taipei-CHN, Colombia, Croatia, Cyprus, Czech Republic, Denmark, El Salvador, England-GBR, Finland, France, Georgia, Germany, Greece, Hong Kong-CHN, Hungary, Iceland, Indonesia, Iran, Islamic Rep. of, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Rep. of, Kuwait, Latvia, Lithuania, Malta, Moldova, Rep. of, Mongolia, Morocco, Netherlands, New Zealand, Northern Ireland-GBR, Norway, Oman, Norway (Grade 4), Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Scotland, Serbia, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United States, Yemen
Measure: TIMSS Mathematics Scale: Overall Mathematics
Variables: All students, Mathematics Benchmarks
Year: 2015

Select Report: Report 1 [Link to this Page](#) [Export Reports](#)

Table **Chart 1** Significance Test Gap Analysis Regression Analysis

Chart Options

Choose an available chart type based on selected data. Choose data dimensions from the drop-down menus and name the chart, then preview the chart. To select different data return to Data Options.

Bar Chart Column Chart Line Chart Percentiles Chart

Bar Values: All students
 Values Grouped by: None
 Chart Name: Chart 1

[Data Options](#) [Preview](#)

While previewing your chart, you can do the following (see exhibit 21 as an example of a **Percentile Chart** and exhibit 22 as an example of a **Bar Chart**):

1. Use the drop-down menus to change the jurisdiction and other variables as applicable. Notice that when you change your selection, the change occurs slowly enough that you get a sense of the size and direction of the change—especially if you didn't previously specify in the data dimensions how you want your values grouped. In order to build a percentile chart, you must have already generated a report choosing percentiles as the statistics option. In the drop down menu for 'Values grouped by', percentiles can be chosen if there is a report created based on the percentiles and this is the data option being used in the chart.
2. Place your cursor over the bars of the chart to see the data points and value label(s).
3. For the **Bar Chart**, choose between using colors or patterns for the bars by clicking the alternating **Pattern** or **Color** button located just below the **Chart** tab in the upper-left portion of the screen. For the **Percentile Chart**, choose between **Color** or **Grayscale**.
4. Change the color of the bars with a single click on each level in the bars, which brings up a thumbnail of a color chart. Click on the thumbnail to reveal a color grid, and then select the color you desire.
5. Change the pattern of the bars with a single click on each level in the bars. Continuous clicking brings up many patterns to choose from.

Exhibit 21. Preview of percentile chart

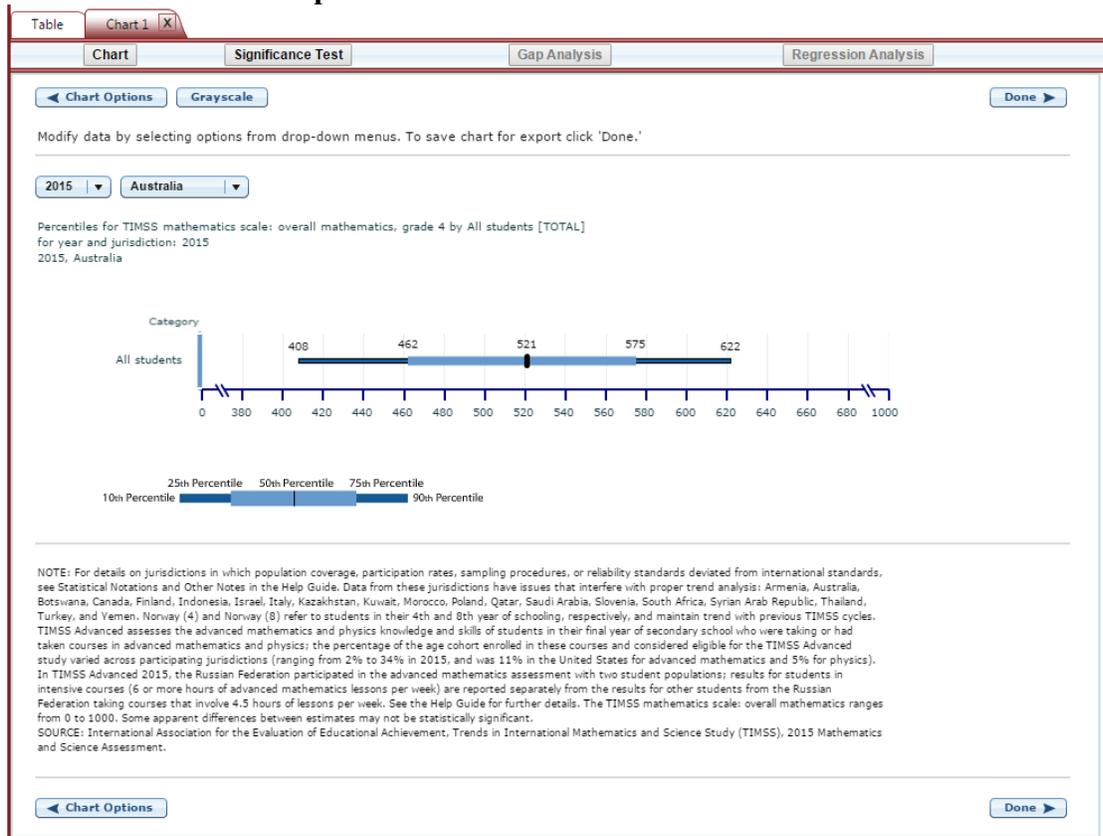


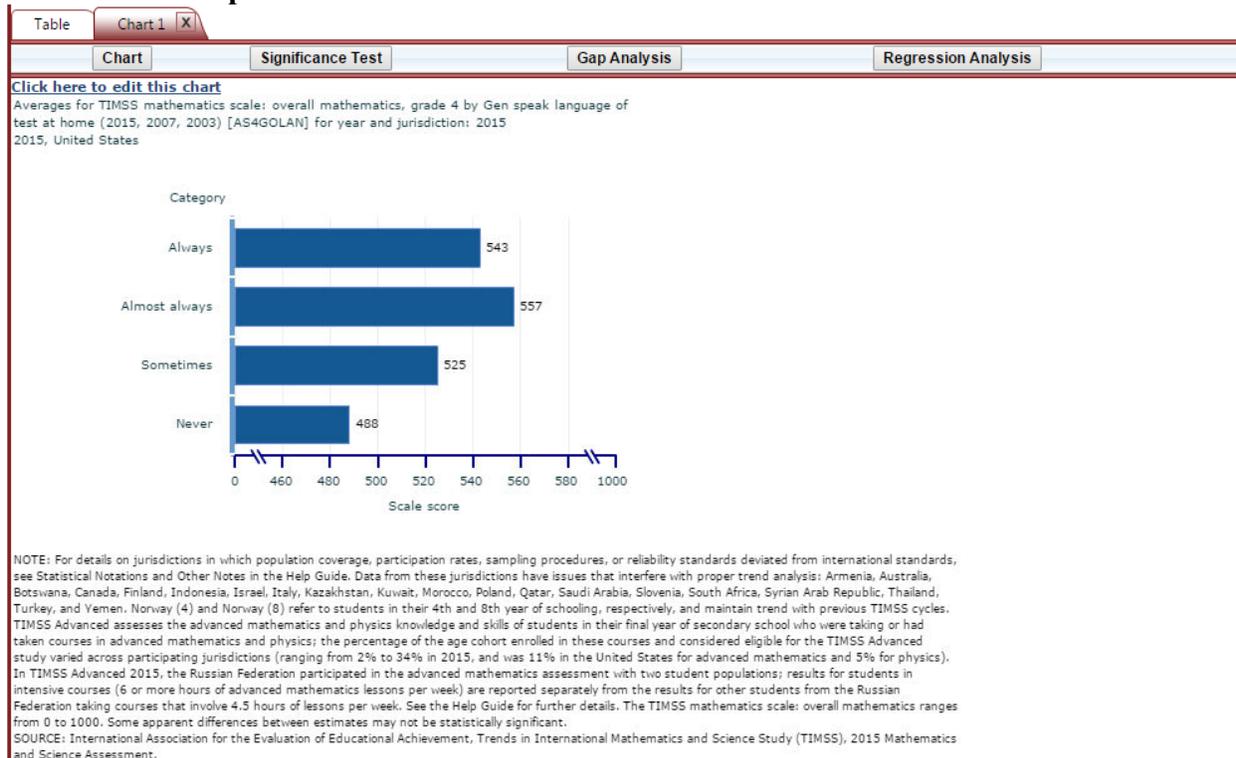
Exhibit 22. Preview of bar chart



Click the **Done** button located on the right side of the screen, or click back to **Chart Options** to change your selection criteria (see exhibit 22). You must click **Done** if you wish to later save and/or print your chart via the **Export Reports** function.

Clicking **Done** takes you to the exportable version of the chart (see exhibit 23). You can subsequently **“Click here to edit this chart”** (located in the upper-left corner, below the **Chart** link) to make more changes. Alternatively, clicking anywhere in the chart area will take you to the edit screen.

Exhibit 23. Completed chart



To make an additional chart from the same report or table, click the **Chart** link on the **Build Reports** screen. It is recommended that you provide a new chart name (the default is Chart 1, Chart 2, etc.). If you don't start the chart process again by clicking the **Chart** link, the new chart will overwrite the previous one.

If you wish to make charts from other reports, select another report in the **Select Report** drop-down list. If other reports were not checked in step 3, **Edit Reports**, go back to step 3 and check the ones you want. Then, when you advance to step 4, **Build Reports**, the reports will appear in the **Select Report** drop-down list). If you need to create new reports, go back to step 1, **Select Criteria**, and/or step 2, **Select Variables**. Remember to export any completed charts you want to save by clicking **Done** and using the **Export Reports** function before leaving the **Build Reports** screen. (For further information, see Section 4.I. Export Reports.)

4.F. Significance Tests

Tests for statistical significance indicate whether observed differences between estimates are likely to have occurred because of sampling error or chance. "Significance" here does not imply any judgment about absolute magnitude or educational relevance. It refers only to the statistical nature of the difference and whether that difference likely reflects a true difference in the population.

With your report of interest selected, click the **Significance Test** link, which is located to the right of the **Chart** link (see exhibit 16 and 23). You first need to decide which variable you want to test and the criterion by which you want to test it (i.e., between jurisdictions, within variables, or across years). You will compare or look across the variable's range of values, so it must have more than one value. You can look across jurisdictions for a variable (that is, compare between two or more jurisdictions) or you can look across the values within a variable for a single jurisdiction. For example, with the variable shown in exhibit 24, you could choose to compare scores of female students between countries and subnational education systems, or you could choose to compare scores of female students and male students.

The general steps for running significance tests are as follows (see exhibit 24):

1. In the **Significance Test** window, select either **Between Jurisdictions**, **Within Variables**, or **Across Years**. Then, select the appropriate jurisdiction(s), variable(s), year(s), and statistic(s). For **Between Jurisdictions**, select at least two jurisdictions. For **Within Variables**, select at least two variable values. For **Across Years**, more than one year needs to be selected.
2. You can enter a **Name** limited to 25 characters, using only letters, numbers, spaces, underscores, and hyphens (otherwise, by default, the test is named "Sig Test 1").
3. Select the output type as either **Table** or **Map**. The table option will show the significance test results as a matrix. The map option will show the significance test results on a world map, highlighting countries and subnational education systems that have been selected. The map output is only available when **Between Jurisdictions** is selected in the first step.
4. Additional options allow you to select **Show Score Details** to display the estimates and standard errors for the table cells. If you selected a map, this option is not applicable, as the map will automatically show score details.
5. Click the **Preview** tab located in the upper-left corner, or the **Preview** button located in the bottom-left corner.
6. Click the **Edit** tab in the upper-left corner of the screen if you wish to go back and make changes to the selections you made for running the significance tests.
7. Click the **Done** button in the upper- or lower-right corner of the screen to run the significance tests.

Exhibit 24. Significance test options

Loading ...
x

Edit Preview
Cancel Done

1. Select one category to compare significance from the choices available below. Help

Between Jurisdictions
 Within Variables
 Across Years

2. Create a name for this significance test. Name:

3. Select the output type.

Table
 Map

4. Select additional options. Show table details

5. Select available options from each of the columns below, then preview results.

Jurisdiction	Variable	Year	Statistic
<input checked="" type="checkbox"/> All Jurisdictions <input checked="" type="checkbox"/> International Average <input checked="" type="checkbox"/> Australia <input checked="" type="checkbox"/> Bahrain <input checked="" type="checkbox"/> Canada <input checked="" type="checkbox"/> Chile	<input checked="" type="checkbox"/> Sex of student <input checked="" type="checkbox"/> Girl <input checked="" type="checkbox"/> Boy	<input checked="" type="checkbox"/> 2015	<input checked="" type="checkbox"/> Averages <input checked="" type="checkbox"/> Percentiles <input checked="" type="checkbox"/> 10th Percentile <input checked="" type="checkbox"/> 90th Percentile

Preview
Cancel Done

When the table option is selected, you will get a significance test matrix in which you will see the differences and p values. Using the symbols shown in the legend of the matrix, an indication is also provided of whether one estimate is significantly lower or higher than another estimate or whether there is no significant difference (see exhibit 25).

The alpha level to establish significance for all comparisons is .05. All comparisons within a jurisdiction, within the same year, are made using dependent samples t -tests. Comparisons between jurisdictions, and comparisons between years, even for the same jurisdiction, are made using independent samples t -tests. The TIMSS IDE also uses independent samples t -tests, between a country and a subnational entity that is participating as a benchmarking entity (for instance, in order to compare scores between the United States and Massachusetts or Minnesota, since they each are an independent sample).

Exhibit 25. Significance test table output

[Link to this Page](#) Export Reports

Select Report: Report 2

Table Sig Test 1 X

Chart Significance Test Gap Analysis Regression Analysis

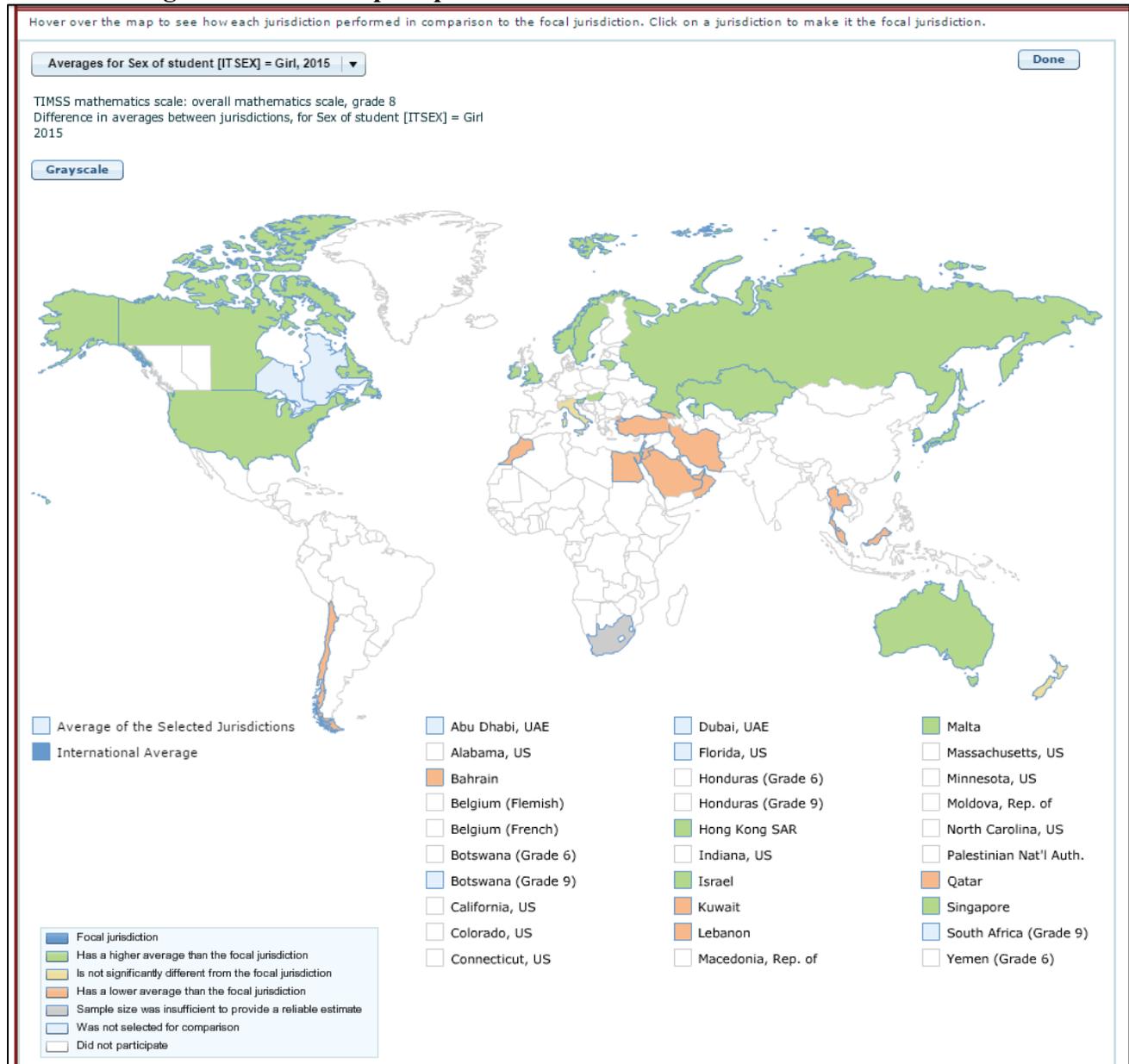
To see how one value compares with the others, read across the row for that value. The displayed symbols indicate whether that value is significantly higher, significantly lower, or not significantly different from the focal jurisdiction.

TIMSS mathematics scale: overall mathematics scale, grade 8
Difference in averages between jurisdictions, for Sex of student [ITSEX] = Girl
2015

	International Average (488)	Australia (504)	Bahrain (462)	Canada (532)	Chile (418)	Chinese Taipei-CHN (599)	Egypt (397)	England-GBR (520)	Georgia (454)	Hong Kong-CHN (591)	Hungary (510)
International Average (488)		Diff = < -16 (3.9) P-value = 0.0000	Diff = > 26 (2.5) P-value = 0.0000	Diff = < -43 (4.4) P-value = 0.0000	Diff = > 70 (3.7) P-value = 0.0000	Diff = < -111 (2.6) P-value = 0.0000	Diff = < -92 (5.6) P-value = 0.0000	Diff = > 32 (5.3) P-value = 0.0000	Diff = < -34 (4.0) P-value = 0.0000	Diff = > 103 (4.7) P-value = 0.0000	Diff = > 22 (4.3)
Australia (504)	Diff = > 16 (3.9) P-value = 0.0000		Diff = > 42 (4.5) P-value = 0.0000	Diff = < -27 (5.8) P-value = 0.0000	Diff = > 86 (5.3) P-value = 0.0000	Diff = < -95 (4.6) P-value = 0.0000	Diff = < -107 (6.7) P-value = 0.0000	Diff = > 16 (6.5) P-value = 0.0151	Diff = < -50 (5.5) P-value = 0.0000	Diff = > 87 (6.1) P-value = 0.0000	Diff = x 6 (5.8)
Bahrain (462)	Diff = < -26 (2.5) P-value = 0.0000	Diff = < -42 (4.5) P-value = 0.0000		Diff = < -70 (5.0) P-value = 0.0000	Diff = > 44 (4.4) P-value = 0.0000	Diff = < -137 (3.5) P-value = 0.0000	Diff = < -65 (6.0) P-value = 0.0000	Diff = > 58 (5.7) P-value = 0.0000	Diff = x -8 (4.6) P-value = 0.0713	Diff = > 129 (5.3) P-value = 0.0000	Diff = > 48 (4.9)
Canada (532)	Diff = > 43 (4.4) P-value = 0.0000	Diff = > 27 (5.8) P-value = 0.0000	Diff = > 70 (5.0) P-value = 0.0000		Diff = > 113 (5.7) P-value = 0.0000	Diff = < -68 (5.0) P-value = 0.0000	Diff = < -135 (7.0) P-value = 0.0000	Diff = x -12 (6.8) P-value = 0.0837	Diff = < -78 (5.9) P-value = 0.0000	Diff = > 60 (6.4) P-value = 0.0000	Diff = < -22 (6.1)
Chile (418)	Diff = < -70 (3.7) P-value = 0.0000	Diff = < -86 (5.3) P-value = 0.0000	Diff = < -44 (4.4) P-value = 0.0000	Diff = < -113 (5.7) P-value = 0.0000		Diff = < -181 (4.5) P-value = 0.0000	Diff = < -21 (6.6) P-value = 0.0012	Diff = > 102 (6.4) P-value = 0.0000	Diff = > 36 (5.4) P-value = 0.0000	Diff = > 173 (6.0) P-value = 0.0000	Diff = > 92 (5.7)
Chinese Taipei-CHN (599)	Diff = > 111 (2.6) P-value = 0.0000	Diff = > 95 (4.6) P-value = 0.0000	Diff = > 137 (3.5) P-value = 0.0000	Diff = > 68 (5.0) P-value = 0.0000	Diff = > 181 (4.5) P-value = 0.0000		Diff = < -202 (6.1) P-value = 0.0000	Diff = < -79 (5.8) P-value = 0.0000	Diff = < -145 (4.7) P-value = 0.0000	Diff = x -8 (5.4) P-value = 0.1558	Diff = < -89 (5.0)
Egypt (397)	Diff = < -92 (5.6) P-value = 0.0000	Diff = < -107 (6.7) P-value = 0.0000	Diff = < -65 (6.0) P-value = 0.0000	Diff = < -135 (7.0) P-value = 0.0000	Diff = < -21 (6.6) P-value = 0.0012	Diff = < -202 (6.1) P-value = 0.0000		Diff = < -79 (5.8) P-value = 0.0000	Diff = < -145 (4.7) P-value = 0.0000	Diff = x -8 (5.4) P-value = 0.1558	Diff = < -89 (5.0)
England-GBR (520)	Diff = > 32 (5.3) P-value = 0.0000	Diff = > 16 (6.5) P-value = 0.0151	Diff = > 58 (5.7) P-value = 0.0000	Diff = x -12 (6.8) P-value = 0.0837	Diff = > 102 (6.4) P-value = 0.0000	Diff = < -79 (5.8) P-value = 0.0000	Diff = < -202 (6.1) P-value = 0.0000		Diff = < -145 (4.7) P-value = 0.0000	Diff = x -8 (5.4) P-value = 0.1558	Diff = < -89 (5.0)
Georgia (454)	Diff = < -34 (4.0) P-value = 0.0000	Diff = < -50 (5.5) P-value = 0.0000	Diff = x -8 (4.6) P-value = 0.0713	Diff = < -78 (5.9) P-value = 0.0000	Diff = > 36 (5.4) P-value = 0.0000	Diff = < -145 (4.7) P-value = 0.0000	Diff = < -202 (6.1) P-value = 0.0000	Diff = < -79 (5.8) P-value = 0.0000		Diff = x -8 (5.4) P-value = 0.1558	Diff = < -89 (5.0)
Hong Kong-CHN (591)	Diff = > 103 (4.7) P-value = 0.0000	Diff = > 87 (6.1) P-value = 0.0000	Diff = > 129 (5.3) P-value = 0.0000	Diff = > 60 (6.4) P-value = 0.0000	Diff = > 173 (6.0) P-value = 0.0000	Diff = x -8 (5.4) P-value = 0.1558	Diff = < -202 (6.1) P-value = 0.0000	Diff = < -79 (5.8) P-value = 0.0000	Diff = < -145 (4.7) P-value = 0.0000		Diff = < -89 (5.0)
Hungary (510)	Diff = > 22 (4.3)	Diff = x 6 (5.8)	Diff = > 48 (4.9)	Diff = < -22 (6.1)	Diff = > 92 (5.7)	Diff = < -89 (5.0)	Diff = < -202 (6.1) P-value = 0.0000	Diff = < -79 (5.8) P-value = 0.0000	Diff = < -145 (4.7) P-value = 0.0000	Diff = x -8 (5.4) P-value = 0.1558	

When the **map option** is selected, a global map is shown with the countries and subnational education systems that were previously selected shaded (see exhibit 26). The focal jurisdiction is shaded in blue, with all other countries compared to it. The other countries are shaded in colors that indicate whether they are higher, lower, or not significantly different from the focal jurisdiction on whatever measure has been selected. (Note that a lighter shade of blue is the default color for countries not selected for comparison.) When you scroll over a country, a text bubble pops up indicating the point estimates for that country and the focal jurisdiction. At any point, you may choose a different focal jurisdiction by clicking on another country.

Exhibit 26. Significance test map output



4.G. Gap Analysis

Gap Analysis is included in the IDE to compare differences in gaps shown in a map, table, or chart. These gap differences can be compared between jurisdictions and/or across years.

Exhibit 27. Gap analysis link selection

Table

Chart Significance Test **Gap Analysis** Regression Analysis

Averages for TIMSS mathematics scale: overall mathematics, grade 8 by Sex of student [ITSEX], year and jurisdiction: 2015

Year	Jurisdiction	Female		Male	
		Average	Standard Error	Average	Standard Error
2015	United Arab Emirates	471	(3.5)	459	(4.0)
	United States	517	(3.3)	519	(3.2)

NOTE: For details on jurisdictions in which population coverage, participation rates, sampling procedures, or reliability standards deviated from international standards, see Statistical Notations and Other Notes in the Help Guide. Data from these jurisdictions have issues that interfere with proper trend analysis: Armenia, Australia, Botswana, Canada, Finland, Indonesia, Israel, Italy, Kazakhstan, Kuwait, Morocco, Poland, Qatar, Saudi Arabia, Slovenia, South Africa, Syrian Arab Republic, Thailand, Turkey, and Yemen. Norway (4) and Norway (8) refer to students in their 4th and 8th year of schooling, respectively, and maintain trend with previous TIMSS cycles. TIMSS Advanced assesses the advanced mathematics and physics knowledge and skills of students in their final year of secondary school who were taking or had taken courses in advanced mathematics and physics; the percentage of the age cohort enrolled in these courses and considered eligible for the TIMSS Advanced study varied across participating jurisdictions (ranging from 2% to 34% in 2015, and was 11% in the United States for advanced mathematics and 5% for physics). In TIMSS Advanced 2015, the Russian Federation participated in the advanced mathematics assessment with two student populations; results for students in intensive courses (6 or more hours of advanced mathematics lessons per week) are reported separately from the results for other students from the Russian Federation taking courses that involve 4.5 hours of lessons per week. Average of Countries shows the TIMSS scale centerpoint of 500 when results for "All students" are shown. See the Help Guide for further details. The TIMSS mathematics scale: overall mathematics ranges from 0 to 1000. Some apparent differences between estimates may not be statistically significant.

SOURCE: International Association for the Evaluation of Educational Achievement, Trends in International Mathematics and Science Study (TIMSS), 2015 Mathematics and Science Assessment.

With your report of interest selected, click on the **Gap Analysis** link, which is located to the right of the **Significance Test** link (see exhibit 27). You will need to decide which variable you would like to test (e.g., gender) and the criterion by which you want to test it (i.e., between jurisdictions or across years). The difference measure, or gap, can be viewed between groups, between years, between groups and years, or between percentiles within the selected variable. For example, if you compute average mathematics scores for two countries at two time points for males and females, you can:

- at one time point, compare the male-female gap in one country to the male-female gap in another country;
- compare the male-female gap at two time points within a country;
- compare the difference between the male-female gap at two time points in one country to the difference between the male-female gap at two time points in another country; or
- compare the gap for females at two time points in one country to the gap for females at two time points in another country.

Exhibit 28. Gap analysis options

Gap Analysis
x

Edit Preview
Cancel Done

1. Select the basis to use for comparison (Between Jurisdictions, Across Years).

Between Jurisdictions Across Years
2. Create a name for this gap analysis.
3. Select the difference measure (gap) to analyze.

Between Groups Between Years Between Groups and Years Between Percentiles
4. Select the output type.

Table Map
5. Check to show table details. Show table details
6. Select available options from each of the columns below, then preview results.

Jurisdiction	Variable	Year	Statistic
<input checked="" type="checkbox"/> All Jurisdictions <input checked="" type="checkbox"/> International Average <input checked="" type="checkbox"/> Australia <input checked="" type="checkbox"/> Bahrain <input checked="" type="checkbox"/> Canada <input checked="" type="checkbox"/> Chile	<input checked="" type="checkbox"/> Sex of student <input checked="" type="checkbox"/> Girl <input checked="" type="checkbox"/> Boy	<input checked="" type="checkbox"/> 2015	<input checked="" type="checkbox"/> Averages <input checked="" type="checkbox"/> Percentiles <input checked="" type="checkbox"/> 10th Percentile <input checked="" type="checkbox"/> 90th Percentile

Preview
Cancel Done

The steps for running a gap analysis are similar to those for conducting a statistical significance test (see exhibit 28). Thus, to run a gap analysis, follow the instructions under section 4.F. **Significance Tests**, noting the following differences:

1. The **Gap Analysis** link should be selected, not the **Significance Test** link.
2. The gap analysis does not have a **Within Variables** option for analysis; the options are **Between Jurisdictions** and **Across Years**.
3. The difference measure (gap) of analysis must be selected from the following: **Between Groups**, **Between Years**, **Between Groups and Years**, and **Between Percentiles** (if variables are selected for which a difference measure is not feasible, the difference measure option will not appear as available in the Gap Analysis menu).

The gap analysis output is presented in a format similar to that of the significance test output, with one difference: the difference estimate shown in the output is the difference between the gaps selected for analysis. Note that you will still see the significance of these differences just like in a significance test. For example, exhibit 29 shows cross-national differences between male-female score gaps among 8th grade students.

The gap analysis function computes and statistically tests differences between score, percentage, or percentile gaps. All gap comparisons are made using independent samples *t*-tests with an alpha level of 0.05. Note that the reference group for the gaps is kept constant during the analysis, as opposed to taking the absolute value of the gaps. Therefore, the gap analysis tests whether the magnitude of the gaps differ from each other only when the gaps go in the same direction (e.g., comparing a 5-point gender gap favoring females in one country with a 15-point gender gap favoring females in another country).

Exhibit 29. Gap analysis output

Table Gap Test 4 X							
Chart		Significance Test		Gap Analysis		Regression Analysis	
To see how one value compares with the others, read across the row for that value. The displayed symbols indicate whether that value is significantly higher, significant							
TIMSS mathematics scale: overall mathematics scale, grade 8 Differences between jurisdictions for gaps in averages between Sex of student [ITSEX]=Girl and Sex of student [ITSEX]=Boy 2015							
	International Average (2)	Australia (-2)	Bahrain (16)	Canada (-10)	Chile (-18)	Chinese Taipei-CHN (0)	Egypt (9)
International Average (2)		Diff = 4 (5.3) P-value = 0.4018	Diff = -13 (3.4) P-value = 0.0001	Diff = 13 (7.5) P-value = 0.0958	Diff = 20 (5.7) P-value = 0.0004	Diff = 3 (4.1) P-value = 0.5328	Diff = 7 (7.5) P-value = 0.3694
Australia (-2)	Diff = -4 (5.3) P-value = 0.4018		Diff = -18 (6.2) P-value = 0.0044	Diff = 8 (9.1) P-value = 0.3726	Diff = 16 (7.7) P-value = 0.0383	Diff = -2 (6.5) P-value = 0.7710	Diff = 11 (9.1) P-value = 0.2189
Bahrain (16)	Diff = 13 (3.4) P-value = 0.0001	Diff = 18 (6.2) P-value = 0.0044		Diff = 26 (8.2) P-value = 0.0017	Diff = 33 (6.5) P-value = 0.0000	Diff = 16 (5.1) P-value = 0.0024	Diff = -6 (8.2) P-value = 0.4410
Canada (-10)	Diff = -13 (7.5) P-value = 0.0958	Diff = -8 (9.1) P-value = 0.3726	Diff = -26 (8.2) P-value = 0.0017		Diff = 8 (9.4) P-value = 0.4083	Diff = -10 (8.5) P-value = 0.2359	Diff = 19 (10.6) P-value = 0.0677
Chile (-18)	Diff = -20 (5.7) P-value = 0.0004	Diff = -16 (7.7) P-value = 0.0383	Diff = -33 (6.5) P-value = 0.0000	Diff = -8 (9.4) P-value = 0.4083		Diff = -18 (6.9) P-value = 0.0097	Diff = 27 (9.4) P-value = 0.0038
Chinese Taipei-CHN (0)	Diff = -3 (4.1) P-value = 0.5328	Diff = 2 (6.5) P-value = 0.7710	Diff = -16 (5.1) P-value = 0.0024	Diff = 10 (8.5) P-value = 0.2359	Diff = 18 (6.9) P-value = 0.0097		Diff = 9 (8.5) P-value = 0.2715
Egypt (9)	Diff = 7 (7.5) P-value = 0.3694	Diff = 11 (9.1) P-value = 0.2189	Diff = -6 (8.2) P-value = 0.4410	Diff = 19 (10.6) P-value = 0.0677	Diff = 27 (9.4) P-value = 0.0038	Diff = 9 (8.5) P-value = 0.2715	
England-GBR (3)	Diff = 1 (7.2) P-value = 0.9324	Diff = 5 (8.8) P-value = 0.5662	Diff = -12 (7.8) P-value = 0.1105	Diff = 13 (10.3) P-value = 0.2012	Diff = 21 (9.0) P-value = 0.0208	Diff = 3 (8.1) P-value = 0.6986	Diff = 13 (10.3) P-value = 0.2012
Georgia (1)	Diff = -2 (5.7) P-value = 0.7823	Diff = 3 (7.7) P-value = 0.7100	Diff = -15 (6.5) P-value = 0.0248	Diff = 11 (9.4) P-value = 0.2413	Diff = 19 (8.0) P-value = 0.0187	Diff = 1 (6.9) P-value = 0.8900	Diff = 19 (8.0) P-value = 0.0187
Hong Kong-CHN (-5)	Diff = -8 (7.7) P-value = 0.3117	Diff = -3 (9.2) P-value = 0.7187	Diff = -21 (8.3) P-value = 0.0120	Diff = 5 (10.7) P-value = 0.6522	Diff = 13 (9.5) P-value = 0.1846	Diff = -5 (8.6) P-value = 0.5424	Diff = 13 (9.5) P-value = 0.1846
LEGEND:							
<	Has a significant negative difference.						
>	Has a significant positive difference.						
x	No significant difference.						
#	A significance test could not be performed because reporting standards were not met, or appropriate standard errors could not be calculated.						
NOTE: For gap analysis tables, all comparisons are independent tests with an alpha level of 0.05. Population coverage, participation rates, sampling procedures, or reliability standards de Ontario-CAN (07), Portugal (15), Qatar (11), Quebec-CAN (15, 07), Saudi Arabia (15), Scotland (07, 03, 95), Serbia (15, 11), Singapore (15, 11), Slovenia (95), Spain (15), Sweden (03, 99, 95), Macedonia (03), Massachusetts-US (11, 07), Minnesota-USA (11, 07), Mongolia (07), Morocco (15, 03, 07), Netherlands (03, 99, 95), New Zealand (15), North Carolina-USA In TIMSS Advanced 2015, the Russian Federation participated with two populations of students for Advanced Mathematics —results for students in intensive courses (6 or more hours per							

Note that a gap analysis across years cannot be combined with the Between Years or Between Groups and Years difference measures, so you will select the difference measure Between Groups, or, if you have selected percentiles as one of your statistics, you may choose Between Percentiles.

4.H. Regression Analysis

Regression Analysis is included in the IDE to test for the relationship between one or more independent variables with a dependent variable, with the independent variables controlling for each other. The type of analysis performed in this feature of the IDE is referred to as linear regression, with the dependent variable being a continuous variable selected at step 1.

Exhibit 30. Regression analysis link selection

Subject, Grade: Mathematics and Science, Grade 8
Jurisdictions: Average of Countries, Average of Selected Countries/Participants, Algeria, Armenia, Australia, Austria, Bahrain, Belgium (Flemish)-BEL, Belgium (French)-BEL, Bosnia and Herzegovina, Botswana, Bulgaria, Canada, Chile, Chinese Taipei-CHN, Colombia, Cyprus, Czech Republic, Denmark, Egypt, El Salvador, England-GBR, Estonia, Finland, France, Georgia, Germany, Ghana, Greece, Hong Kong-CHN, Hungary, Iceland, Indonesia, Iran, Islamic Rep. of, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Rep. of, Kuwait, Latvia, Lebanon, Lithuania, Macedonia, Rep. of, Malaysia, Malta, Moldova, Rep. of, Mongolia, Morocco, Netherlands, New Zealand, Norway, Norway (8), Oman, Palestinian Nat'l Auth., Philippines, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Scotland, Serbia, Singapore, Slovak Republic, South Africa, Slovenia, Spain, Sweden, Switzerland, Syrian Arab Republic, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United States
Measure: TIMSS Mathematics Scale: Overall Mathematics
Variable: Index of home resources for learning (2011, 2015)
Year: 2015

Select Report: Report 1 [Link to this Page](#) [Export Reports](#)

Table [Chart](#) [Significance Test](#) [Gap Analysis](#) [Regression Analysis](#)

Averages for TIMSS mathematics scale: overall mathematics, grade 8 by Index of home resources for learning (2011, 2015) [B55DG214], year and jurisdiction: 2015

Year	Jurisdiction	Many Resources		Some Resources		Few Resources	
		Average	Standard Error	Average	Standard Error	Average	Standard Error
2015	Average of Countries	539	(1.1)	486	(0.5)	436	(1.1)

A regression analysis can be performed based on the selections that were made to build your table in the IDE by selecting the **Regression Analysis** button above the table (see Exhibit 30). The Measure, or continuous variable, that you selected in Step 1 and that is displayed in your table will automatically become your dependent variable for the regression analysis (in Exhibit 30 this is “TIMSS Mathematics Scale: Overall Mathematics”). Please note that continuous variables cannot be used as independent variables. The variables that you selected in Step 2 and that are displayed in your table will become your independent variable options for the regression analysis (in Exhibit 30 this is “Index of home resources for learning (2011, 2015)”).

The general steps for running a regression analysis are as follows (see exhibit 31):

1. In the **Regression Analysis** pop-up window, you can enter a **Name** limited to 25 characters, using only letters, numbers, spaces, underscores, and hyphens (otherwise, by default, the test will be named “Regression 1”).
2. Select the appropriate jurisdiction, year, and variable(s) for analysis. Please note that you may only choose one jurisdiction and year at a time, but you may choose up to 3 independent variables to be in your report. In order to use up to 3 variables, you must have already created and selected a cross-tabulated report (by selecting 3 variables in Step 2, **Select Variables**).
3. Click the **Preview** tab located in the upper-left corner to view the table format into which your output will be populated. In the Preview tab, an “X” denotes where the output will display.
4. Click the **Edit** tab in the upper-left corner of the screen if you wish to go back and make changes to the selections you made for running the analysis.

- Click the **Done** button in the upper- or lower-right corner of the screen to run the regression analysis.

Exhibit 31. Regression analysis options

The screenshot shows a software window titled "Regression Analysis" with a close button (X) in the top right. Below the title bar are two tabs: "Edit" (active) and "Preview". In the top right corner of the window are buttons for "Cancel" and "Done".

Step 1: "1. Create a name for this regression analysis." Below this is a text input field containing "Regression 1". A "Help" button is located to the right of the input field.

Step 2: "2. Select available options from each of the columns below, then preview results." Below this is a table with three columns: "Jurisdiction", "Year", and "Variable".

Jurisdiction	Year	Variable
<ul style="list-style-type: none"> <input type="radio"/> South Africa <input type="radio"/> Sweden <input type="radio"/> Thailand <input type="radio"/> Turkey <input type="radio"/> United Arab Emirates <input checked="" type="radio"/> United States 	<ul style="list-style-type: none"> <input checked="" type="radio"/> 2015 	<ul style="list-style-type: none"> <input type="checkbox"/> All Variables <input checked="" type="checkbox"/> Index of home resources for learning

At the bottom right of the window are buttons for "Cancel" and "Done".

After you have clicked **Done**, your regression analysis output will load onto the screen (see exhibit 32). A 0-1 contrast coding is used to code the independent variable, where the first subgroup of the independent variable is the reference group. Using dummy-coded variables in a linear regression is useful for comparing each subgroup against a reference group. For example, in exhibit 32, if the subgroup “Many Resources” is the reference group for the independent variable **Index of home resources for learning [BS5DG214]**, the IDE creates a “Some Resources” dummy variable (1 for respondents who answered “Some Resources”, 0 otherwise), a “Few Resources” dummy variable (1 for respondents who answered “Few Resources”, 0 otherwise). Reference group “Many Resources” is excluded from the regression analysis.

Exhibit 32. Regression analysis output

Mathematics and Science, Grade 8 2015							
Dependent Variable: TIMSS Mathematics Scale: Overall Mathematics							
Independent Variable(s): Index of home resources for learning [BS5DG214]							
Contrast Coding Reference Group: Many Resources							
United States							
Multiple Correlation	0.33						
R Squared	0.11						
	Degrees of Freedom	Mean square	F Ratio	P Value			
Model	2	1370408346.91	75	0			
Error	1220.24	18272819.97					
	Standardized Regression Coefficients	S.E. of Standardized Coefficients	Regression Coefficients	S.E. of Regression Coefficients	T Statistic	Probability	Significance
Intercept	0	0	567.3095	3.6403	155.8418	0	>
Index of home resources for learning							
Some Resources	-0.3185	0.0161	-58.5646	3.3471	-17.497	0	<
Few Resources	-0.3016	0.0171	-98.4313	5.5434	-17.7564	0	<
	Mean		SD				
TIMSS Mathematics Scale: Overall Mathematics	518.3		83.3				
	Percentage	SD					
Index of home resources for learning							
Some Resources	71	45					
Few Resources	7	25					

Using the output from exhibit 32 you can compare the average mathematics achievement of 8th grade students who have some or few home resources for learning to the mean mathematics achievement of those with many home resources. When a single dummy-coded variable is used in a regression, the *intercept* is the mean of the reference group (e.g., 567.3095), and the *regression coefficient* is the difference between the mean of the reference group and the group identified (coded 1) with the dummy-coded variable (e.g., -98.4313 for Few Resources). Since the regression coefficients are presented with a standard error and a *t* value, these can be used to test whether a difference between means is statistically significant. Under the Significance column in the output you will see 3 possible signs: 1) < signifies a significant negative difference, 2) > signifies a significant positive difference, and 3) x signifies the difference is not statistically significant.

4.I. Export Reports

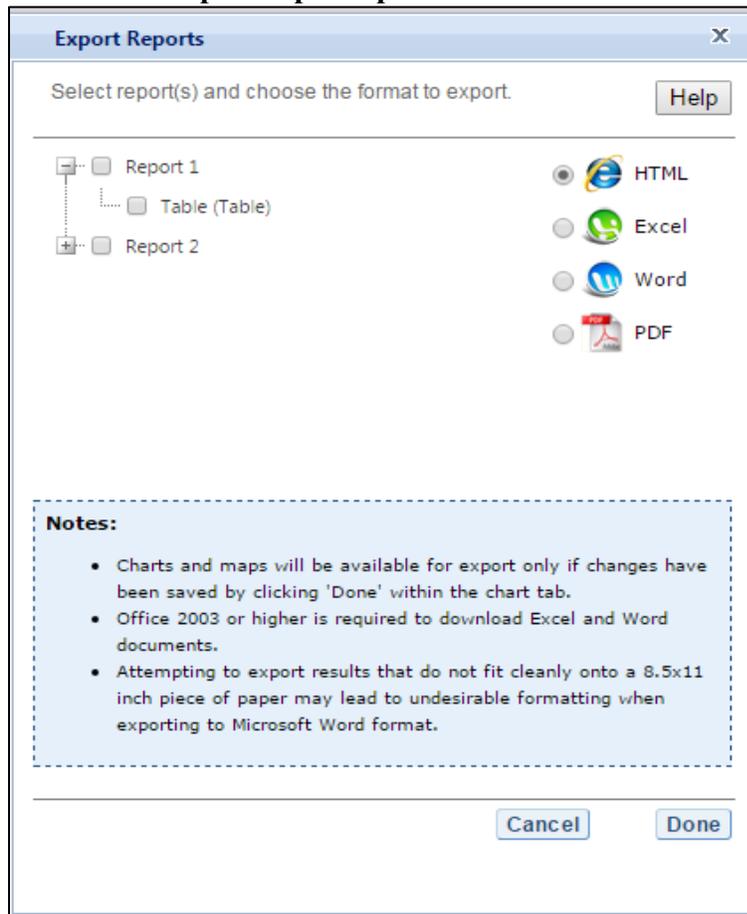
Click on the **Export Reports** button/arrow located on the right side of the **Build Reports** screen to save or print your tables, charts, and significance tests. The report names that appear in the **Export Reports** window are those that were checked off at step 3, **Edit Reports**.

Check the files you want to export, and select one of the file formats: **HTML** (print-friendly), **Excel**, **Word**, or **PDF** (see exhibit 33). All reports that you select at the same time will be exported in one file. In the Excel format, you will be able to increase the visible decimal places

visible wherever more precision is available. Because there are many different operating systems in use, you may get an error message with Excel or one of the other formats. Usually, this will not affect your ability to export, so please wait for the software “errors” to resolve.

Charts or maps for each report will only be available on the **Export Reports** menu if you saved them by clicking **Done** when you finished each one (see exhibit 26). If a chart or map that you wish to save or print is grayed out (not available for selection), cancel the **Export Reports** tool, go back to your chart or map, and be sure to click **Done** on the last screen. After that, it will be available for export.

Exhibit 33. Export report options



V. TIMSS International Data Explorer (IDE) Definitions

This section describes the kinds of criteria and variables that are used to form data queries, as well as the kinds of data that are available and the statistical methods used to assess them.

These topics include the following:

- Criteria
 - Subject
 - Grade
 - Measures
 - Jurisdictions
- Variables
- Statistics options
 - Averages
 - Percentages
 - Standard deviations
 - Percentiles
- Cross-tabulations
- Statistical notations and other notes

1. Criteria

Each data query must include at least one selection from four criteria choices: subject, grade, measure(s), and jurisdiction(s). Shown below is an outline of these selection criteria followed by a brief description.

1. Subject:
 - Mathematics and Science
 - TIMSS Advanced: Advanced Mathematics
 - TIMSS Advanced: Physics
2. Grade:
 - Grade 4
 - Grade 8
 - End of High School
3. Measure:
 - TIMSS scale scores
 - Mathematics: Grade 4
 - Overall scale
 - Subscales
 - Mathematics: Grade 8
 - Overall scale
 - Subscales

- Science: Grade 4
 - Overall scale
 - Subscales
- Science: Grade 8
 - Overall scale
 - Subscales
- TIMSS Advanced: Advanced Mathematics: End of High School
 - Overall scale
 - Subscales
- TIMSS Advanced: Physics: End of High School
 - Overall scale
 - Subscales
- Student and Family Characteristics
- Student Computer Use
- Student Activities Outside of School
- Student Perception/Valuing of Mathematics/Science
- Teacher Background Characteristics, Formal Education, and Training
- Teacher Perception of Mathematics/Science Teaching/Learning
- Teacher Preparation and Collaboration
- Teacher Activities Outside of School (when Mathematics and Science is selected)
- Classroom Characteristics
- Classroom Instruction
- Role of Homework (Teacher)
- School Characteristics
- School Resources
- Home Involvement (School)
- School Climate and Safety

4. Jurisdiction:

- Average of Countries
- Average of the Selected Jurisdictions
- Country
- Benchmarking Jurisdiction (when Mathematics and Science is selected)
- Off-Grade Participants (when Mathematics and Science is selected)

Subject

TIMSS is a study of mathematics and science, and those are the subjects that can be selected. The Mathematics and Science subject can only be selected with either Grade 4 or Grade 8 options. TIMSS Advanced is a study of advanced mathematics and physics, and those are the subjects that can be selected. The Advanced Mathematics and Physics options can only be selected with the End of High School grade option.

Measures

TIMSS focuses on overall mathematics and science knowledge, but within these broad categories a variety of subscales are available each year. Subscales are constituent parts of the composite subject scale for an assessment, and are specified by the assessment framework for that year. The weighted average of these is the basis for the mathematics and science composite scales, as described in the TIMSS and TIMSS Advanced frameworks.

Subscales are based on fewer observations than the composite scales and, as a result, may have larger standard errors.

In addition, there are a number of continuous variables other than scale and subscale scores that you may choose as a measure of analysis. These variables fall under different categories, such as Student and Family Characteristics and School Characteristics, and include variables such as age, teaching experience, and class size.

Jurisdictions

Note that some country counts overlap because some countries participated at both the fourth- and eighth-grade levels. Also, benchmarking participants are currently available in the IDE for 2015, 2011, 2007, and 2003. So they are only listed below for those years.

In 2015, there were 49 countries and subnational education systems, as well as 6 benchmarking participants—Abu Dhabi and Dubai (United Arab Emirates); the Argentinian city of Buenos Aires; the Canadian provinces of Ontario and Quebec; and the U.S. state of Florida—that participated in TIMSS at the fourth-grade level. At the eighth-grade level, 38 countries and subnational education systems, along with 6 benchmarking participants—Abu Dhabi and Dubai (United Arab Emirates); the Argentinian city of Buenos Aires; the U.S. state of Florida; and the Canadian provinces of Ontario and Quebec—participated. Nine countries participated in TIMSS Advanced at the end of high school.

Also, for TIMSS 2015, countries where students were expected to find the TIMSS assessments too difficult for their fourth- or eighth-grade students were given the option to assess students at a higher grade. Accordingly, one country (South Africa) administered the fourth grade assessment to their fifth grade students and two countries (Bostwana and South Africa) aministered the eighth grade assessment to their ninth grade students.

Additionally, for TIMSS 2015, 7 countries and 1 benchmarking education system participated in the Numeracy assessment (newly developed TIMSS Numeracy assessment, a less difficult version of the fourth grade mathematics assessment), including Bahrain, Indonesia, Iran, Kuwait, Jordan, Morocco, and South Africa as well as Buenos Aires. Each of these participants gave the fourth-grade assessments in mathematics and science as well as the Numeracy assessment, except that Jordan and South Africa participated in Numeracy only.

In 2015, Norway chose to assess fifth and ninth grades to obtain better comparisons with Sweden and Finland, but also collected benchmark data at fourth and eighth grades to maintain trend with previous TIMSS cycles.

In 2011, there were 52 countries and subnational education systems, as well as 7 benchmarking participants—Abu Dhabi and Dubai (United Arab Emirates); the Canadian provinces of Alberta, Ontario, and Quebec; and the U.S. states of Florida and North Carolina—that participated in TIMSS at the fourth-grade level. At the eighth-grade level, 45 countries and subnational education systems, along with 14 benchmarking participants—Abu Dhabi and Dubai (United Arab Emirates); the U.S. states of Alabama, California, Colorado, Connecticut, Florida, Indiana, Massachusetts, Minnesota, and North Carolina; and the Canadian provinces of Alberta, Ontario and Quebec—participated. Also, for TIMSS 2011, countries where students were expected to find the TIMSS assessments too difficult for their fourth- or eighth-grade students were given the option to assess students at a higher grade. Accordingly, three countries administered the fourth grade assessment to their sixth grade students and the eighth grade assessment to their ninth grade students.

In 2007, there were 37 countries and subnational education systems, as well as 7 benchmarking participants—the Canadian provinces of Alberta, British Columbia, Ontario, and Quebec; Dubai (United Arab Emirates); and the U.S. states of Massachusetts and Minnesota—that participated in TIMSS at the fourth-grade level. At the eighth-grade level, 50 countries and subnational education systems, along with 7 benchmarking participants—the Canadian provinces of British Columbia, Ontario, and Quebec; Dubai (United Arab Emirates); the Basque region of Spain; and the U.S. states of Massachusetts and Minnesota—participated.

In 2003, there were 25 countries and subnational education systems, as well as 3 benchmarking participants—the Canadian provinces of Ontario and Quebec and the U.S. state of Indiana—that participated in TIMSS at the fourth-grade level. At the eighth-grade level, 48 countries and subnational education systems, along with 4 benchmarking participants—the Canadian provinces of Ontario and Quebec; the Basque region of Spain; and the U.S. state of Indiana—participated.

In 1999, there were 38 countries and subnational education systems that participated in TIMSS at the eighth-grade level. Fourth-grade students were not assessed in TIMSS 1999.

In 1995, there were 29 countries and subnational education systems that participated in TIMSS at the fourth-grade level. At the eighth-grade level, 46 countries and subnational education systems participated.

All listed jurisdictions can be selected for any analyses. However, the IDE contains a few U.S.-specific background variables (e.g., race/ethnicity) that, when selected, will not yield information for any non-U.S. jurisdictions.

2. Variables

In the TIMSS IDE, questions from three types of questionnaires (student, teacher, and school) as well as variables that are derived from background information are organized into categories that have shared characteristics and can be selected as a group when examining and generating tables.

Content category and subcategory titles may overlap, but specific variables appear only once in a subcategory. Use **Search** in the **Select Variables** step to locate variables.

Benchmarks

In addition to average scale scores, achievement results for TIMSS and TIMSS Advanced are reported using benchmarks. The benchmarks are internationally set levels based on collective judgments about what students should know and be able to do relative to the body of content reflected in each subject-area assessment. Using score cutpoints, the average scale scores are divided into four international benchmarks for TIMSS (*low, intermediate, high, and advanced*) and three international benchmarks for TIMSS Advanced (*intermediate, high, and advanced*).

TIMSS benchmark data for grades 4 and 8 are presented in a discrete format. This “discrete” format presents the percentage of students performing at each international benchmark: *at low, at intermediate, at high, and at advanced*, with an additional category created for those students scoring below the *low* benchmark (*below low*). (Note that there is simply too little information to know what students scoring below the *low* benchmark can actually do.)

TIMSS Advanced benchmark data are presented in a discrete format. This “discrete” format presents the percentage of students performing at each international benchmark: *at intermediate, at high, and at advanced*, with an additional category created for those students scoring below the *intermediate* benchmark (*below intermediate*). (Note that there is simply too little information to know what students scoring below the *intermediate* benchmark can actually do.)

The following tables contain descriptions of the competencies displayed by students categorized at each benchmark in the 2015 TIMSS and TIMSS Advanced international assessments. Competencies are described separately for grade 4 mathematics, grade 8 mathematics, grade 4 science, grade 8 science, advanced mathematics at the end of high school, and physics at the end of high school. The table also displays score cutpoints for each benchmark.

Table 1. Description of TIMSS international benchmarks, fourth-grade mathematics: 2015

Benchmark	Cutpoint	Grade 4 mathematics skills and strategies
Low	400	<ul style="list-style-type: none"> • Basic mathematical knowledge • Add and subtract whole numbers, multiplication by one-digit numbers, and solve simple word problems • Some knowledge of simple fractions, geometric shapes, and measurement • Read and complete simple bar graphs and tables
Intermediate	475	<ul style="list-style-type: none"> • Apply basic mathematical knowledge in straightforward situations • Demonstrate understanding of whole numbers • Demonstrate some understanding of fractions and decimals • Relate two- and three-dimensional shapes and identify and draw shapes with simple properties • Read and interpret bar graphs and tables
High	550	<ul style="list-style-type: none"> • Apply knowledge and understanding to solve problems • Solve word problems involving operations with whole numbers, simple fractions, and two-place decimals • Understand geometric properties of shapes and angles that are less than or greater than a right angle • Interpret and use data in tables and a variety of graphs to solve problems
Advanced	625	<ul style="list-style-type: none"> • Understand a variety of relatively complex situations and show ability to explain reasoning • Solve a variety of multistep word problems involving whole numbers • Increased understanding of fractions and decimals • Apply geometric knowledge of a range of two- and three-dimensional shapes in a variety of situations • Interpret and represent data to solve multistep problems

NOTE: Information about the procedures used to set the international benchmarks is available in [Methods and Procedures in TIMSS 2015](#).

SOURCE: Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2016). [TIMSS 2015 International Results in Mathematics](#). Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Table 2. Description of TIMSS international benchmarks, eighth-grade mathematics: 2015

Benchmark	Cutpoint	Grade 8 mathematics skills and strategies
Low	400	<ul style="list-style-type: none"> • Knowledge of whole numbers and basic graphs • Some evidence of an elementary understanding of whole numbers • Match tables to bar graphs and pictographs
Intermediate	475	<ul style="list-style-type: none"> • Apply basic mathematical knowledge in straightforward situations • Solve problems involving negative numbers, decimals, percentages, and proportions • Some knowledge of linear expressions and two- and three- dimensional shapes • Read and interpret data in graphs and tables • Basic knowledge of chance
High	550	<ul style="list-style-type: none"> • Understanding and knowledge in a variety of relatively complex situations • Use information to solve problems involving different types of numbers and operations. • Show basic procedural knowledge related to algebraic expressions • Solve a variety of problems with angles (triangles, parallel lines, rectangles, and similar figures). • Interpret data in a variety of graphs and solve simple problems involving outcomes and probabilities
Advanced	625	<ul style="list-style-type: none"> • Apply and reason in a variety of problem situations, solve linear equations, and make generalizations • Solve a variety of fraction, proportion, and percent problems and justify their conclusions • Use knowledge of geometric figures to solve a wide range of problems about area • Demonstrate understanding of the meaning of averages and solve problems involving expected values

NOTE: Information about the procedures used to set the international benchmarks is available in [Methods and Procedures in TIMSS 2015](#).
 SOURCE: Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2016). [TIMSS 2015 International Results in Mathematics](#). Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Table 3. Description of TIMSS international benchmarks, fourth-grade science: 2015

Benchmark	Cutpoint	Grade 4 science skills and strategies
Low	400	<ul style="list-style-type: none"> • Elementary knowledge of life science and physical science • Interpret simple diagrams, complete simple tables and provide short, fact-based written responses
Intermediate	475	<ul style="list-style-type: none"> • Basic knowledge and understanding of life, physical, and Earth sciences • Demonstrate some knowledge of life processes of plants, animals, and humans; impacts on environment and human health. Apply knowledge of properties of matter, energy transfer, electricity, forces and motion. Show understanding of Earth's physical characteristics and basic knowledge of solar system. • Ability to interpret information in diagrams and apply factual knowledge to everyday situations, provide simple explanations for biological and physical phenomena
High	550	<ul style="list-style-type: none"> • Apply knowledge and understanding of life, physical, and Earth sciences in everyday and abstract contexts • Apply knowledge of ecosystems and organisms interactions with environment, energy transfer in practical contexts, Earth's history and basic understanding of the Earth-moon-sun system. • Provide brief descriptive responses combining knowledge of science concepts with information from everyday experience of physical and life processes
Advanced	625	<ul style="list-style-type: none"> • Communicate understanding of life, physical, and Earth sciences and demonstrate some knowledge of the process of scientific inquiry • Demonstrate knowledge of characteristics and life processes of a variety of organisms, relationships in ecosystems, physical and chemical changes, forms of energy, forces and their effect on motion, Earth's revolution and rotation • Demonstrate basic knowledge and skills related to scientific inquiry, recognizing how a simple experiment should be set up, interpreting the results of an investigation, reasoning and drawing conclusions from descriptions and diagrams, and evaluating and supporting an argument.

NOTE: Information about the procedures used to set the international benchmarks is available in [Methods and Procedures in TIMSS 2015](#).
 SOURCE: Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2016). [TIMSS 2015 International Results in Science](#). Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Table 4. Description of TIMSS international benchmarks, eighth-grade science: 2015

Benchmark	Cutpoint	Grade 8 science skills and strategies
Low	400	<ul style="list-style-type: none"> • Show some basic knowledge of biology, chemistry, physics, and Earth science.
Intermediate	475	<ul style="list-style-type: none"> • Demonstrate and apply knowledge of biology, chemistry, physics, and Earth science in various contexts • Understand the characteristics and life processes of animal and human health • Apply some knowledge of matter, forces and motion, and energy • Apply knowledge of Earth's processes, resources, and physical features • Interpret information from tables, graphs, and diagrams
High	550	<ul style="list-style-type: none"> • Communicate understanding of concepts from biology, chemistry, physics, and Earth sciences in everyday and abstract situations • Understand biological concepts including human health and the interrelationship of organisms in ecosystems • Knowledge of situations related to light and sound transfer, forces and motion • Understand the Earth's processes and physical features as well as resources and conservation, and Earth and Moon interactions • Demonstrate some scientific inquiry skills, including selecting appropriate experimental method, provide explanations conveying scientific knowledge.
Advanced	625	<ul style="list-style-type: none"> • Communicate understanding of complex concepts in biology, chemistry, physics, and Earth science in practical, abstract, and experimental contexts • Understand cells and their functions, and the complexity of living organisms and how they relate to their environment • Demonstrate knowledge of composition and physical properties of matter, electricity and magnetism, forces and pressure • Knowledge of the solar system and of Earth's structures and physical features • Understand basic aspects of scientific investigation and identify which variables to control in an experimental situation, compare information from several sources, predict and draw conclusions.

NOTE: Information about the procedures used to set the international benchmarks is available in [Methods and Procedures in TIMSS 2015](#).
 SOURCE: Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2016). [TIMSS 2015 International Results in Science](#). Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Table 5. Description of TIMSS Advanced Mathematics international benchmarks, twelfth-grade: 2015

Benchmark	Cutpoint	Grade 12 advanced mathematics skills and strategies
Intermediate	475	<ul style="list-style-type: none"> • Demonstrate basic knowledge of concepts and procedures in algebra, calculus, and geometry to solve routine problems. • Apply and transform a formula to solve a word problem. • Determine a term in a geometric sequence and analyze a proposed solution of a simple logarithmic equation. Recognize a graph of the absolute value of a function and identify and evaluate composite functions. • Make connections between the sign of the derivative and the graph of a function. • Use knowledge of basic properties of geometric figures and the Pythagorean theorem to solve problems. Add and subtract vectors in coordinate form.
High	550	<ul style="list-style-type: none"> • Apply a broad range of mathematical concepts and procedures in algebra, calculus, geometry, and trigonometry to analyze and solve multistep problems set in routine and non-routine contexts. • Analyze and solve algebra problems, including problems set in a practical context. Solve problems requiring interpretation of information related to functions and graphs of functions. • Determine a sum of an arithmetic sequence and solve quadratic and other inequalities. Simplify logarithmic expressions and multiply complex numbers. • Have a basic understanding of continuity and differentiability. Analyze equations of functions and graphs of functions. Relate the graphs of functions to graphs and signs of their first and second derivatives. Show some conceptual understanding of definite integrals. • Use trigonometric properties to solve a variety of problems involving trigonometric functions and geometric figures. Use the Cartesian plane to solve problems, identify a vector perpendicular to a given vector, and prove that a quadrilateral given in the coordinate system is a parallelogram.
Advanced	625	<ul style="list-style-type: none"> • Demonstrate thorough understanding of concepts, mastery of procedures, and mathematical reasoning skills. Solve problems in complex contexts in algebra, calculus, geometry, and trigonometry.

		<ul style="list-style-type: none"> • Reason with functions to solve pure mathematical problems. Demonstrate facility with complex numbers and permutations and can find sums of algebraic and infinite geometric series. In calculus, demonstrate thorough understanding of continuity and differentiability. Solve problems about optimization in different contexts and justify their solutions. Use definite integrals to calculate the area between the curves. • Use geometric reasoning to solve complex problems. Use properties of vectors to express relationships among vectors. Use trigonometric properties including the sine and cosine rules to solve non-routine problems about geometric figures.
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SOURCE: Mullis, I.V.S., Martin, M.O., Foy, P., and Hooper, M. (2016). TIMSS Advanced 2015 International Results in Advanced Mathematics and Physics. Retrieved from <http://timssandpirls.bc.edu/timss2015/international-results/advanced/>.

Table 6. Description of TIMSS Advanced Physics international benchmarks, end of high school: 2015

Benchmark	Cutpoint	Grade 12 physics skills and strategies
Intermediate	475	<ul style="list-style-type: none"> • Demonstrate some basic knowledge of the physics underlying a range of phenomena. • Use knowledge of forces and motion to solve problems, apply knowledge of heat and temperature to energy transfers, and of conservations laws to everyday and abstract contexts. • Show knowledge of electric fields, point charges, and electromagnetic induction. Apply knowledge of phenomena related to mechanical and electromagnetic waves and knowledge of atomic and nuclear physics to solve problems. • Interpret information in diagrams and graphs to solve problems, calculate a variety of physical quantities in a range of contexts, and evaluate statements to identify explanations for physical phenomena.
High	550	<ul style="list-style-type: none"> • Apply basic laws of physics in solving problems in a variety of situations. • Apply knowledge of forces and motion, communicate understanding of the laws of conservation of energy and momentum, and apply knowledge of heat and temperature to solve problems. • Apply knowledge of Ohm's Law and Joule's Law to electric circuits, solve problems involving charged particles in electric and magnetic fields, and apply knowledge of magnetic fields and electromagnetic

		<p>induction to solve problems. Show understanding of phenomena related to electromagnetic waves and knowledge of nuclear reactions.</p> <ul style="list-style-type: none"> • Interpret information in complex diagrams and graphs depicting abstract concepts, derive formulas and provide calculations of a variety of physical quantities in a range of contexts, evaluate explanations for physical phenomena, and provide brief explanations to communicate scientific knowledge.
Advanced	625	<ul style="list-style-type: none"> • Communicate understanding of laws of physics to solve problems in practical and abstract contexts. • Apply knowledge of the motion of objects in freefall, of heat and temperature, and of electrical circuits and electrical fields. • Communicate understanding of magnetic fields and of phenomena related to mechanical and electromagnetic waves, and demonstrate understanding of atomic and nuclear physics. • Design experimental procedures and interpret results, synthesize information in complex diagrams and graphs depicting abstract physics concepts to solve problems, provide multistep calculations of a variety of physical quantities in a range of contexts, draw conclusions about physical phenomena, and provide explanations to communicate scientific knowledge.

SOURCE: Mullis, I.V.S., Martin, M.O., Foy, P., and Hooper, M. (2016). TIMSS Advanced 2015 International Results in Advanced Mathematics and Physics. Retrieved from <http://timssandpirls.bc.edu/timss2015/international-results/advanced/>.

3. Statistics Options

The IDE reports TIMSS data with several statistics options:

- Averages
- Percentages
- Standard deviations
- Percentiles

Averages

This statistic provides the average value for a selected continuous variable or overall score for the combined scale (for example, TIMSS Mathematics Scale: Overall Mathematics) or score for one of the subscales corresponding to the subject chosen (for example, TIMSS Mathematics Scale: Algebra).

For the TIMSS and TIMSS Advanced assessment, student performance is reported on scales that range from 0 to 1,000, with the TIMSS scale centerpoint fixed at 500 and a standard deviation of 100.

Scale scores can show the standard error and are often accompanied by data showing percentages and standard deviations.

TIMSS scales are produced using item response theory (IRT) to estimate average scores for mathematics, science, advanced mathematics, and physics for each jurisdiction. IRT identifies patterns of response and uses statistical models to predict the probability of answering an item correctly as a function of students' proficiency in answering other questions. That is, student responses to the assessment questions are analyzed to determine the percentage of students responding correctly to each multiple-choice question and the percentage of students achieving in each of the score categories for constructed-response questions.

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 distribution. In the IDE, Average of Countries shows the TIMSS scale centerpoint when "All students" is selected at Step 2 as the independent variable.

Percentages

This statistic shows the percentage of students as a row percentage. For example, if the first column lists countries, then each country will display its own percentage distribution across its row. By default, percentage distributions do not include missing data, although there is an option to include them.

Standard deviations

The standard deviation is a measure of how widely or narrowly dispersed scores are for a particular dataset. Under general normality assumptions, 95 percent of the scores are within two standard deviations of the mean. For example, if the average score of a dataset is 500 and the standard deviation is 100, it means that 95 percent of the scores in this dataset fall between 300 and 700. The standard deviation is the square root of the variance.

Percentiles

This statistic shows the threshold (or cutpoint) score for the following:

- 10th percentile—the bottom 10 percent of students
- 25th percentile—the bottom quarter of students
- 50th percentile—the median (half the students scored below the cutpoint and half scored above it)
- 75th percentile—the top quarter of students
- 90th percentile—the top 10 percent of students

4. Cross-tabulations

Cross-tabulation is a method of combining separate variables into a single table. Normally, each variable has its own table. If you have selected two or three variables (not counting **All students**) and when you go to the **Edit Reports** step, you will automatically get one table for each variable (including one for **All students**); at the end of that list, you will get one cross-tabulation for the two or three variables selected.

If you have chosen four or more variables (not counting **All students**), you will get tables for each variable, but you won't get the cross-tabulation.

Be advised that if you go back to add another variable without subtracting one to keep the total under four, you will lose any edits you might have made to the cross-tabulation.

5. Statistical Notations and Other Notes

Statistical notations and other notes are found at the end of a data table, as applicable to that table:

- — Not available.
- † Not applicable. (For instance, the standard error for the statistic cannot be reported because the statistic does not meet reporting standards.)
- # The statistic rounds to zero.
- ‡ Reporting standards not met. (For instance, the sample size is insufficient to permit a reliable estimate.)

- NOTE: A general note pertains to any special characteristics of the data in the table. Population coverage, participation rates, sampling procedures, and trend analysis issues are addressed here. See details below.
- SOURCE: Source information is listed for all TIMSS and TIMSS Advanced data and should be cited when data are used in a publication or presentation.

The general note (NOTE) warns users of jurisdiction-specific changes in population coverage, participation rates, or sampling procedures that deviate from international standards. Population coverage, participation rates, sampling procedures, or reliability standards deviated from international standards for 4th graders in the following jurisdictions (years in parentheses): Abu Dhabi-UAE (15), Alberta-CAN (11, 07), Australia (03, 95), Austria (95), Azerbaijan (11), Bahrain (15), Belgium (Flemish)-BEL (15), British Columbia-CAN (07), Canada (15), Croatia (11), Denmark (15, 11, 07), Dubai-UAE (07), England-GBR (03, 95), Florida-USA (15, 11), Georgia (15, 11, 07), Hong Kong-CHN (15, 11, 03), Hungary (95), Israel (95), Italy (15), Kazakhstan (11, 07), Kuwait (15, 11, 95), Latvia (07, 95), Lithuania (15, 11, 07, 03), Massachusetts-USA (07), Minnesota-USA (07), Mongolia (07), Morocco (15), the Netherlands (15, 11, 07, 03, 95), North Carolina-USA (11), Northern Ireland-GBR (15, 11), Norway (11), Ontario-CAN (07), Portugal (15), Qatar (11), Quebec-CAN (15, 07), Saudi Arabia (15), Scotland (07, 03, 95), Serbia (15, 11), Singapore (15, 11), Slovenia (95), Spain (15), Sweden (15), Thailand (95), and United States (15, 11, 07, 03); and for 8th graders in: Alabama-US (11), Alberta-CAN (11), Australia (95), Austria (95), Belgium (Flemish)-BEL (99, 95), Belgium (French)-BEL (95), British Columbia-CAN (07), Buenos Aires-ARG (15), California-USA (11), Canada (15), Chile (15), Colombia (95), Colorado-USA (11), Connecticut-USA (11), Denmark (95), Dubai-UAE (07), Egypt (15), England-GBR (11, 07, 03, 99, 95), Florida-USA (15, 11), Greece (95), Georgia (15, 11, 07), Germany (95), Honduras-Grade 9 (11), Hong Kong-CHN (07, 03, 99), Indiana-USA (11), Indonesia (03), Iran, Islamic Rep. of (15), Israel (15, 11, 07, 03, 99, 95), Italy (15), Jordan (15), Kuwait (15, 95), Latvia (99, 95), Lithuania (15, 11, 07, 03, 99, 95), Macedonia (03), Massachusetts-US (11, 07), Minnesota-USA (11, 07), Mongolia (07), Morocco (15, 03, 07), Netherlands (03, 99, 95), New Zealand (15), North Carolina-USA (11), Oman (15), Ontario-CAN (11, 07), Qatar (15), Quebec-CAN (15, 07), Romania (95), Russian Federation (11), Saudi Arabia (15), Scotland (07, 03, 95), Serbia (07, 03), Singapore (15, 11), Slovenia (95), Switzerland (95), Thailand (95), and United States (15, 11, 07, 03, 95); and for TIMSS Advanced participants in Lebanon (15), Portugal (15), and United States (15).

Norway (4) and Norway (8) refer to students in their 4th and 8th years of schooling, respectively, and maintain trend with previous TIMSS cycles.

TIMSS Advanced assesses the advanced mathematics and physics knowledge and skills of students in their final year of secondary school who were taking or had taken courses in advanced mathematics and physics; the percentage of the age cohort enrolled in these courses and considered eligible for the TIMSS Advanced study varied across participating jurisdictions (ranging from 2% to 34% in 2015, and was 11% in the United States for advanced mathematics and 5% for physics).

In TIMSS Advanced 2015, the Russian Federation participated with two populations of students for Advanced Mathematics—results for students in intensive courses (6 or more hours per week) are reported separately from the results for other students from the Russian Federation taking courses that involve 4.5 hours per week.

Data from these jurisdictions have issues that interfere with proper trend analysis: Armenia, Australia, Botswana, Canada, Finland, Indonesia, Israel, Italy, Kazakhstan, Kuwait, Morocco, Poland, Qatar, Saudi Arabia, Slovenia, South Africa, Syrian Arab Republic, Thailand, Turkey, and Yemen. For more details on trends with 2015 data, see Appendix A in the IEA [TIMSS 2015 International Reports](#), which lists all countries with previous years of data not comparable for measuring trends to 2015, primarily due to countries improving translations or increasing population coverage.

See the [IEA TIMSS 2011 International Reports](#), the [IEA TIMSS 2007 International Reports](#), and the [IEA TIMSS 2003 International Reports](#) for further information on specific trend issues in previous years. Because of national-level changes in the starting age/date of school, 1999 data for Australia and Slovenia cannot be compared to 2003 data. Because of changes in the population tested, 1995 data for Israel, Italy, New Zealand, and South Africa and 1999 data for Morocco cannot be used for trend analyses. Because only Latvian-speaking schools were included in 1995 and 1999 data for Latvia, 1995 and 1999 data cannot be compared to 2003, 2007, and 2011 data. Data for Kuwait, Indonesia, Saudi Arabia, Morocco, and Turkey cannot be used for trend analyses because comparable data across years are not available.

The Syrian Arab Republic participated in TIMSS 2003 at the 8th grade and Yemen participated in TIMSS 2003 at the 4th grade, but because the characteristics of their sample are not completely known, they were shown in an appendix in the TIMSS 2003 International Report and their 2003 data are excluded from the IDE.

South Africa and Bulgaria participated in TIMSS 1995 at the 8th grade, but due to problems with their background data, their 1995 data are excluded from the IDE.

Linking teacher data

Results shown in the TIMSS IDE may differ slightly from those in the International Association for the Evaluation of Educational Achievement (IEA) TIMSS International Reports because of a slightly different procedure used in linking teacher data to the students. For Grade 4 and Grade 8, some students (mostly for Grade 8) may be assigned more than one science or mathematics teacher. Each teacher is asked to complete the teacher questionnaire, and the IEA TIMSS International Reports present results that are based on averaged data for these teachers. For the TIMSS IDE, if a student has more than one teacher for each subject, a student is linked to data from a single teacher for mathematics and science. The teacher is chosen randomly from the group of teachers (mathematics or science) who answered the questionnaire for each student.

Statistical comparisons

The alpha level to establish significance for all comparisons is .05. All comparisons within a jurisdiction, within the same year, are made using dependent samples *t*-tests. Comparisons between jurisdictions, and comparisons between years, even for the same jurisdiction, are made using independent samples *t*-tests. The TIMSS IDE also uses independent samples *t*-tests, between a country and a subnational entity that is participating as a benchmarking entity (for instance, in order to compare scores between the United States and Massachusetts or Minnesota, since they each are an independent sample).

Data suppression

Data suppression may be handled slightly differently in the TIMSS IDE and the IEA TIMSS International Reports. For the IDE, the Rule of 62 is applied to suppress data to avoid reporting results for groups about which little of interest could be said due to lack of power. The Rule of 62 is borrowed from the IDE's counterpart, the National Assessment of Educational Progress (NAEP) Data Explorer (NDE). This rule states that statistics for a group are suppressed if they are based on less than 62 cases. Statistics are: means, standard errors, standard deviations and a set of percentiles. The rule serves to assure a minimum power requirement to detect moderate differences at a nominal significance level (0.05). The minimum power is 0.80 and the moderate effect size is 0.5 standard deviation units. A design effect of 2 is assumed to derive an appropriate complex sample standard deviation.

6. Glossary

Below is a list of technical and TIMSS-specific assessment terms used in the IDE. The index variables listed are derived from a combination of variables, or questions, taken from the student, teacher, and/or school questionnaires. Sections 6.A. through 6.C. refer to variables taken from the student questionnaire. Sections 6.D. through 6.F. and 6.I. refer to variables taken from the teacher questionnaire, and section 6.J. and 6.L. refer to variables taken from the school questionnaire. Sections 6.G., 6.H., 6.K. and 6.M. contain a variety of index variables that are derived from one of the three questionnaires. The items in brackets indicate the variable names listed in the IDE.

6.A. Student and Family Characteristics

Number of Home Study Supports [AS5DG083, BS5DG265, BS6DG06S]—This index was derived from two questions assessing the availability of an internet connection and/or student's own room, as reported by 4th- and 8th-grade students. The responses are categorized as (1) neither own room nor internet connection are available; (2) either own room or internet connection are available; and (3) both own room and internet connection are available.

Home Resources for Learning (Index/Scale) [BS5BG213, BS5DG214]—Both the index and scale, were created using 8th-grade students' responses concerning the availability of three home educational resources: (1) the number of books in the home; (2) the number of home study

supports (internet connection and own room); and (3) the highest level of education of either parent.

Students with *Many Resources* had a score of at least 12.5, which is the point on the scale corresponding to students reporting that they had more than 100 books in the home and two home study supports, and that at least one parent had finished university, on average. Students with *Few Resources* had a score no higher than 8.2, which is the scale point corresponding to students reporting that they had 25 or fewer books in the home, neither of the two home study supports, and that neither parent had gone beyond upper-secondary education, on average. All other students were assigned to the *Some Resources* category.

Home Educational Resources (Index/Scale) [MS3DGHHER, PS3DGHHER, MS3BGHER, PS3BGHER]—For more details, see [TIMSS Advanced Results](#).

Home Resources—For 1995, 1999, 2003, 2007, 2011, and 2015, within the home resources category up to seven country-specific home possession items could be included, depending on the year of the assessment. Across countries and subnational education systems, students were asked whether they had items at home, varying by year, such as: books of your very own, own room, internet connection, calculator; computer (not including PlayStation, GameCube, Xbox, or other TV/video game computers); study desk/table for personal use; and dictionary. These variables are comparable across countries and applicable years. However, the nationally defined possessions are not comparable across countries or years. For example, in 2007, the United States used four country-specific variables: encyclopedia (book or CD-ROM); PlayStation, GameCube, Xbox, or other TV/video game system; VHS or DVD player; and three or more cars, small trucks, or sport utility vehicles. For additional details about country-specific language options, see the [TIMSS 2015 User Guide, Supplement 2](#); the [TIMSS 2011 User Guide, Supplement 2](#); the [TIMSS 2007 User Guide, Supplement 2](#); the [TIMSS 2003 User Guide, Supplement 2](#); the [TIMSS 1999 User Guide, Supplement 2](#); and the [TIMSS 1995 User Guide, Supplement 3](#).

In 1995 and 1999, an **Index of Home Educational Resources [BSDGHERI]** was created. This index is based on 8th-grade students' responses to the following variables: number of books in the home; educational aids in the home (computer, study desk/table for own use, dictionary); and parents' education (mother's and father's). The index is reported on three levels: *high*, *medium*, and *low*. *High* indicates the student has more than 100 books in the home, has all three educational aids, and either parent's highest level of education is finished university. *Low* indicates the student has 25 or fewer books in the home, does not have all three educational aids, and both parents' highest level of education is some secondary or less or the student did not know. *Medium* indicates all other combinations. For additional details about the index, please see the [TIMSS 1999 User Guide, Supplement 3](#).

In 1999 and 1995, another index was computed based on **the possession of a computer, desk, and dictionary [BSDGPSA]** at home. Students' responses to these three home resources questions were coded into two categories: yes, if all three responses are yes; and no, if any of the three responses are no.

Parents' Place of Birth [ASDGBORN, BSDGBORN]—This variable is based on where 4th- and 8th-grade students' parents or guardians were born. Students were asked, “Was your mother (or stepmother or female guardian) born in <country>?” and “Was your father (or stepfather or male guardian) born in [country]?” The variable is given one of three values: *Both parents born in country* = 1; *Only one parent born in country* = 2; *Neither parent born in country* = 3.

ISCED—The International Standard Classification of Education (ISCED) is an internationally comparable method for describing levels of education across countries, created by the United Nations Educational, Scientific, and Cultural Organization (UNESCO). ISCED levels are defined as follows:

- **Level 0**—The initial stage of organized instruction, designed primarily to introduce very young children to a school-type environment. ISCED level 0 programs can either be center or school based. Preschool and kindergarten programs in the United States fall into the level 0 category.
- **Level 1**—Consists of primary education, which usually lasts 4 to 6 years. ISCED level 1 typically begins between ages 5 and 7, and is the stage where students begin to study basic subjects, such as reading, writing, and mathematics. In the United States, elementary school (grades 1 through 6) is classified as level 1.
- **Level 2**—Also known as lower secondary education, students continue to learn the basic subjects taught in level 1, but this level is typically more subject-specific than level 1 and may be taught by specialized teachers. ISCED level 2 usually lasts between 2 and 6 years, and begins around the age of 11. Middle school and junior high (grades 7 through 9) in the United States are classified as level 2. These programs are primarily designed to prepare students for ISCED level 3.
- **Level 3**—Also known as upper secondary education, student coursework is generally subject-specific and often taught by specialized teachers. Students often enter upper secondary education at the age of 15 or 16 and attend anywhere from 2 to 5 years. ISCED level 3 can prepare students for postsecondary education or the labor force. Senior high school (grades 10 through 12) is considered level 3 in the United States. These programs are primarily designed to prepare students for ISCED levels 5A and 5B.
- **Level 4**—Consists primarily of vocational education, and courses are taken after the completion of secondary school, though the content is not more advanced than the content of secondary school courses. ISCED level 4 programs in the United States are often in the form of 1-year certificate programs. These programs can prepare students for ISCED levels 5A and 5B.
- **Level 5**—Divided into levels 5A and 5B, this level refers to tertiary (postsecondary) education and usually lasts 3 to 6 years. ISCED level 5A refers to academic higher education below the doctoral level. Level 5A programs are intended to provide sufficient qualifications to gain entry into advanced research programs and professions with high skill requirements. In the United States, bachelor's, master's, and first-professional degree programs are classified as ISCED level 5A. ISCED level 5B refers to vocational postsecondary education. Level 5B programs provide a higher level of career and technical education and are designed to prepare students for the labor market. In the United States, associate's degree programs are classified at this level.

- **Level 6**—Refers to the doctoral level of academic higher education. Level 6 programs usually require the completion of a research thesis or dissertation.

Student Educational Aspirations Relative to Parents [BSDGASP]—This index variable is based on three questions: (1) What is the highest level of education completed by your mother (or stepmother or female guardian)? (2) What is the highest level of education completed by your father (or stepfather or male guardian)? and (3) How far in school do you expect to go? Responses are reported in four categories: (1) Student expects to finish university, and either parent went to university or the equivalent, (2) Student expects to finish university, and neither parent went to university or the equivalent, (3) Student doesn't expect to finish university, regardless of parents' education, and (4) Student does not know, regardless of parents' education. The derived variable is coded as missing if the highest education level of either parent is missing.

Parents' highest education level [BS1GEDUP, BS2GEDUP, BS3GEDUP, BS5DG266, MS3DGEDUP, PS3DGEDUP]—This index variable is derived from students' responses to the following questions: (1) What is the highest level of education completed by your mother (or stepmother or female legal guardian)? and (2) What is the highest level of education completed by your father (or stepfather or male legal guardian)?

Parents' highest occupation level [MS3DGOCCP, PS3DGOCCP] – This index variable is derived from students' responses to the following question: What kind of work do your father (or stepfather or male legal guardian) and mother (or stepmother or female legal guardian) do for their main jobs? For additional details about the index, please see the TIMSS Advanced 2015 Student Questionnaire ([Advanced Mathematics](#) and [Physics](#)).

6.B. Student Activities Outside of School

Out of School Study Time [BSDGOSTI]—This index is based on 8th-grade students' responses to three questions on (1) time spent after school studying mathematics or doing mathematics homework; (2) time spent after school studying science or doing science homework; and (3) time spent after school studying or doing homework in school subjects other than mathematics and science. The responses are summed and assigned to three levels: *High* = Student reports spending more than 3 hours studying all subjects combined; *Low* = Student reports spending 1 hour or less studying all subjects combined; and *Medium* = Student reports spending between 1 hour to 3 hours studying all subjects combined. BSDGOSTI is coded as missing if any source variables are missing. [BSDGSALL] documents whether students spent some time each day studying or doing homework in each subject (math, science, and other).

Time Spent on Math/Science Homework (Index) [ASDMHW, ASDMTMH, BS5DM269, BS5DS270, BSDMTMH, BSDMHW]—This variable was derived from students' reports of weekly time spent on math homework. Answers were categorized into the following: (1) 3 hours or more; (2) more than 45 minutes but less than 3 hours; and (3) 45 minutes or less. For science, the subject-specific variables follow the same pattern [BS5DB271, BS5DC272, BS5DE274, and BS5DP273].

Index of Time Spent on Mathematics/Science Homework (TMH/TSH) [ASDMTMH, ASDSTSH, ASDMHW, ASDSHW, BSDMTMH, BSDSTSH, BSDMHW, BSDSHW]—This index, used in 2003 and modified slightly in 2007, is based on two questions given to 4th- and 8th-grade students about the frequency with which they are assigned homework and the amount of time they spend doing it. The first question remains the same across years: How often does your teacher give you homework in mathematics/science? The second question in 2003 was: When your teacher gives you mathematics homework, how many minutes are you usually given? In 2007 the second question was: When your teacher gives you mathematics homework, about how many minutes do you usually spend on your homework?

For both 2003 and 2007, responses to the frequency of homework assigned are coded on a 5-point scale for each item as follows: *Every day* = 1; *3 or 4 times a week* = 2; *1 or 2 times a week* = 3; *Less than once a week* = 4; and *Never* = 5. Responses to the 2003 variable, “how many minutes are you usually given,” are coded as follows: *Fewer than 15 minutes* = 1; *15–30 minutes* = 2; *31–60 minutes* = 3; *61–90 minutes* = 4; and *More than 90 minutes* = 5. Responses to the amount of time spent on homework for the variable in 2007 are coded as follows: *0 minutes* = 1; *1–15 minutes* = 2; *16–30 minutes* = 3; *31–60 minutes* = 4; *61–90 minutes* = 5; and *More than 90 minutes* = 6.

For both 2003 and 2007, responses are categorized for the index variable such that *High* = students report that they receive homework at least 3 or 4 times a week and spend more than 30 minutes on each assignment; *Low* = students report that they receive homework no more than twice a week and spend 30 minutes or less on each assignment; and *Medium* = all other combinations of answers.

The eighth-grade science indexes follow a similar pattern for each science subject.

6.C. Student Perception/Valuing of Mathematics/Science

Students Like Learning Mathematics (Index/Scale) [AS5BG071, AS5DG072, BS5BG217, BS5DG218]—Both the index and scale are based on 4th- and 8th-grade students’ reports of the extent of their agreement with the following statements about learning math: (1) I enjoy learning mathematics; (2) I wish I did not have to study mathematics; (3) Mathematics is boring; (4) I learn many interesting things in mathematics; and (5) I like mathematics.

Students were scored according to their degree of agreement with the five statements on the scale. Students who *Like Learning Mathematics* had a score on the scale of at least 10.1 (for 4th-graders) or 11.3 (for 8th-graders), which corresponds to their “agreeing a lot” with three of the five statements and “agreeing a little” with the other two, on average. Students who *Do Not Like Learning Mathematics* had a score no higher than 8.1 (for 4th-graders) or 9.0 (for 8th-graders), which corresponds to their “disagreeing a little” with three of the five statements and “agreeing a little” with the other two, on average. All other students *Somewhat Like Learning Mathematics*.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Students Like Learning Science (Index/Scale) [AS5BG073, AS5DG074, BS5BG219, BS5DG220]—Both the index and scale are based on 4th- and 8th-grade students' reports of the extent of their agreement with the following statements about learning science: (1) I enjoy learning science; (2) I wish I did not have to study science; (3) Science is boring; (4) I learn many interesting things in science; and (5) I like science.

Students were scored according to their degree of agreement with the five statements on the scale. Students who *Like Learning Science* had a score on the scale of at least 9.7 (for 4th-graders) or 10.8 (for 8th-graders), which corresponds to their “agreeing a lot” with three of the five statements and “agreeing a little” with the other two, on average. Students who *Do Not Like Learning Science* had a score no higher than 7.6 (for 4th-graders) or 8.4 (for 8th-graders), which corresponds to their “disagreeing a little” with three of the five statements and “agreeing a little” with the other two, on average. All other students *Somewhat Like Learning Science*.

Students Like Learning Biology/Chemistry/Earth Science/Physics (Index/Scale) [BS5BG221, BS5DG222, BS5BG223, BS5DG224, BS5BG225, BS5DG226, BS5BG227, BS5DG228]—The science subject-specific indexes and scales used in 2011 follow the same guidelines and procedures as the general science index and scale, above. Note that not all countries report science subject-specific results. Where students are enrolled in science as a single subject, the general science index/scale is reported; where students are taught science as separate subjects, the subject-specific indexes/scales are reported.

Students Like Learning Physics (Index/Scale) [PS3DGSLP, PS3BGSLP]—This TIMSS Advanced questionnaire index/scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS Advanced 2015. Students were scored according to their degree of agreement with twelve statements on the Students Like Learning Physics scale. For more details, see [TIMSS Advanced Results](#).

Students Like Learning Advanced Mathematics (Index/Scale) [MS3DGSLM, MS3BGSLM]—This TIMSS Advanced questionnaire index/scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS Advanced 2015. Students were scored according to their degree of agreement with twelve statements on the Students Like Learning Advanced Mathematics scale. For more details, see [TIMSS Advanced Results](#).

Index of Students' Positive Attitude Towards Mathematics/Science (PATM/PATS) [ASDMPATM, ASDSPATS, BSDMPATM, BSDSPATS]—This index is based on three statements directed at students' feelings towards mathematics/science: (1) I enjoy learning mathematics/science; (2) Mathematics/science is boring; and (3) I like mathematics/science. The 1999 index also includes these statements: Mathematics/science is important to everyone's life; and I would like a job that involved using mathematics/science. Student responses were coded on a 4-point scale for each item, as follows: *Agree a lot* = 1; *Agree a little* = 2; *Disagree a little* = 3; and *Disagree a lot* = 4. After reverse-coding relevant items, the index was categorized by

averaging the responses to the three source questions such that *High* = average ≤ 2 ; *Medium* = average $> 2 < 3$; and *Low* = average ≥ 3 .

The items used for the fourth-grade mathematics index are AS4MAENJ, AS4MABOR, and AS4MALIK. Please note that the same coding process was used for the items in the fourth-grade science index [AS4SAENJ, AS4SABOR, AS4SALIK] and the eighth-grade mathematics index [BS4MAENJ, BS4MABOR, BS4MALIK]. The eighth-grade science indexes follow a similar pattern for each science subject.

Index of Students' Positive Attitude Towards Biology/Chemistry/Earth Science/Physics [BSDBPATS, BSDCPATS, BSDEPATS, BSDPPATS]—The science subject-specific indexes and scales follow the same guidelines and procedures as the general science index and scale, above.

Mat Overall Attitude Toward Mathematics [ASDGMATT]—This index is based on 4th-grade students' responses to three questions and statements directed at students' feelings toward mathematics: (1) How much do you like mathematics? (2) I enjoy learning mathematics; and (3) Mathematics is boring. Student responses were averaged on a 4-point scale as follows: *Strongly negative* ($1 < 1.5$) = 1; *Negative* ($1.5 < 2.5$) = 2; *Positive* ($2.5 < 3.5$) = 3; and *Strongly positive* ($3.5-4$) = 4. Students were coded as missing on the index variable only if all three of the source variables were missing.

Students' Confidence with Mathematics (Index/Scale) [AS5BG075, AS5DG076, BS5BG241, BS5DG242]—Both the index and scale are based on 4th- and 8th-grade students' reports of the extent of their agreement with the following statements about math: (1) I usually do well in mathematics; (2) Mathematics is harder for me than for many of my classmates; (3) I am just not good at mathematics; (4) I learn things quickly in mathematics; (5) I am good at working out difficult mathematical problems; (6) My teacher tells me I am good at mathematics; and (7) Mathematics is harder for me than any other subject.

Students were scored according to their degree of agreement with the seven statements on the scale. Students *Confident* with mathematics had a score on the scale of at least 10.6 (for 4th-graders) or 12.0 (for 8th-graders), which corresponds to their “agreeing a lot” with four of the seven statements and “agreeing a little” with the other three, on average. Students who were *Not Confident* had a score no higher than 8.5 (for 4th-graders) or 9.4 (for 8th-graders), which corresponds to their “disagreeing a little” with four of the seven statements and “agreeing a little” with the other three, on average. All other students were *Somewhat Confident* with mathematics.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Students' Confidence with Science (Index/Scale) [AS5BG077, AS5DG078, BS5BG243, BS5DG244]—Both the index and scale are based on 4th- and 8th-grade students' reports of the extent of their agreement with the following statements about science: (1) I usually do well in

science; (2) Science is harder for me than for many of my classmates; (3) I am just not good at science; (4) I learn things quickly in science; (5) I am good at working out difficult science problems; (6) My teacher tells me I am good at science; and (7) Science is harder for me than any other subject.

Students were scored according to their degree of agreement with the seven statements on the scale. Students *Confident* with science had a score on the scale of at least 10.1 (for 4th-graders) or 11.5 (for 8th-graders), which corresponds to their “agreeing a lot” with four of the seven statements and “agreeing a little” with the other three, on average. Students who were *Not Confident* had a score no higher than 8.3 (for 4th-graders) or 9.0 (for 8th-graders), which corresponds to their “disagreeing a little” with four of the seven statements and “agreeing a little” with the other three, on average. All other students were *Somewhat Confident* with science.

Students’ Confidence with Biology/Chemistry/Earth Science/Physics (Index/Scale)

[BS5BG245, BS5DG246, BS5BG247, BS5DG248, BS5BG249, BS5DG250, BS5BG251, BS5DG252]—The science subject-specific indexes and scales used in 2011 follow the same guidelines and procedures as the general science index and scale, above. Note that not all countries report science subject-specific results. Where students are enrolled in science as a single subject, the general science index/scale is reported; where students are taught science as separate subjects, the subject-specific indexes/scales are reported.

Index of Self-Confidence in Learning Mathematics/Science (SCM/SCS) [ASDMSCM, ASDSSCS, BSDMSCM, BSDSSCS]

—This index is composed of four statements regarding students’ self-confidence in learning mathematics/science: (1) I usually do well in mathematics/science; (2) Mathematics/science is harder for me than for many of my classmates; (3) I am just not good at mathematics/science; and (4) I learn things quickly in mathematics/science. Student responses were coded on a 4-point scale as follows: *Agree a lot* = 1; *Agree a little* = 2; *Disagree a little* = 3; and *Disagree a lot* = 4. After reverse-coding relevant items, the responses were averaged such that *High* = average ≤ 2 ; *Medium* = average $> 2 < 3$; and *Low* = average ≥ 3 .

The items used for the fourth-grade mathematics index are AS4MAWEL, AS4MACLM, AS4MANOT, and AS4MAQKY. Please note that the same coding process was used for the items in the fourth-grade science index [AS4SAWEL, AS4SACLM, AS4SANOT, AS4SAQKY] and the eighth-grade mathematics index [BS4MAWEL, BS4MACLM, BS4MANOT, BS4MAQKY]. The eighth-grade science indexes follow a similar pattern for each subject: biology [BSDBSCS], chemistry [BSDCSCS], Earth science [BSDESCS] and physics [BSDPSCS].

Index of Confidence in Mathematics/Science Ability [BSDMCMAI, BSDSCSAI]

—This index is based on 8th-grade students’ responses to statements regarding their self-confidence in their mathematics/science ability: (1) I would like mathematics/science if it were not so difficult; (2) Although I do my best, mathematics/science is more difficult for me than for many of my classmates; (3) Nobody can be good in every subject, and I am just not talented in

mathematics/science; (4) Sometimes, when I do not understand a new topic in mathematics/science, I know that I will never really understand it; and (5) Mathematics/science is not one of my strengths. Student responses were coded on a 4-point scale for each item as follows: *Strongly agree* = 1; *Agree* = 2; *Disagree* = 3; and *Strongly disagree* = 4. Responses are categorized for the index variable such that *High* = student responds *Strongly disagree* or *Disagree* to all questions; *Low* = student responds *Strongly agree* or *Agree* to all questions; and *Medium* = all other combinations. The index is coded as missing if any source variable is missing.

Index of Self-Concept in Biology/Chemistry/Earth Science/Physics Ability [BSDBCSAI, BSDCCSAI, BSDECSAI, BSDPCSAI]—The eighth-grade science indexes follow a similar pattern as the 1999 Index of Confidence in Science Ability for each science subject.

Students Value Learning Mathematics (Index/Scale) [BS5BG229, BS5DG230]—Both the index and scale, are based on 8th-grade students' reports of the extent of their agreement with the following statements about math: (1) I think learning mathematics will help me in my daily life; (2) I need mathematics to learn other school subjects; (3) I need to do well in mathematics to get into the university of my choice; (4) I need to do well in mathematics to get the job I want; (5) I would like a job that involves using mathematics; and (6) It is important to do well in mathematics.

Students were scored according to their degree of agreement with the six statements on the scale. Students who *Value* mathematics had a score on the scale of at least 10.3, which corresponds to their “agreeing a lot” with three of the six statements and “agreeing a little” with the other three, on average. Students who *Do Not Value* mathematics had a score no higher than 7.9, which corresponds to their “disagreeing a little” with three of the six statements and “agreeing a little” with the other three, on average. All other students *Somewhat Value* mathematics.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Students Value Learning Science (Index/Scale) [BS5BG231, BS5DG232]—Both the index and scale are based on 8th-grade students' reports of the extent of their agreement with the following statements about science: (1) I think learning science will help me in my daily life; (2) I need science to learn other school subjects; (3) I need to do well in science to get into the university of my choice; (4) I need to do well in science to get the job I want; (5) I would like a job that involves using science; and (6) It is important to do well in science.

Students were scored according to their degree of agreement with the six statements on the scale. Students who *Value* science had a score on the scale of at least 10.5, which corresponds to their “agreeing a lot” with three of the six statements and “agreeing a little” with the other three, on average. Students who *Do Not Value* science had a score no higher than 8.6, which corresponds to their “disagreeing a little” with three of the six statements and “agreeing a little” with the other three, on average. All other students *Somewhat Value* science.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Students Value Learning Biology/Chemistry/Earth Science/Physics (Index/Scale) [BS5BG233, BS5DG234, BS5BG235, BS5DG236, BS5BG237, BS5DG238, BS5BG239, BS5DG240]—The science subject-specific indexes and scales used in 2011 follow the same guidelines and procedures as the general science index and scale, above. Note that not all countries report science subject-specific results. Where students are enrolled in science as a single subject, the general science index/scale is reported; where students are taught science as separate subjects, the subject-specific indexes/scales are reported.

Students Value Physics (Index/Scale) [PS3DGSVP, PS3BGSVP]—This TIMSS Advanced questionnaire index/scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS Advanced 2015. Students were scored according to their degree of agreement with twelve statements on the Students Value Physics scale. For more details, see [TIMSS Advanced Results](#).

Students Value Advanced Mathematics (Index/Scale) [MS3DGSVM, MS3BGSVM]—This TIMSS Advanced questionnaire index/scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS Advanced 2015. Students were scored according to their degree of agreement with twelve statements on the Students Value Advanced Mathematics scale. For more details, see [TIMSS Advanced Results](#).

Index of Students' Valuing Mathematics/Science (SVM/SVS) [BSDMSVM, BSDMSV, BSDSSVS, BSDSSV]—This index is based on 8th-grade students' responses to statements regarding the value of mathematics/science in their lives: (1) I think learning mathematics/science will help me in my daily life; (2) I need mathematics/science to learn other school subjects; (3) I need to do well in mathematics/science to get into the university of my choice; and (4) I need to do well in mathematics/science to get the job I want. The 2003 index also includes these statements: (1) I would like to take more mathematics/science in school; (2) I enjoy learning mathematics/science; and (3) I would like a job that involved mathematics/science. Student responses were coded on a 4-point scale for each item as follows: *Agree a lot* = 1; *Agree a little* = 2; *Disagree a little* = 3; and *Disagree a lot* = 4. Responses are categorized for the index variable such that *High* = average ≤ 2 ; *Medium* = average $> 2 < 3$; and *Low* = average ≥ 3 .

There are no comparable fourth-grade indexes. The eighth-grade science indexes follow a similar pattern for each subject in each year: biology [BSDBSVS, BSDBSV], chemistry [BSDCSVS, BSDCSV], Earth science [BSDESVS, BSDESV] and physics [BSDPSVS, BSDPSV].

Students Engaged in Mathematics Lessons (Index/Scale) [AS5BG079, AS5DG080, BS5BG253, BS5DG254]—Both the index and scale are based on 4th- and 8th-grade students' reports of the extent of their agreement with the following statements about mathematics lessons: (1) I know what my teacher expects me to do; (2) I think of things not related to the lesson; (3)

My teacher is easy to understand; (4) I am interested in what my teacher says; and (5) My teacher gives me interesting things to do.

Students were scored according to their degree of agreement with the five statements on the scale. Students *Engaged* in mathematics lessons had a score on the scale of at least 10.2 (for 4th-graders) or 11.4 (for 8th-graders), which corresponds to their “agreeing a lot” with three of the five statements and “agreeing a little” with the other two, on average. Students who were *Not Engaged* had a score no higher than 7.4 (for 4th-graders) or 8.3 (for 8th-graders), which corresponds to their “disagreeing a little” with three of the five statements and “agreeing a little” with the other two, on average. All other students were *Somewhat Engaged* in mathematics lessons.

Students Engaged in Science Lessons (Index/Scale) [AS5BG081, AS5DG082, BS5BG255, BS5DG256]—Both the index and scale are based on 4th- and 8th-grade students’ reports of the extent of their agreement with the following statements about science lessons: (1) I know what my teacher expects me to do; (2) I think of things not related to the lesson; (3) My teacher is easy to understand; (4) I am interested in what my teacher says; and (5) My teacher gives me interesting things to do.

Students were scored according to their degree of agreement with the five statements on the scale. Students *Engaged* in science lessons had a score on the scale of at least 10.1 (for 4th-graders) or 11.2 (for 8th-graders), which corresponds to their “agreeing a lot” with three of the five statements and “agreeing a little” with the other two, on average. Students who were *Not Engaged* had a score no higher than 7.4 (for 4th-graders) or 8.4 (for 8th-graders), which corresponds to their “disagreeing a little” with three of the five statements and “agreeing a little” with the other two, on average. All other students were *Somewhat Engaged* in science lessons.

Students Engaged in Biology/Chemistry/Earth Science/Physics Lessons (Index/Scale) [BS5BG257, BS5DG258, BS5BG259, BS5DG260, BS5BG261, BS5DG262, BS5BG263, BS5DG264]—The science subject-specific indexes and scales used in 2011 follow the same guidelines and procedures as the general science index and scale, above. Note that not all countries report science subject-specific results. Where students are enrolled in science as a single subject, the general science index/scale is reported; where students are taught science as separate subjects, the subject-specific indexes/scales are reported.

6.D. Teacher Background Characteristics, Formal Education, and Training

Teachers Majored in Mathematics and Education [AT6MDM05, AT6SDM05, BT6MDM05, BT6SDS05, MT3DG05]—For more details, see [TIMSS Results](#) and [TIMSS Advanced Results](#).

Teachers Majored in Physics and Education [PT3DG05]—For more details, see [TIMSS Results](#) and [TIMSS Advanced Results](#).

Qualifications to Teach Math/Science [BTDMMQUA, BTDSSPQUA, BTDSSBQUA, BTDSSCQUA, BTDSSEQUA, BTDSSSQUA]—This index is based on 8th-grade teachers' responses concerning whether (1) they have a teacher training certificate and (2) they majored in mathematics or mathematics education (for BTDMQUA) or Physical Science, Chemistry, Biology, Earth Science, or General Science (for BTDSPQUA, BTDSBQUA, BTDCSCQUA, BTDSEQUA, BTDSSQUA) when they obtained their B.A. or M.A. Responses were coded as 1 = *Yes* for both questions and 2 = *No* for either. The index is coded as missing if all responses are missing.

6.E. Teacher Perception of Mathematics/Science Teaching/Learning

Confidence in Teaching Mathematics - Teacher (Index/Scale) [AT5MBM242, AT5SBM242, AT5MDM243, AT5SDM243, BT5MMB169, BT5MMD170]—Both the index and scale are based on 4th- and 8th-grade teachers' reports of how confident they feel in teaching math to the class to (1) answer students' questions about mathematics; (2) show students a variety of problem solving strategies; (3) provide challenging tasks for capable students; (4) adapt my teaching to engage students' interest; and (5) help students appreciate the value of learning mathematics.

Students were scored according to their teachers' responses on the scale. Students with *Very Confident* teachers had a score on the scale of at least 9.2 (for 4th- and 8th-graders), which corresponds to their teachers being "very confident" in using three of the five instructional strategies and "somewhat confident" in using the other two, on average. All other students had *Somewhat Confident* teachers.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Confidence in Teaching Science - Teacher (Index/Scale) [AT5MBS244, AT5SBS244, AT5MDS245, AT5SDS245, BT5SSB168, BT5SSD169]—Both the index and scale are based on 4th- and 8th-grade teachers' reports of how confident they feel in teaching science to the class to (1) answer students' questions about science; (2) explain science concepts or principles by doing science experiments; (3) provide challenging tasks for capable students; (4) adapt my teaching to engage students' interest; and (5) help students appreciate the value of learning science.

Students were scored according to their teachers' responses on the scale. Students with *Very Confident* teachers had a score on the scale of at least 9.9 (for 4th-graders) or 9.3 (for 8th-graders), which corresponds to their teachers being "very confident" in using three of the five instructional strategies and "somewhat confident" in using the other two, on average. All other students had *Somewhat Confident* teachers.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Teacher Career Satisfaction (Index/Scale) [AT5MBG246, AT5SBG246, AT5MDG247, AT5SDG247, BT5MMB171, BT5MMD172, BT5SSB170, BT5SSD171]—Both the index and scale are based on 4th- and 8th-grade teachers’ reports of the extent of their agreement with the following statements about their satisfaction with their career: (1) I am content with my profession as a teacher; (2) I am satisfied with being a teacher at this school; (3) I had more enthusiasm when I began teaching than I have now; (4) I do important work as a teacher; (5) I plan to continue as a teacher for as long as I can; and (6) I am frustrated as a teacher.

Students were scored according to their teachers’ degree of agreement with the six statements on the scale. Students with *Satisfied* teachers had a score on the scale of at least 10.1 (for 4th-graders) or 10.4 (for 8th-graders), which corresponds to their teachers “agreeing a lot” with three of the six statements and “agreeing a little” with the other three, on average. Students with *Less Than Satisfied* teachers had a score no higher than 6.6 (for 4th-graders) or 7.0 (for 8th-graders), which corresponds to their teachers “disagreeing a little” with three of the six statements and “agreeing a little” with the other three, on average. All other students had *Somewhat Satisfied* teachers.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

6.F. Teacher Preparation and Collaboration

Index of Confidence to Teach Math/Science [BTDMMCPTM, BTDSSCPTS]—This index is based on teachers’ responses to questions about their confidence in their preparation to teach different mathematics/science topics. The average is computed across the items, including those items where the teacher did not respond. The average is computed based on recoded responses of 1 = *Not well prepared*, 2 = *Somewhat prepared*, and 3 = *Very well prepared*. The index is assigned three levels: *High* = average > 2.75; *Medium* = average > 2.25 ≤ 2.75; and *Low* = average ≤ 2.25. The index is coded as missing if all of the source variables are missing.

Collaborate to Improve Teaching (Index/Scale) [AT5MBG248, AT5SBG248, AT5MDG249, AT5SDG249, BT5MMB173, BT5MMD174, BT5SSB172, BT5SSD173]—Both the index and scale were created using 4th- and 8th-grade teachers’ responses concerning how often they interacted with other teachers in each of the following five teaching areas: (1) discuss how to teach a particular topic; (2) collaborate in planning and preparing instructional materials; (3) share what I have learned about my teaching experiences; (4) visit another classroom to learn more about teaching; and (5) work together to try out new ideas.

Students were scored according to their teachers’ responses on the scale. Students with *Very Collaborative* teachers had a score on the scale of at least 11.0 (for 4th-graders) or 11.4 (for 8th-graders), which corresponds to their teachers having interactions with other teachers at least “one to three times per week” in each of three of the five areas and “two or three times per month” in each of the other two, on average. Students with *Somewhat Collaborative* teachers had a score no higher than 7.3 (for 4th-graders) or 7.5 (for 8th-graders), which corresponds to their teachers interacting with other teachers “never or almost never” in each of three of the five areas and “two

or three times per month” in the other two, on average. All other students had *Collaborative* teachers.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Frequency of Collaboration Among Math/Science Teachers [ATDMGCOLL, ATDSGCOLL, BTDMMCOLL, BTDSGCCOLL]—This index is based on 4th- and 8th-grade teachers’ responses to how often they have the following types of interactions with other teachers: (1) discussions about how to teach a particular concept; (2) working on preparing instructional materials; (3) visits to another teacher’s classroom to observe his/her teaching; and (4) informal observations of their classroom by another teacher. Teacher responses were coded on a 4-point scale for each item as follows: *Never or almost never* = 1; *2 or 3 times per month* = 2; *1–3 times per week* = 3; and *Daily or almost daily* = 4. Responses are averaged for the index variable such that *Never or almost never* = average ≤ 1.4 ; *2 or 3 times per month* = average $> 1.4 \leq 2.4$; and *at least weekly* = average > 2.4 .

The items used for the fourth-grade mathematics and science indexes are AT4GOTDC, AT4GOTPM, AT4GOTVT, and AT4GOTAT. Please note that the same coding processes were used for the items in the eighth-grade mathematics and science indexes [BT4GOTDC, BT4GOTPM, BT4GOTVT, BT4GOTAT]. The items for the eighth-grade indexes share the same variable names, but separate questionnaires were given to mathematics and science teachers.

6.G. Classroom Characteristics

Challenges Facing Teachers (Index/Scale) [AT6SDGCFT, AT6SBGCFT, AT6MDGCFT, BT6MDGCFT, BT6MBGCFT, BT6SDGCFT, BT6SBGCFT]—For more details, see [TIMSS Results](#).

Teaching Limited by Student Needs (Index/Scale) [AT6MDGLSN, AT6SDGLSN, AT6SBGLSN, BT6MDGLSN, BT6MBGLSN, BT6SDGLSN, BT6SBGLSN]—For more details, see [TIMSS Results](#).

Mathematics/Science Achievement Too Low for Estimation (Index) [AS5DM084, BS5DM267, AS5DS085, BS5DS268]—Students were considered to have achievement too low for estimation in 2011 if their performance on the assessment was no better than could be achieved by simply guessing on the multiple choice assessment items. However, such students were assigned scale scores (plausible values) by the achievement scaling procedure, despite concerns about their reliability.

Index of Teachers’ Reports on Mathematics/Science Classes Without Limiting Factors (MCFL/SCFL) [ATDMMCFL, ATDSSCFL, BTDMMCFL, BTDMMLT, BTDSSCFL, BTDSSTL]—This index is based on teachers’ responses about the instructional impact of five characteristics of their students: (1) differing academic abilities; (2) a wide range in

backgrounds; (3) students with special needs; (4) uninterested students; and (5) disruptive students. In 2003, low morale among students was also included. Responses were coded on a 5-point scale for each item, where *Not applicable* = 1; *Not at all* = 2; *A little* = 3; *Some* = 4; and *A lot* = 5. Responses were averaged for the index variable such that *High* = average ≤ 2 ; *Medium* = average $> 2 < 3$; and *Low* = average ≥ 3 .

The items used for the fourth-grade mathematics index are AT4MVMSA, AT4MVMSW, AT4MVMSS, AT4MVMUS, and AT4MVMSD. Please note that the same coding process was used for the items in the fourth-grade science index [AT4SVSSA, AT4SVSSW, AT4SVSSS, AT4SVSUS, AT4SVSDS], the eighth-grade mathematics index [BT4MLI01–BT4MLI05], and the eighth-grade science index [BT4SLI01–BT4SLI05].

6.H. Classroom Instruction

AP Advanced Mathematics Course Type [APCALCS, APCALCS2]—These U.S. nationally-derived variables, used in 2015 for TIMSS Advanced, are based on school records. These are categorical variables that provide the highest Advanced Placement (AP) course taken as well as identify non-AP students based on whether they took an International Baccalaureate (IB) mathematics course (either standard-level or high-level) or another advanced mathematics course (e.g., “standard” calculus, calculus and analytical geometry, honors calculus, multivariate calculus, differential calculus). [APCALCS] contains 4 response categories: 1. Took AP Calculus BC; 2. Took AP Calculus AB (but not BC); 3. Took an IB mathematics course; 4. Did not take an AP Calculus or IB mathematics course. [APCALCS2] contains 3 response categories: 1. Took AP Calculus BC; 2. Took AP Calculus AB (but not BC); 3. Did not take an AP Calculus course. The category “Did not take an AP Calculus course” included students who took a regular or honors calculus course or an International Baccalaureate (IB) mathematics course as their highest mathematics course.

AP Physics Course Type [APPHYSS, APPHYSS2]—These U.S. nationally-derived variables, used in 2015 for TIMSS Advanced, are based on school records. These are categorical variables that provide the highest Advanced Placement (AP) course taken as well as identify non-AP students based on whether they took an International Baccalaureate (IB) physics course (either standard-level or high-level) or another physics course (e.g., second-year physics courses such as “honors” or “regents” courses). [APPHYSS] contains 7 response categories: 1. Took an AP Physics C: electricity and magnetism; 2. Took an AP Physics C: mechanics; 3. Took an AP Physics 2; 4. Took an AP Physics B; 5. Took an AP Physics 1; 6. Took an IB physics course; 7. Did not take an AP or IB Physics course. [APPHYSS2] contains 3 response categories: 1. Took an AP Physics C course; 2. Took an AP Physics B, 2, or 1 course (but not a C course); 3. Did not take an AP Physics course. The category “Took an AP Physics C course” included students who took mechanics, electricity and magnetism, and combined courses as their highest physics course. The category “Took an AP Physics B, 2, or 1 course” included: (1) students who took Physics B before or during the 2013-14 school year and never took an AP Physics C course; and (2) students who took one or both of two one-year courses designed to replace Physics B after the 2013-14 school year and never took an AP Physics C course. The category “Did not take an

AP Physics course” included students who took other courses such as regular or honors second-year physics or International Baccalaureate (IB) physics courses as their highest physics course.

Summ Students Taught Topics [ATDMMTPNU, ATDMMTPOV, ATDMMTPDA, ATDMMTPGE, BTDMMTPGE, BTDMMTPNU, BTDMMTPAL, BTDMMTPOV, BTDMMTPDA, ATDMMTADA, ATDSMTADA, ATDMMTAGE, BTDMMTODA, BTDMMTOGE, BTDMMTOME, BTDMMTONU, BTDMMTOAL, ATDSMTAGE, ATDMMTAME, ATDSMTAME, ATDMMTANU, BTDMMTOOV, ATDSMTANU, ATDMMTAOV, ATDSMTAOV, ATDMMTAPE, ATDSMTAPE]—Variables that describe the summary of students taught different mathematics and science topics can be found in the continuous variables section (Step 1) of the IDE. All of these derived variables are computed from teachers’ responses to the following question: The following list includes the main topics addressed by the TIMSS mathematics/science test. Choose the response that best describes when students in the TIMSS class have been taught each topic. If a topic was taught half this year and half before this year, please choose “Mostly taught this year.” The international version of the questionnaire has the following options for each topic: (1) mostly taught before this year; (2) mostly taught this year; (3) not yet taught or just introduced. The derived variables compute the percentage of students whose teachers checked option 1 or 2 for each individual topic. Then the average of all these percentages is included in the variable.

Mat Index: Emphasis on Problem Solving [BTDMMERPS]—This index is based on 8th-grade teachers’ responses to the following questions: In your mathematics lessons, how often do you usually ask students to do the following: (a) explain reasoning behind an idea; (b) represent and analyze relationships using tables, charts, graphs; (c) work on problems for which there is no immediately obvious method of solution; and (d) write equations to represent relationships? The average is computed across the four items based on *Never or almost never* = 1; *Some lessons* = 2; *Most lessons* = 3; and *Every lesson* = 4. Responses are categorized for the index variable such that *High* = average > 3; *Medium* = average > 2.25 ≤ 3; and *Low* = average < 2.25. The index is coded as missing if more than one source variable is missing.

Sci Index: Emphasis on Problem Solving [BTDSSEPS]—This index is based on 8th-grade teachers’ responses to the following questions: In your science lessons, how often do you usually ask students to do the following: (a) explain reasoning behind an idea; (b) represent and analyze relationships using tables, charts, graphs; (c) work on problems for which there is no immediately obvious method of solution; (d) write explanations about what was observed and why it happened; and (e) put events or objects in order and give a reason for the organization? The average is computed across the five items based on *Never or almost never* = 1; *Some lessons* = 2; *Most lessons* = 3; and *Every lesson* = 4. Responses are categorized for the index variable such that *High* = average > 3; *Medium* = average > 2.25 ≤ 3; and *Low* = average < 2.25. The index is coded as missing if more than one source variable is missing.

Teacher Emphasis on Science Investigation (Index/Scale) [BT6SDSESI, BT6SBSESI]—For more details, see [TIMSS Results](#).

Science (Biology/ Chemistry/Earth Science/Physics) Instructional Hours per Week [BT6SDBHW, BT6SDCHW, BT6SDEHW, BT6SDPHW]—For more details, see [TIMSS Results](#).

Total Instructional Hours per year [BC6DG07HY, MC3DG07HY, PC3DG07HY]—For more details, see [TIMSS Results](#) and [TIMSS Advanced Results](#).

Percent of Students Taught Mathematics (Algebra/Data and Chance/Geometry/Number/Calculus) Topics [BT6MDM21AL, BT6MDM21DT, BT6MDM21GE, BT6MDM21NU]—For more details, see [TIMSS Results](#).

Percent of Students Taught Advanced Mathematics (Algebra/Calculus/Geometry) Topics [MT3DM21AL, MT3DM21CA, MT3DM21GE]—For more details, see [TIMSS Advanced Results](#).

Percent of Students Taught Science (Biology/Chemistry/Earth Science/Physics/Life Science/Physical Science) Topics [BT6SDS20BI, BT6SDS20CH, BT6SDS20ES, BT6SDS20PH, AT6SDS05ES, AT6SDS05LI, AT6SDS05PH]—For more details, see [TIMSS Results](#).

Percent of Students Taught Physics (Nuclear Physics/Electricity and Magnetism/Mechanics and Thermodynamics) Topics [PT3DP22AN, PT3DP22EL, PT3DP22ME]—For more details, see [TIMSS Advanced Results](#).

Students' Views on Engaging Teaching in Physics Lessons (Index/Scale) [PS3DGEPL, PS3BGEPL]—For more details, see [TIMSS Advanced Results](#).

Students' Views on Engaging Teaching in Advanced Mathematics Lessons [MS3DGEML, MS3BGEML]—For more details, see [TIMSS Advanced Results](#).

Instruction to Engage Students in Learning (Index/Scale) [AT5MBG250, AT5SBG250, AT5MDG251, AT5SDG251, BT5MMB175, BT5MMD176, BT5SSB174, BT5SSD175]—Both the index and scale were created using 4th- and 8th-grade teachers' responses concerning how often they used each of the following six instructional practices to engage students in learning: (1) summarize what students should have learned from the lesson; (2) relate the lesson to students' daily lives; (3) use questioning to elicit reasons and explanations; 4) encourage all students to improve their performance; (5) praise students for good effort; and (6) bring interesting materials to class.

Students were scored according to their teachers' responses on the scale. Students with teachers who used engagement practices in *Most Lessons* had a score on the scale of at least 9.1 (for 4th-graders) or 8.7 (for 8th-graders), which corresponds to their teachers using three of the six practices “every or almost every lesson” and using the other three in “about half the lessons,” on average. Students with teachers who used engagement practices in *Some Lessons* had a score no higher than 6.0 (for 4th-graders) or 5.7 (for 8th-graders), which corresponds to their teachers using

three of the six practices in “some lessons” and using the other three in “about half the lessons,” on average. All other students had teachers who used engagement practices in *About Half the Lessons*.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

6.1. Role of Homework

Index of Teachers’ Emphasis on Mathematics/Science Homework (EMH/ESH)

[ATDSSESH, ATDMMEMH, ATDSMEMH, BTDMMEMH, BTDSSESH]—This index is based on 4th- and 8th-grade teachers’ responses to three questions about assigning homework: (1) whether they assign homework; (2) how often they assign it; and (3) how many minutes are usually assigned. Teachers can respond either “yes” or “no” to whether or not they assign homework. A 3-point scale is used to code how often homework is assigned: *Every or almost every lesson* = 1; *About half the lessons* = 2; and *Some lessons* = 3. Response options for the typical length of time usually assigned include the following: *Fewer than 15 minutes* = 1; *15–30 minutes* = 2; *31–60 minutes* = 3; *61–90 minutes* = 4; and *More than 90 minutes* = 5. Responses are categorized for the index variable such that *High* = responded *Yes* to assigning homework, responded *Every or almost every lesson* or *About half the lessons* to frequency of assigning homework, and responded *31–60 minutes* or *61–90 minutes* or *More than 90 minutes* to length of assignment; *Low* = responded *No* to assigning homework, or responded *Yes* to assigning homework, responded *About half the lessons* or *Some lessons* to frequency of assigning homework, and responded *Fewer than 15 minutes* or *15–30 minutes* to length of assignment; and *Medium* = all other response combinations.

The eighth-grade science indexes follow a similar pattern for each subject in each year: biology [BSDBSVS, BSDBSV], chemistry [BSDCSVS, BSDCSV], Earth science [BSDESVS, BSDES], and physics [BSDPSVS, BSDPSV].

Amount of Mathematics/Science Homework [BTDMMHWK, BTDSHWK]—This index is based on 8th-grade teachers’ reports of the amount of mathematics/science homework given to students. The percentage of students in the following categories is based on teachers’ responses concerning the amount and frequency of homework they assign. The options are (1) never assign homework; (2) assign homework less than once a week for more than 30 minutes; (3) assign homework less than once a week for more than 30 minutes; (4) assign homework once or twice a week for more than 30 minutes; (5) assign homework once or twice a week for 30 minutes or less; (6) assign homework three times a week or more for more than 30 minutes; and (7) assign homework three times a week or more for 30 minutes or less. The index is coded as missing if any source variable is missing.

Homework Based on Projects and Investigations [BTDMMHWK2, BTDSHWK2]—This 1999 index is based on 8th-grade teachers’ responses to questions about homework based on (1) small investigation(s) or gathering data; (2) working individually on long-term projects or experiments; and (3) working as a small group on long-term projects or experiments. Average

responses are based on the response code values *Never* = 1; *Rarely* = 2; *Sometimes* = 3; and *Always* = 4. The averages values are recoded into two categories: *Sometimes or always* = Average ≥ 2.5 ; *Never or rarely* = Average < 2.5 . The index is coded as missing if more than one source variable is missing.

6.J. School Characteristics

School Composition by Student Background (Index) [AC6DG03, AC5DG123, BC5DG103]—This index was created using 4th- and 8th-grade principals' responses concerning the percentage of students who (1) come from economically disadvantaged homes; and/or (2) come from economically affluent homes. Students in schools where their principals reported a *More Affluent* school composition attended schools where more than 25 percent of students come from economically affluent homes and not more than 25 percent come from economically disadvantaged homes. Students in schools where their principals reported a *More Disadvantaged* school composition attended schools where more than 25 percent of students come from economically disadvantaged homes and not more than 25 percent come from economically affluent homes. All other students attended schools with a *Neither More Affluent nor More Disadvantaged* school composition.

School Composition by Student Economic Background [MC3DG03, PC3DG03]—For more details, see [TIMSS Advanced Results](#).

Students Having Early Numeracy Skills (Index) [AC5DG124]—This index was created using 4th-grade principals' responses concerning how many students could do the following when they began primary/elementary school: (1) count up to 100 or higher; (2) recognize all 10 written numbers from 1–10; and (3) write all 10 numbers from 1–10.

Principals' responses across the three items were averaged and their students were assigned to one of four categories: (1) *Schools where more than 75 percent enter with skills* indicates an average greater than 3.25; (2) *Schools where 51–75 percent enter with skills* indicates an average greater than 2.5 through 3.25; (3) *Schools where 25–50 percent enter with skills* indicates an average of 1.75 through 2.5; and (4) *Schools where less than 25 percent enter with skills* indicates an average less than 1.75.

Students Where Students Enter the Primary Grades with Literacy and Numeracy Skills [AC6DGLNS, AC6BGLNS]—For more details, see [TIMSS Results](#).

6.K. School Resources

School Supports Advanced Mathematics and Physics Education – School Reports (Index/Scale) [MC3DGSMP, MC3BGSMP, PC3DGSMP, PC3BGSMP]—For more details, see [TIMSS Advanced Results](#).

School Supports Advanced Mathematics and Physics Education – Teacher Reports (Index/Scale) [MT3DGSMP, MT3BGSMP, PT3DGSMP, PT3BGSMP]—For more details, see [TIMSS Advanced Results](#).

Instruction Affected by Math Resource Shortages (Index/Scale) [AC6DGMRS, AC6BGMRS, AC5BG117, AC5DG118, BC5BG097, BC5DG098]—Both the index and scale were created using 4th- and 8th-grade principals' responses concerning 12 school and classroom resources: (1) instructional materials (e.g., textbooks); (2) supplies (e.g., papers, pencils); (3) school buildings and grounds; (4) heating/cooling and lighting systems; (5) instructional space (e.g., classrooms); (6) technologically competent staff; (7) computers for instruction; (8) teachers with a specialization in mathematics; (9) computer software for mathematics instruction; (10) library materials relevant to mathematics instruction; (11) audio-visual resources for mathematics instruction; and (12) calculators for mathematics instruction.

Students were scored according to their principals' responses on the scale. Students in schools where instruction was *Not Affected* by resource shortages had a score on the scale of at least 11.1 (for both 4th- and 8th-graders), which corresponds to their principals reporting that shortages affected instruction “not at all” for 6 of the 12 resources and “a little” for the other 6, on average. Students in schools where instruction was *Affected a Lot* had a score no higher than 6.8 (for 4th-graders) or 7.3 (for 8th-graders), which corresponds to their principals reporting that shortages affected instruction “a lot” for 6 of the 12 resources and “some” for the other 6, on average. All other students attended schools where instruction was *Somewhat Affected* by resource shortages.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Instruction Affected by Science Resource Shortages (Index/Scale) [AC5BG115, AC5DG116, BC5BG095, BC5DG096]—Both the index and scale were created using 4th- and 8th-grade principals' responses concerning 12 school and classroom resources: (1) instructional materials (e.g., textbooks); (2) supplies (e.g., papers, pencils); (3) school buildings and grounds; (4) heating/cooling and lighting systems; (5) instructional space (e.g., classrooms); (6) technologically competent staff; (7) computers for instruction; (8) teachers with a specialization in science; (9) computer software for science instruction; (10) library materials relevant to science instruction; (11) audio-visual resources for science instruction; and (12) science equipment and materials.

Students were scored according to their principals' responses on the scale. Students in schools where instruction was *Not Affected* by resource shortages had a score on the scale of at least 11.3 (for 4th-graders) or 11.2 (for 8th-graders), which corresponds to their principals reporting that shortages affected instruction “not at all” for 6 of the 12 resources and “a little” for the other 6, on average. Students in schools where instruction was *Affected a Lot* had a score no higher than 7.1 (for 4th-graders) or 7.3 (for 8th-graders), which corresponds to their principals reporting that shortages affected instruction “a lot” for 6 of the 12 resources and “some” for the other 6, on

average. All other students attended schools where instruction was *Somewhat Affected* by resource shortages.

Index of Availability of School Resources for Mathematics/Science Instruction (ASRMI/ASRSI) [ACDSRMI, ACDSRSI, BCDSRMI, BCDSRSI, BCDMST, BCDSST]—

This index is based on principals' responses about the availability of general school resources: instructional materials (e.g., textbook); budget for supplies (e.g., paper, pencils); school buildings and grounds, heating/cooling and lighting systems; and instructional space (e.g., classrooms). They also responded to five questions about shortages affecting instructional materials: computers for mathematics/science instruction; computer software for mathematics/science instruction; calculators for mathematics/science instruction; library materials relevant to mathematics/science instruction; and audiovisual resources for mathematics/science instruction. Responses were coded on a 4-point scale for each item as follows: *None* = 1; *A little* = 2; *Some* = 3; and *A lot* = 4. Responses were categorized for the index variable such that *High* = the average of general materials < 2 and the average of mathematics/science-specific materials < 2; *Low* = the average of general materials ≥ 3 and the average of mathematics/science-specific materials ≥ 3; and *Medium* = all other response combinations. Trends are not available in the IDE because the public-use data does not link the 2007 and 2003 variables.

The items used for the fourth-grade mathematics index are AC4GST01–AC4GST05 for general materials and AC4MST07–AC4MST11 for mathematics-specific materials. Please note that the same general material questions are used for the fourth-grade science index, and the same averaging process is used with the comparable science-specific questions [AC4SST12–AC4SST17]. Furthermore, the same pattern is followed for the eighth-grade indexes, with BC4GST01–BC4GST05 common to both indexes and BC4MST07–BC4MST11 and BC4SST12–BC4SST17 used for mathematics- and science-specific items, respectively.

Index Availability of School Resources for Science Instruction (1999, 1995) [BCDSASR]—

This index is based on principals' average response to five questions about shortages that affect general capacity to provide instruction (instructional materials; budget for supplies; school buildings and grounds; heating/cooling and lighting systems; instructional space), and the average response to six questions about shortages that affect science instruction (laboratory equipment and materials; computers; computer software; calculators; library materials; audio-visual resources) (see reference exhibits R4.1–R4.2). *High* level indicates that both shortages, on average, affect instructional capacity none or a little. *Medium* level indicates that one shortage affects instructional capacity none or a little and the other shortage affects instructional capacity some or a lot. *Low* level indicates that both shortages affect instructional capacity some or a lot.

School Library Size (Index) [AC5DG125]—This index was derived from two questions assessing the availability of a school library and/or how many books with different titles the school library has (excluding magazines and periodicals), as reported by 4th- and 8th-grade principals. The responses are categorized as (1) more than 5,000 book titles; (2) 501–5,000 book titles; (3) 500 book titles or fewer; and (4) no school library.

Teaching Working Conditions (Index/Scale) [AT5MBG236, AT5SBG236, AT5MDG237, AT5SDG237, BT5MMB163, BT5MMD164, BT5SSB162, BT5SSD163]—Both the index and scale were created using 4th- and 8th-grade teachers’ responses to the following statements about working conditions in their school: (1) The school building needs significant repair; (2) Classrooms are overcrowded; (3) Teachers have too many teaching hours; (4) Teachers do not have adequate workspace (e.g., for preparation, collaboration, or meeting with students); and (5) Teachers do not have adequate instructional materials and supplies.

Students were scored according to their teachers’ responses on the scale. Students whose teachers had *Hardly Any Problems* with their working conditions had a score on the scale of at least 11.3 (for 4th-graders) or 11.7 (for 8th-graders), which corresponds to their teachers reporting “not a problem” for three of five areas and a “minor problem” for the other two, on average. Students whose teachers had *Moderate Problems* had a score no higher than 8.7 (for 4th-graders) or 8.9 (for 8th-graders), which corresponds to their teachers reporting a “moderate problem” for three of five conditions and a “minor problem” for the other two, on average. All other students had teachers who reported *Minor Problems* with their working conditions.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Index of Adequate Working Conditions for Mathematics/Science Teachers (M-TAWC/S-TAWC) [ATDMMTAWC, ATDSSTAWC, BTDMMTAWC, BTDSSTAWC]

—This index is based on 4th- and 8th-grade teachers’ responses about the severity of three school conditions: the school building needs significant repair; classrooms are overcrowded; and teachers do not have adequate workspace outside their classroom. Responses are coded on a 3-point scale for each item as follows: *Not a problem* = 1; *Minor problem* = 2; and *Serious problem* = 3. Responses are averaged such that *High* = average value = 1; *Medium* = average value > 1 ≤ 2; and *Low* = average value > 2.

The items used for the fourth-grade mathematics index are AT4GSPBR, AT4GSPCO, and AT4GSPWO. Please note that the same items are used for the fourth-grade science index, with one extra item: materials are not available to conduct experiments or investigations [AT4GSPME]. A similar pattern is followed for the eighth-grade indexes, with three items common to both indexes [BT4GSPBR, BT4GSPCO, and BT4GSPWO] and one more included in the science index [BT4GSPME].

Computers Available for Instruction for Students (Index) [AC5DG126, BC5DG104]—This index was derived from two questions assessing the availability of computers for instruction, as reported by 4th- and 8th-grade principals. The questions ask the principal to report (1) the total enrollment of 4th-grade students as of the first day of the month TIMSS 2011 testing begins; and (2) the total number of computers that can be used for instructional purposes by 4th-grade students. The responses are categorized as (1) 1 computer for 1–2 students; (2) 1 computer for 3–5 students; (3) 1 computer for 6 or more students; and (4) no computers available.

Schools' Access to the Internet [BCDGINT]—This index is based on principals' responses to the following questions: (1) Does your school have access to the Internet for instruction/educational purposes? (2) Is your school planning to get internet access? (3) What percentage of the computers have access to e-mail? and (4) What percentage have access to the World Wide Web? Responses are coded into four categories: *Have access to the Internet and the percentage of computers having access to the World Wide Web is 1–100% = 1*; *have access to the Internet and the percentage of computers having access to e-mail only is 1–100% = 2*; *do not have access to the Internet, but planning to obtain access by 2001 = 3*; and *do not have access to the Internet and no immediate plans to obtain access = 4*. The index is coded as missing if any source variable is missing.

Availability of Computers/Ratio [BCDGMRC]—This index is based on the ratio of grade 8 students to total computers for use by students and teachers. The index is derived from principals' responses to the following questions: (1) How many boys are in <grade 8>? (2) How many girls are in <grade 8>? and (3) What is the total number of computers that can be used for instructional purposes by either students or teachers? The variable is coded into the following categories: *<15 students per computer = 1*; *15–30 students per computer = 2*; *31–50 students per computer = 3*; *> 50 students per computer = 4*; and *No computers = 5*.

6.L. Home Involvement

School Expectations of Parents to Volunteer [BCDGVOL]—This index is derived from principals' responses to two “yes/no” questions about whether their school expects parents to serve as volunteers: *Volunteer for school projects and programs*; *Assist teachers on trips*. The index is based on the number of “yes” responses: *Expects parents to serve as volunteers* (“yes” to either) = 1; *Does not expect parents to serve as volunteers* (“no” to either) = 2. The index is coded as missing if both source variables are missing or if one is “no” and the other is missing.

6.M. School Climate and Safety

Students' Sense of School Belonging (Index/Scale) [AS6DGSSB, AS6BGSSB, BS6DGSSB, BS6BGSSB, MS3DGSSB, MS3BGSSB, PS3DGSSB, PS3BGSSB]—For more details, see [TIMSS Results](#) and [TIMSS Advanced Results](#).

School Discipline Problems – Reported by Principals [MC3DGDAS, MC3BGDAS, PC3DGDAS, PC3BGDAS]—For more details, see [TIMSS Advanced Results](#).

Teachers Job Satisfaction (Index) [MT3DGTJS, MT3BGTJS, PT3DGTJS, PT3BGTJS] – For more details, see [TIMSS Advanced Results](#).

Students Bullied At School (Index/Scale) [AS5BG069, AS5DG070, BS5BG215, BS5DG216]—Both the index and scale were created using 4th- and 8th-grade students' reports of how often they experienced the following six bullying behaviors at school: (1) I was made fun of or called names; (2) I was left out of games or activities by other students; (3) Someone spread

lies about me; (4) Something was stolen from me; (5) I was hit or hurt by other student(s); and (6) I was made to do things I didn't want to do by other students.

Students were scored according to their responses on the scale. Students bullied *Almost Never* had a score on the scale of at least 10.1 (for 4th-graders) or 9.6 (for 8th-graders), which corresponds to “never” experiencing three of the six bullying behaviors and experiencing each of the other three behaviors “a few times a year,” on average. Students bullied *About Weekly* had a score no higher than 8.3 (for 4th-graders) or 7.7 (for 8th-graders), which corresponds to their experiencing each of three of the six behaviors “once or twice a month” and each of the other three “a few times a year,” on average. All other students were bullied *About Monthly*.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Index of Students' Perception of Being Safe in School (SPBSS) [ASDGPBSS, BSDGPBSS]—This index is based on 4th- and 8th-grade students' “yes” and “no” responses to statements about safety in school: (1) Something of mine was stolen; (2) I was hit or hurt by other student(s) (e.g., shoving, hitting, kicking); (3) I was made to do things I didn't want to do by other students; (4) I was made fun of or called names; and (5) I was left out of activities by other students. Responses were categorized for the index variable such that *High* = “no” responses to all five statements; *Low* = “yes” responses to three or more statements; and *Medium* = all other response combinations.

The items used for the fourth-grade index are AS4GSTOL, AS4GHURT, AS4GMADE, AS4GMFUN, and AS4GLEFT. Please note that the same process was used for the items in the eighth-grade index [BS4GSTOL, BS4GHURT, BS4GMADE, BS4GMFUN, BS4GLEFT].

Safe and Orderly School - Teacher Reports [MT3DGSOS, MT3BGSOS, PT3DGSOS, PT3BGSOS]—For more details, see [TIMSS Advanced Results](#).

Safe and Orderly School - Teacher Reports (Index/Scale) [AT5SBG240, AT5MDG241, AT5SDG241, BT5MMB167, BT5MMD168, BT5SSB166, BT5SSD167]—Both the index and scale were created using 4th- and 8th-grade teachers' responses concerning the extent of their agreement with the following statements: (1) This school is located in a safe neighborhood; (2) I feel safe at this school; (3) This school's security policies and practices are sufficient; (4) The students behave in an orderly manner; and (5) The students are respectful of the teachers.

Students were scored according to their teachers' degree of agreement with the five statements on the scale. Students in *Safe and Orderly* schools had a score on the scale of at least 10.2 (for 4th-graders) or 10.7 (for 8th-graders), which corresponds to their teachers “agreeing a lot” with three of the five qualities of a safe and orderly school and “agreeing a little” with the other two, on average. Students in *Not Safe and Orderly* schools had a score no higher than 6.3 (for 4th-graders) or 6.8 (for 8th-graders), which corresponds to their teachers “disagreeing a little” with three of the five qualities and “agreeing a little” with the other two, on average. All other students attended *Somewhat Safe and Orderly* schools.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Index of Teachers' Perception of School Safety (TPSS, M-TPSS/S-TPSS) [ATDMGTPSS, ATDSGTPSS, BTDMMPSS, BTDSSTPSS]—This index is based on 4th- and 8th-grade teachers' responses to three statements regarding their sense of safety within the school where they work: (1) This school is located in a safe neighborhood; (2) I feel safe at this school; and (3) This school's security policies and practices are sufficient. Responses are coded on a 4-point scale for each item as follows: *Agree a lot* = 1; *Agree* = 2; *Disagree* = 3; and *Disagree a lot* = 4. Responses were categorized for the index variable such that *High* = responded *Agree a lot* or *Agree* to all three statements; *Low* = responded *Disagree* or *Disagree a lot* to all three statements; and *Medium* = all other combinations. For 2003, the index is coded as missing if one or more source variables are missing. For 2007, the index is coded as missing if two or more source variables have invalid data.

The items used for the fourth-grade index are AT4GCUSN, AT4GCUSA, and AT4GUAS. Please note that the same coding process was used for the items in the eighth-grade indexes for mathematics and science teachers (M-TPSS/S-TPSS) [BT4GCUSN, BT4GCUSA, BT4CUAS]. The items for the eighth-grade indexes share the same variable names, but separate questionnaires were given to mathematics and science teachers.

School Emphasis on Academic Success - Teacher (Index/Scale) [AT5MBG238, AT5SBG238, AT5MDG239, AT5SDG239, BT5MMB165, BT5MMD166, BT5SB164, BT5SSD165]—Both the index and scale were created using 4th- and 8th-grade teachers' responses characterizing the following five aspects of academic success within their school: (1) teachers' understanding of the school's curricular goals; (2) teachers' degree of success in implementing the school's curriculum; (3) teachers' expectations for student achievement; (4) parental support for student achievement; and (5) students' desire to do well in school.

Students were scored according to their teachers' responses on the scale. Students in schools where their teachers reported a *Very High Emphasis* on academic success had a score on the scale of at least 13.1 (for 4th-graders) or 13.6 (for 8th-graders), which corresponds to their teachers characterizing three of the five aspects as "very high" and the other two as "high," on average. Students in schools with a *Medium Emphasis* on academic success had a score no higher than 8.8 (for 4th-graders) or 9.5 (for 8th-graders), which corresponds to their teachers characterizing three of the five aspects as "medium" and the other two as "high," on average. All other students attended schools with a *High Emphasis* on academic success.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Index of Teachers' Perception of School Climate (TPSC, M-TPSC/S-TPSC) [ATDMGTPSC, ATDSGTPSC, BTDMMPSC, BTDSSTPSC]—This index is based on 4th- and 8th-grade teachers' responses to questions about various aspects of their school environment:

teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Responses are coded on a 5-point scale for each item as follows: *Very high* = 1; *High* = 2; *Medium* = 3; *Low* = 4; and *Very low* = 5. Responses were categorized for the index variable such that *High* = average value ≤ 2 ; *Medium* = average value $> 2 < 3$ (for 2003) or $> 2 \leq 3$ (for 2007); and *Low* = average value ≥ 3 (for 2003) or > 3 (for 2007). The index is coded as missing if there are three or more source questions with invalid data.

The items used for the fourth-grade index are AT4GCHTS, AT4GCHTU, AT4GCHTC, AT4GCHES, AT4GCHPS, AT4GCHPI, AT4GCHSR, and AT4GCHSD. Please note that the same coding process was used for the items in the eighth-grade indexes for mathematics and science teachers (M-TPSC/S-TPSC) [BT4GCHTS, BT4GCHTU, BT4GCHTC, BT4GCHES, BT4GCHPS, BT4GCHPI, BT4GCHSR, BT4GCHSD]. The items for the eighth-grade indexes share the same variable names, but separate questionnaires were given to mathematics and science teachers.

School Emphasis on Academic Success - Principal (Index/Scale) [AC5BG119, AC5DG120, BC5BG099, BC5DG100]—Both the index and scale were created using 4th- and 8th-grade principals' responses characterizing the following five aspects of academic success within their school: (1) teachers' understanding of the school's curricular goals; (2) teachers' degree of success in implementing the school's curriculum; (3) teachers' expectations for student achievement; (4) parental support for student achievement; and (5) students' desire to do well in school.

Students were scored according to their principals' responses on the scale. Students in schools where their principals reported a *Very High Emphasis* on academic success had a score on the scale of at least 13.1 (for 4th-graders) or 13.3 (for 8th-graders), which corresponds to their principals characterizing three of the five aspects as "very high" and the other two as "high," on average. Students in schools with a *Medium Emphasis* on academic success had a score no higher than 8.9 (for 4th-graders) or 9.2 (for 8th-graders), which corresponds to their principals characterizing three of the five aspects as "medium" and the other two as "high," on average. All other students attended schools with a *High Emphasis* on academic success.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).

Index of Principals' Perception of School Climate (PPSC) [ACDGPPSC, BCDGPPSC]—This index is based on principals' responses to questions about various aspects of their school environment: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Responses are coded on a 5-point scale for each item as follows: *Very high* = 1; *High* = 2;

Medium = 3; *Low* = 4; and *Very low* = 5. Responses were categorized for the index variable such that *High* = average value ≤ 2 ; *Medium* = average value $> 2 \leq 3$; and *Low* = average value > 3 . The index is coded as missing if there are three or more source questions with invalid data.

The items used for the fourth-grade index are AC4GCHTS, AC4GCHTU, AC4GCHTC, AC4GCHES, AC4GCHPS, AC4GCHPI, AC4GCHSR, and AC4GCHSD. Please note that the same coding process was used for the items in the eighth-grade index [BC4GCHTS, BC4GCHTU, BC4GCHTC, BC4GCHES, BC4GCHPS, BC4GCHPI, BC4GCHSR, BC4GCHSD].

Index of Good Attendance at School (GAS) [ACDGAS, BCDGAS]—This index is based on principals' responses to questions about the frequency and severity of attendance issues in their school: arriving late at school, absenteeism (i.e., unjustified absences), and skipping class. Responses about the frequency of these events were coded as follows for each item: *Never* = 1; *Rarely* = 2; *Monthly* = 3; *Weekly* = 4; and *Daily* = 5. Responses to questions about the severity of these issues were coded on a 3-point scale for each item: *Not a problem* = 1; *Minor problem* = 2; and *Serious problem* = 3. Responses were categorized for the index variable such that schools at the *High* level of the index reported that all three behaviors never occurred or were not a problem; schools at the *Low* level of the index indicated that two or more of the behaviors were a serious problem, one was a serious problem and the other two were minor problems, or one variable value was missing and the other two were coded as serious problems; and the *Medium* category includes all other combinations of responses.

The items used for the fourth-grade index are AC4GFP01–AC4GFP03 and AC4GSP01–AC4GSP03. Please note that the same coding process was used for the items in the eighth-grade index [BC4GFP01–BC4GFP03 and BC4GSP01–BC4GSP03].

Index of Good School Attendance (1999) [BCDGSA]—This index is based on principals' responses to three questions concerning the severity of attendance issues in their school: arriving late to school, absenteeism, and skipping class. Responses about the severity of each problem were coded as follows for each item: *Not a problem* = 1; *Minor problem* = 2; and *Serious problem* = 3. The index is assigned three levels: *Not a problem* for all three questions = *High*; *Serious problem* for two of three questions OR *Serious problem* for one question and *Minor problem* for two questions = *Low*; and All other combinations = *Medium*. The index is coded as missing if more than one source variable is missing.

School Discipline and Safety - Principal (Index/Scale) [AC5BG121, AC5DG122, BC5BG101, BC5DG102]—This index and scale were created using 4th and 8th grade principals' responses concerning 10 potential school discipline and safety problems: (1) arriving late at school; (2) absenteeism (i.e., unjustified absences); (3) classroom disturbance; (4) cheating; (5) profanity; (6) vandalism; (7) theft; (8) intimidation or verbal abuse among students (including texting, e-mailing, etc.); (9) physical fights among students; and (10) intimidation or verbal abuse of teachers or staff (including texting, e-mailing, etc.).

Students were scored according to their principals' responses on the scale. Students in schools with *Hardly Any Problems* had a score on the scale of at least 9.7 (for 4th-graders) or 12.0 (for 8th-graders), which corresponds to their principals reporting "not a problem" for 5 of the 10 discipline and safety issues and a "minor problem" for the other 5, on average. Students in schools with *Moderate Problems* had a score no higher than 7.6 (for 4th-graders) or 8.4 (for 8th-graders), which corresponds to their principals reporting a "moderate problem" for 5 of the 10 issues and a "minor problem" for the other 5, on average. All other students attended schools with *Minor Problems*.

For information on creating and interpreting the TIMSS 2011 context questionnaire scales, see [Methods and Procedures in TIMSS and PIRLS 2011](#).