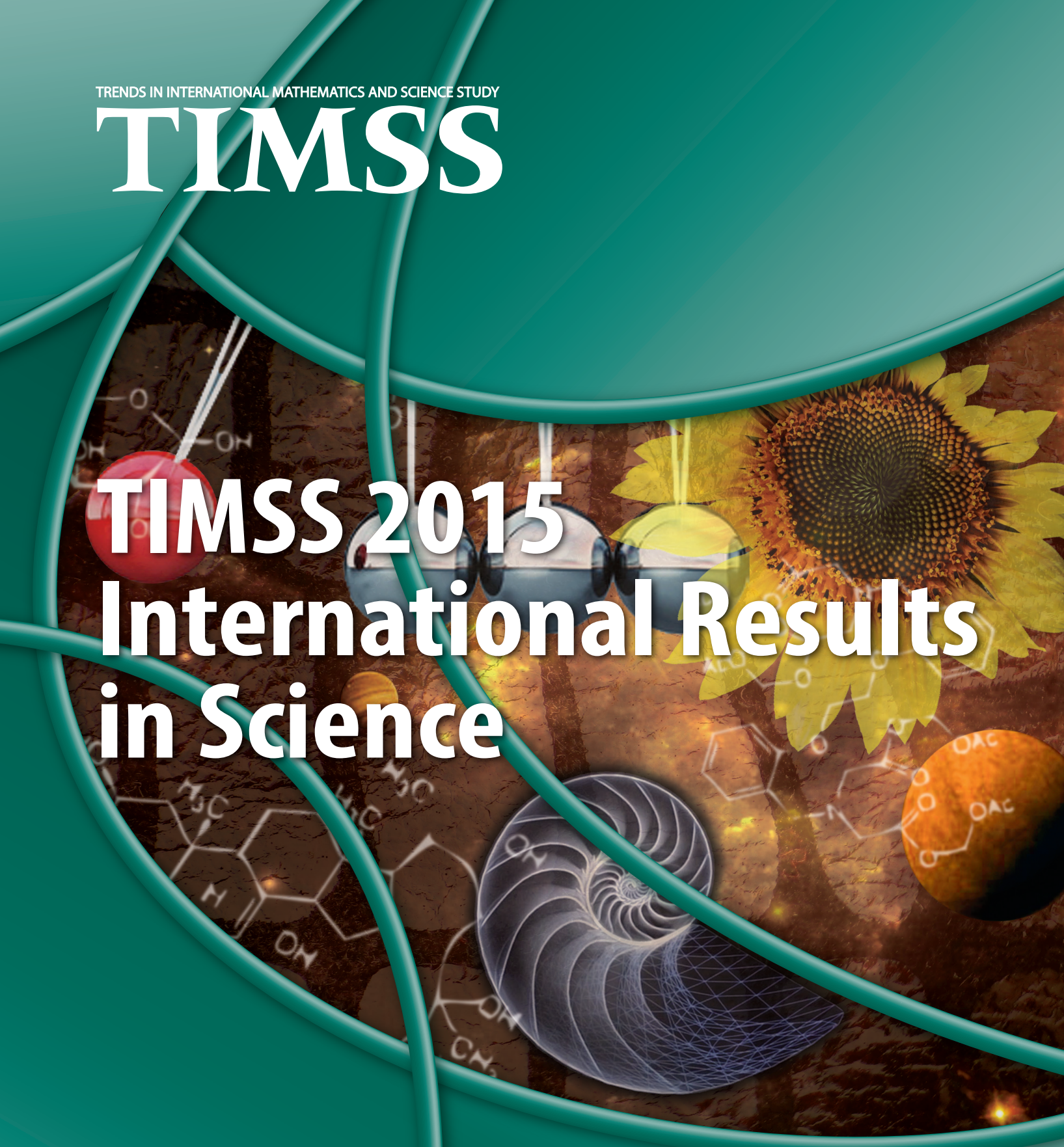
TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY

TIMSS



TIMSS 2015 International Results in Science

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TIMSS 2015

TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

EIGHTH GRADE SCIENCE

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About TIMSS 2015

In 2015, IEA and its TIMSS & PIRLS International Study Center at Boston College conducted TIMSS 2015 at fourth and eighth grades and TIMSS Advanced 2015 for students in the final year of secondary school enrolled in special advanced mathematics and physics programs or tracks. Both TIMSS 2015 and TIMSS Advanced 2015 provide 20-year trend measures for countries that participated in the first TIMSS assessments in 1995.

TIMSS 2015 and TIMSS Advanced 2015 continue the long history of international assessments in mathematics and science conducted by IEA – the International Association for the Evaluation of Educational Achievement. IEA is an independent international cooperative of national research institutions and government agencies that has been conducting studies of cross-national achievement since 1959. IEA pioneered international comparative assessments of educational achievement in the 1960s to gain a deeper understanding of the effects of policies across countries' different systems of education.

IEA's TIMSS & PIRLS International Study Center is located in the Lynch School of Education at Boston College and has been responsible for directing TIMSS and TIMSS Advanced since 1995.

TIMSS 2015

TIMSS is an international assessment of mathematics and science at the fourth and eighth grades that has been conducted every four years since 1995. TIMSS 2015 is the sixth assessment in the TIMSS series monitoring 20 years of trends in educational achievement, together with comprehensive data on students' contexts for learning mathematics and science.

In 2015, 57 countries and 7 benchmarking entities (regional jurisdictions of countries such as states or provinces) participated in TIMSS. In total, more than 580,000 students participated in TIMSS 2015.

The TIMSS 2015 mathematics and science assessments are based on comprehensive frameworks developed collaboratively with the participating countries. For each curriculum area at each grade, the frameworks are organized around two dimensions: a content dimension specifying the content to be assessed and a cognitive dimension specifying the thinking processes to be assessed. The TIMSS assessments contain nearly 800 assessment items, about 200 per grade for each curriculum area. The majority of TIMSS items assess students' applying and reasoning skills.

New for TIMSS 2015, a home questionnaire was completed by fourth grade students' parents or caregivers, in addition to the questionnaires routinely given at both fourth and eighth grades to students, teachers, school principals, and curriculum specialists. The questionnaire data primarily are reported in the form of indices created using IRT scaling methods, and results are presented for three regions of the scales (most to least desirable). When possible, scales were developed in parallel to provide comparisons between mathematics and science as well as the fourth and eighth grades.

TIMSS has the goal of helping countries make informed decisions about how to improve teaching and learning in mathematics and science. With its strong curricular focus and emphasis on policy relevant information about the home, school, and classroom contexts for learning, TIMSS is a valuable tool that countries can use to evaluate achievement goals and standards and monitor students' achievement trends in an international context. The *TIMSS 2015 Encyclopedia* complements the quantitative information in the international reports with a chapter by each country summarizing mathematics and science curricula, instructional practices, and teacher education requirements.

Countries Participating in TIMSS 2015

Exhibit 1 lists the 57 countries participating in TIMSS 2015, including some distinct educational systems within countries that have always participated separately throughout IEA's long history (e.g., the Dutch-speaking part of Belgium and Hong Kong Special Administrative Region (SAR) of the People's Republic of China). In addition, TIMSS had 7 benchmarking participants including a variety of educational entities.

Exhibit 1: Countries Participating in TIMSS 2015

Armenia
Australia
Bahrain
Belgium (Flemish)
Botswana
Bulgaria
Canada
Chile
Chinese Taipei
Croatia
Cyprus
Czech Republic
Denmark
Egypt
England
Finland
France
Georgia
Germany
Hong Kong SAR
Hungary
Indonesia
Iran, Islamic Rep. of
Ireland
Israel
Italy
Japan
Jordan
Kazakhstan
Korea, Rep. of
Kuwait
Lebanon
Lithuania
Malaysia
Malta
Morocco
Netherlands
New Zealand
Northern Ireland
Norway
Oman
Poland
Portugal
Qatar
Russian Federation
Saudi Arabia
Serbia
Singapore
Slovak Republic
Slovenia
South Africa
Spain
Sweden
Thailand
Turkey
United Arab Emirates
United States

Benchmarking Participants

Buenos Aires, Argentina
Ontario, Canada
Quebec, Canada
Abu Dhabi, UAE
Dubai, UAE
Florida, US

Countries and benchmarking participants could elect to participate in the fourth grade assessment, the eighth grade assessment, or both. Also, countries where students were expected to find the TIMSS assessments too difficult at the fourth grade could participate in the newly developed TIMSS Numeracy assessment, a less difficult version of the fourth grade mathematics assessment. Fifty countries and the 7 benchmarking participants administered the fourth grade assessments. Of those, 7 countries and 1 benchmarking entity participated in the Numeracy assessment, including Bahrain, Indonesia, Iran, Kuwait, Jordan, Morocco, and South Africa as well as Buenos Aires. Each of these participants gave both the fourth grade assessments in mathematics and science as well as the Numeracy assessment, except Jordan and South Africa that participated in Numeracy only. Thirty-nine countries and the 7 benchmarking participants administered the eighth grade mathematics and science assessments. 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). Botswana and South Africa assessed ninth grade to better match their curricula and to maintain trend measurement. Exhibit 2 provides more information about the students assessed in TIMSS 2015, including average ages as well as policies for age of entry, promotion, and retention.

In each grade, nationally representative samples of approximately 4,000 students from 150-200 schools participated in TIMSS 2015. Including the mathematics, numeracy, and science assessments and questionnaires, more than 312,000 students, 250,000 parents, 20,000 teachers, and 10,000 schools participated in the fourth grade assessments, and a further 270,000 students, 31,000 teachers, and 8,000 schools in the eighth grade assessments.

Exhibit 2: Information About the Students Assessed in TIMSS 2015

Reported by National Research Coordinators, except Average Ages are from TIMSS 2015 Data

Country	Grade 4		Grade 8		Information About Policy on Students' Age of Entry to Primary School	Information About Students' Age of Entry to Primary School in Practice
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing		
Australia	Year 4	10.0	Year 8	14.0	Varies by state, but generally children must begin school by age 6.	Most children begin school when they are 4.5–5 years old, but some wait until the compulsory age, either on advice from preschool staff or on the judgment of parents, usually because of maturity.
Bahrain	Grade 4	9.9	Grade 8	14.0	Children must be 6 years old to begin school in September.	Follows policy
Belgium (Flemish)	Grade 4	10.1			Children must begin school in September during the calendar year of their 6th birthday.	Parents can keep their child in kindergarten until age 7, with approval from an independent counseling center. Homeschooling is also practiced. Children with serious disabilities can be exempt from compulsory education.
Botswana (9)			Grade 9	15.6	Children must be 6 years old by the end of June to begin in January of the same calendar year.	Children from remote areas or disadvantaged children may begin later than age 6. Children enter private schools at age 5.
Bulgaria	Grade 4	10.8			Children must begin school during the calendar year of their 7th birthday.	Children may begin at the age of 6 with parental/guardian discretion.
Canada	Grade 4	9.9	Grade 8	14.0	Varies by province, but most children begin school at the age of 6.	Practice varies by province, but generally parents have the option of accelerating or delaying enrollment by one year. Some parents opt to homeschool their children.
Chile	Basic 4	10.2	Basic 8	14.3	Children must be 6 years old by March 31 of the year they begin school.	Principals are allowed some discretion regarding the admission of children who will turn 6 after March 31 but before June 30.
Chinese Taipei	Grade 4	10.2	Grade 8	14.3	Children must be 6 years old to begin school in September.	Parents can apply for early enrollment to elementary schools. Legal representatives can apply to delay enrollment to elementary schools for children with disabilities.
Croatia	Grade 4	10.6			Children can begin school during the calendar year of their 6th birthday.	Children typically begin primary school at age 7 because their parents feel they will benefit from being more mature.
Cyprus	Grade 4	9.8			Children can begin school if they are 5.75 years old before September 1.	Parents can apply to delay enrollment of children for one year with the approval of the Director of Primary Education.
Czech Republic	Grade 4	10.4			Children must be 6 years old to begin school in September.	On one hand, parents may request that children born after September 1 be allowed to enroll at age 5 with pedagogical and psychological certification. On the other hand, about 22% of students every year receive permission to postpone enrollment for one year.
Denmark	Grade 4	10.9			Children can begin school during the calendar year of their 6th birthday.	Parents may request early enrollment for mature children whose 5th birthdays are before October 1 from the school principal. Parents may also request a one-year postponement of enrollment for developmentally challenged children from the municipal council.
Egypt			–	14.1	Children must be 6 years old by the end of September to begin school.	Follows policy
England	Year 5	10.1	Year 9	14.1	Children must begin school during the calendar year of their 5th birthday.	Most children begin school the September after their 4th birthday. Parents may request that their child's entry to school is deferred until later in the school year and up until the compulsory school age.
Finland	Grade 4	10.8			Children must begin school during the calendar year of their 7th birthday.	It is possible for parents to enroll children one year earlier or one year later than the official policy.
France	CM1	9.9			Children must begin school in September of the calendar year of their 6th birthday.	In rare cases it is possible for parents and/or teachers to request early enrollment for academically advanced and mature children or to request a one-year delay in enrollment for immature children.

* The TIMSS target population is the grade that represents four years or eight years of schooling counting from the first year of ISCED Level 1. However, IEA has a policy that students do not fall under the minimum average age of 9.5 years old (Grade 4) or 13.5 years old (Grade 8) at the time of testing, so England, Malta, and New Zealand assessed students in their fifth year or ninth year of formal schooling.

A dash (-) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2: Information About the Students Assessed in TIMSS 2015 (Continued)

Country	Grade 4		Grade 8		Information About Policy on Students' Age of Entry to Primary School	Information About Students' Age of Entry to Primary School in Practice
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing		
Georgia	Grade 4	9.7	Grade 8	13.7	Children must be 6 years old to begin school.	Follows policy
Germany	Grade 4	10.4			Varies by state, but generally children must have reached their 6th birthday before a statutory qualifying date (usually between June 30 and September 30) to begin school on August 1.	Varies by state, but generally, parents may request early enrollment from the local primary school or request deferred enrollment from the school administration for children with demonstrated physical or mental disabilities.
Hong Kong SAR	Primary 4	10.1	Secondary 2	14.2	Children begin school if they are 5.75 years old before September 1.	Some parents choose not to enroll their children according to policy.
Hungary	Grade 4	10.7	Grade 8	14.7	Children must be 6 years old before August 31 to begin school that year.	Children may remain in preschool for an extra year upon recommendation from a committee of experts.
Indonesia	Grade 4	10.4			Children must be 6 years old to begin school in August.	Parents may request early enrollment for mature students. In rural areas, it is common for children to enroll at age 7.
Iran, Islamic Rep. of	Grade 4	10.2	Grade 8	14.2	Children must be 6 years old by September 21 to begin school that year.	Parents may enroll their children at age 7.
Ireland	Fourth Class	10.4	Second Year	14.4	Children can begin school (ISCED 0) at age 4, but must begin school by age 6.	Most children begin primary school at age 4 –5, the first two years of which are pre-primary grades.
Israel			Grade 8	14.0	Children begin school the calendar year of their 6th birthday.	Parents may apply for delayed enrollment and have the final say in enrollment decisions.
Italy	Primary Grade 4	9.7	Lower Secondary Grade 3	13.8	Children begin school the calendar year of their 6th birthday.	Parents have discretion over early or delayed enrollment.
Japan	Grade 4	10.5	Grade 8	14.5	Children must be 6 years old by April 1 to begin school.	Follows policy
Jordan	Grade 4	9.8	Grade 8	13.8	Children must be at least 5.75 years old by September 1 to begin school.	Follows policy
Kazakhstan	Grade 4	10.3	Grade 8	14.3	Children must begin school at age 6.	Parents can delay enrollment for one year.
Korea, Rep. of	Elementary School Grade 4	10.5	Middle School Grade 2	14.4	Children must be 6 years old by the end of December to begin school the following March.	Parents can decide to enroll academically advanced children one year earlier or postpone enrollment for one year for health reasons with the permission of the school superintendent.
Kuwait	Grade 4	9.7	Grade 8	13.7	Children must be 6 years old by March 15 to begin school that calendar year.	Follows policy
Lebanon			Grade 8	14.2	Children must be 6 years old by the end of June to begin school the following September.	Parental discretion is not allowed in private schools. In public schools there may be special cases authorized by the Ministry of Education.
Lithuania	Grade 4	10.7	Grade 8	14.7	Children begin school during the calendar year of their 7th birthday.	Parents can request early enrollment or request to delay enrollment by one year.
Malaysia			Form 2	14.3	Children must be at least 6 years old to begin school.	Follows policy
Malta			Year 9	13.8	Children begin school during the calendar year of their 5th birthday.	Follows policy
Morocco	Grade 4	10.3	Middle School Year 2	14.5	Children must be 6 years old to begin school.	Follows policy
Netherlands	Group 6	10.0			Children must start kindergarten on the first day of the month after their 5th birthday.	Most children begin kindergarten when they are 4 years old and begin primary school when they are 6 years old. Some children start primary school later if the school thinks that the child would benefit from being more mature. Parents are involved in this decision, but the school has the final say.
New Zealand	Year 5	10.0	Year 9	14.1	Children can begin school at age 5, but must be enrolled in primary school by their 6th birthday.	Most children begin school on or soon after their 5th birthday.
Northern Ireland	Year 6	10.4			Children must be 4 years old by July 1 to begin school in September.	Follows policy

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2: Information About the Students Assessed in TIMSS 2015 (Continued)

Country	Grade 4		Grade 8		Information About Policy on Students' Age of Entry to Primary School	Information About Students' Age of Entry to Primary School in Practice
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing		
Norway (5, 9)	Grade 5	10.7	Grade 9	14.7	Children must begin school during the calendar year of their 6th birthday.	Follows policy
Oman	Grade 4	9.6	Grade 8	14.0	Children begin school during the calendar year of their 6th birthday.	Follows policy
Poland	Grade 4	10.7			Children must begin school during the calendar year of their 6th birthday.	From 2012–2015, parents could decide whether to send their children to school at age 6 or age 7.
Portugal	Grade 4	9.9			Children must be 6 years old by September 15 to begin school in that calendar year.	Parents or legal guardians can request that children who will be 6 years old between September 16 and December 31 be allowed to enroll in primary education in the school year of their 6th birthday.
Qatar	Grade 4	10.1	Grade 8	14.1	Children must be 6 years old by the end of December to begin school in September.	Follows policy
Russian Federation	Grade 4	10.8	Grade 8	14.7	Children begin school when they are at least 6.5 years old by September 1 of that school year.	Children under 6.5 years old may begin school with consent of the parents and school principal. Parents may delay entry until age 7 or older if they want the child to be more mature, or for health reasons.
Saudi Arabia	Grade 4	10.0	Grade 8	14.1	Children must be 6 years old by the end of August to begin school in September.	Follows policy
Serbia	Grade 4	10.7			Children must be 6.5–7 years old to begin school.	Schools may recommend one year of continued preparatory preschool for children not considered school ready. If the child is over 7.5 years old, and due to illness or other differences did not enroll in first grade, he or she may enroll in the first or other appropriate grade based on the results of testing.
Singapore	Primary 4	10.4	Secondary 2	14.4	According to the Compulsory Education Act, children must begin school in the calendar year of their 7th birthday.	Parents may seek a deferral of registration for medical reasons or if the child is homeschooled.
Slovak Republic	Grade 4	10.4			Children must begin school on September 1 if their 6th birthday is before August 31.	Children may begin school early or after an approved delay based on psychological tests and professional recommendations.
Slovenia	Grade 4	9.8	Grade 8	13.8	Children begin school during the calendar year of their 6th birthday.	Parents can request early enrollment for children who have their 6th birthday in January of the next calendar year or request a one-year delay in enrollment for medical or developmental reasons.
South Africa (5, 9)	Grade 5	11.5	Grade 9	15.7	Children must be 5 years old and have their 6th birthday by June 30 of the next year to begin school mid–January.	Follows policy
Spain	Grade 4	9.9			Children must begin school during the calendar year of their 6th birthday.	Almost all children begin kindergarten at age 3, even though it is not compulsory.
Sweden	Grade 4	10.8	Grade 8	14.7	Children begin school during the calendar year of their 7th birthday.	In special cases students may begin school when they are 6 or 8 years old.
Thailand			Grade 8	14.4	Children must be 6 years old by May 16 to begin school the following academic year.	Follows policy
Turkey	Grade 4	9.9	Grade 8	13.9	Children must be 5.5 years old to begin school in September.	If parents prefer, children ages 5.5–5.75 can delay enrollment for one year. Children ages 5.75–6 can delay enrollment for one year for medical or developmental reasons.
United Arab Emirates	Grade 4	9.8	Grade 8	13.9	Children can begin school during the calendar year of their 6th birthday, but must begin by age 8.	Parents may delay enrollment, but students may not be older than 8 years old on December 31 of their entry year.
United States	Grade 4	10.2	Grade 8	14.2	Each state requires parents to send their children to school between set ages. Required entry is often between 5 to 7 years old, exact age varies by state.	Children typically begin kindergarten at age 5.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2: Information About the Students Assessed in TIMSS 2015 (Continued)

Country	Grade 4		Grade 8		Information About Policy on Students' Age of Entry to Primary School	Information About Students' Age of Entry to Primary School in Practice
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing		
Benchmarking Participants						
Buenos Aires, Argentina	Grade 4	9.8	Secondary 1	14.1	Children must be 6 years old by the end of June to begin school in March of the same year.	Follows policy
Ontario, Canada	Grade 4	9.8	Grade 8	13.8	Students can begin school in September if they have their 6th birthday before December 31.	Parents may enroll their children in junior kindergarten at age 4 or senior kindergarten at age 5. Some students may start school at the junior kindergarten level at 3 years old if their birthday is between September 1 and December 31. In addition, some parents homeschool their children.
Quebec, Canada	Grade 4	10.1	Secondary 2	14.3	Children must be 6 years old by September 30 to begin in September of that calendar year.	Follows policy
Norway (4, 8)	Grade 4	9.7	Grade 8	13.7	Children must be 6 years old by September 30 to begin in September of that calendar year.	Follows policy
Abu Dhabi, UAE	Grade 4	9.8	Grade 8	13.9	Children begin school during the calendar year of their 6th birthday.	Follows policy
Dubai, UAE	Grade 4	9.8	Grade 8	13.9	Children begin school during the calendar year of their 6th birthday.	Follows policy
Florida, US	Grade 4	10.4	Grade 8	14.4	Children must begin school if they have their 6th birthday by February 1 of that school year.	Children who are 5 years old on or before September 1 of the school year are eligible for admission to public kindergarten during that school year, based on rules prescribed by the school board. Parents may choose whether or not to enroll their children in kindergarten. School superintendents may authorize certificates of exemptions from school attendance requirements in certain situations.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

TIMSS Advanced 2015

With the current emphasis on college and career readiness and increasing global competitiveness in STEM (science, technology, engineering, and mathematics) fields, in 2015 TIMSS Advanced once again was joined with TIMSS. First conducted in 1995 and then again in 2008, TIMSS Advanced is the only international assessment that provides essential information about students' achievement in advanced mathematics and physics. It assesses students in their final year of secondary school (often 12th grade) who are engaged in advanced mathematics and physics studies that prepare them to enter STEM programs in higher education.

TIMSS Advanced 2015 was offered together with TIMSS to provide 20 years of trends at three important points in students' schooling (4th grade, 8th grade, and final grade) and provide information about how the foundations established in primary school can influence students' educational career through lower secondary and impact achievement in students' final year of secondary school.

Quality Assurance

TIMSS 2015 made every effort to attend to the quality and comparability of the data through careful planning and documentation, cooperation among participating countries, standardized procedures, and rigorous attention to quality control throughout. The assessments were administered to nationally representative and well-documented probability samples of students in each country. Staff from Statistics Canada and the IEA Data Processing and Research Center (DPC) worked with National Research Coordinators on all phases of sampling activities to ensure compliance with sampling and participation requirements, with the few exceptions from compliance annotated in the data exhibits. The IEA Secretariat worked with the TIMSS & PIRLS International Study Center to manage an extensive series of verification checks to ensure the comparability of translations of the assessment items and questionnaires, and to conduct an international quality assurance program of school visits to monitor and report on the administration of the assessment. IEA DPC staff worked closely with National Research Coordinators all through the project to organize data collection operations and to check all data for accuracy and consistency within and across countries.

TIMSS 2015 Results

The international results for TIMSS 2015 are reported on this website and the results for TIMSS Advanced 2015 also can be accessed from here.

The TIMSS 2015 results are presented separately for mathematics and science, and within each subject separately for fourth grade and eighth grade. Each of the two reports contains 10 chapters or sections providing overviews in the form of infographics and numerous exhibits summarizing

fourth and eighth grade student achievement distributions, performance at the TIMSS International Benchmarks, achievement trends over time, and achievement in relation to students' home, school, and classroom educational contexts for learning mathematics and science. The exhibits can be downloaded and printed from the Download Center.

The website includes links to:

- *TIMSS 2015 Assessment Frameworks* presents the mathematics and science assessment frameworks that describe in some detail the major content and cognitive domains to be assessed at the fourth and eighth grades as well as the framework describing the types of learning situations and factors that will be investigated via the questionnaire data and an overview of the assessment design.
- *TIMSS 2015 Encyclopedia: Education Policy and Curriculum in Mathematics and Science* describes national contexts for mathematics and science teaching and learning. It contains selected data about the countries' curricula together with a chapter written by each participant summarizing the structure of its education system, the mathematics and science curricula and instruction in primary and secondary grades, the teacher education requirements, and the types of examinations and assessments employed.
- *Methods and Procedures in TIMSS 2015* describes the methods and procedures used to develop, implement, and analyze the results from the TIMSS 2015 assessments.

TIMSS 2015

CHAPTER 1: STUDENT ACHIEVEMENT

TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

IEA
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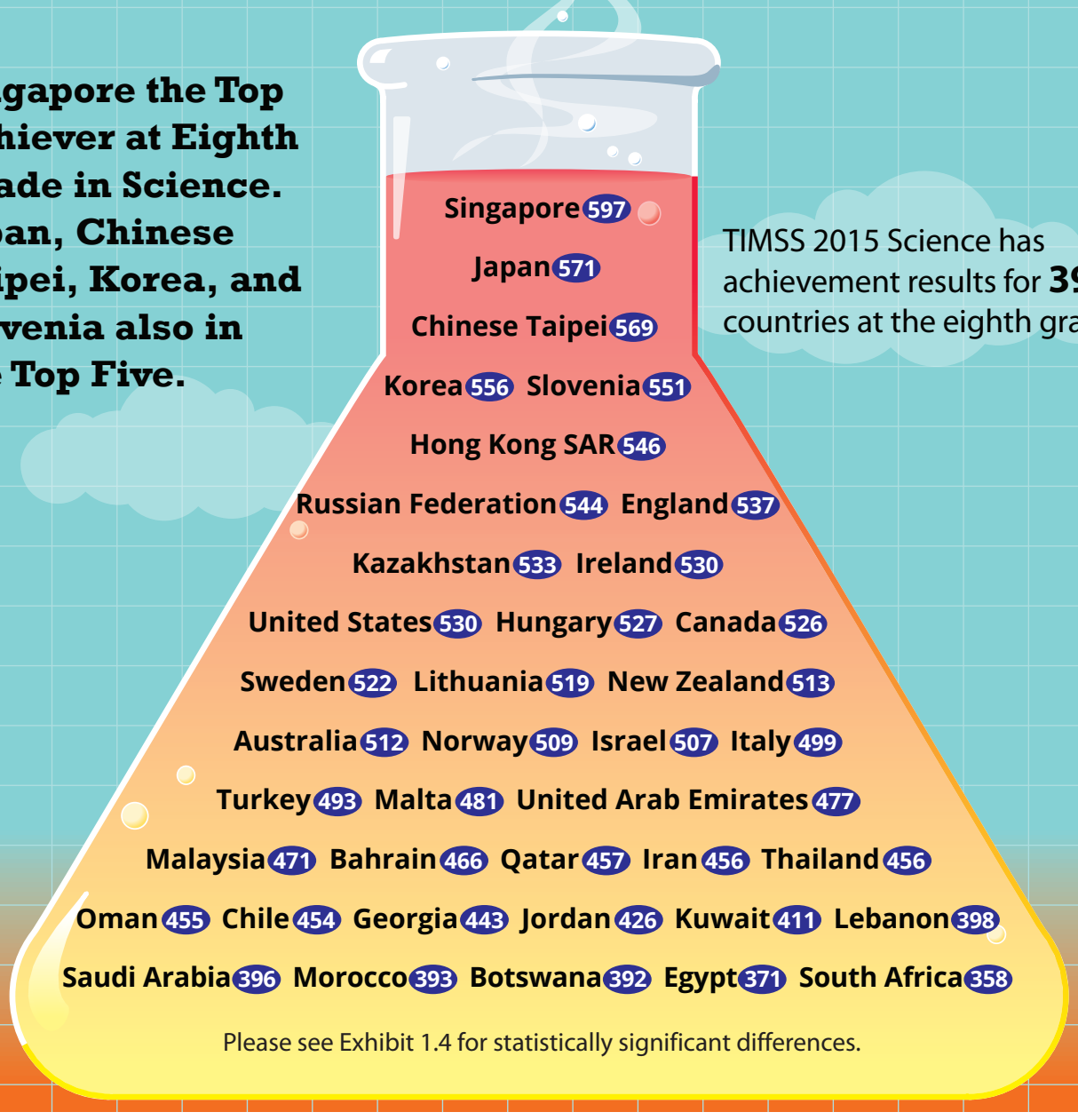
International Science Achievement

Singapore the Top Achiever at Eighth Grade in Science. Japan, Chinese Taipei, Korea, and Slovenia also in the Top Five.



TIMSS 2015 Science has achievement results for **39** countries at the eighth grade.

Please see Exhibit 1.4 for statistically significant differences.

Trends at Eighth Grade Show Increases in Science Achievement Around the World

Trends 2011-2015: 34 Countries

15 Countries Higher Average Achievement

Bahrain, Georgia, Hong Kong SAR, Japan, Kazakhstan, Lithuania, Malaysia, Morocco, Oman, Qatar, Slovenia, South Africa, Sweden, Turkey, United Arab Emirates

15 Countries Same Average Achievement

Australia, Chile, Chinese Taipei, England, Hungary, Israel, Italy, Korea, Lebanon, New Zealand, Norway, Russian Federation, Singapore, Thailand, the United States

4 Countries Lower Average Achievement

Botswana, Iran, Jordan, Saudi Arabia

Trends 1995-2015: 16 Countries

9 Countries Higher Average Achievement

Hong Kong SAR, Ireland, Japan, Korea, Lithuania, Russian Federation, Singapore, Slovenia, the United States

4 Countries Same Average Achievement

Australia, England, Iran, New Zealand

3 Countries Lower Average Achievement

Hungary, Norway, Sweden

In TIMSS 2015, Although there Was No Difference between Boys and Girls in Science Achievement in More than Half the Countries, Girls Outperformed Boys in Three-fourths of the Remaining Countries.

Of the 39 TIMSS 2015 Countries:

- Girls had higher achievement in **14** countries, with an average difference of **28** points.
- Boys had higher achievement in **5** countries, with an average difference of **11** points.
- **20** countries had no difference between boys and girls in average science achievement.

Short Term Trends Show Increasing Advantage for Girls in Science Achievement, While 20-year Trends Show Great Reduction in Boys' Historical Advantage in Science

Trends 2011-2015: 34 Countries

- In 2011, boys had higher average achievement in **8** countries, compared to **12** countries for girls.
- In 2015, boys had higher average achievement in **5** countries, compared to **12** countries for girls.
- Among the **34** countries, there was no average achievement difference between boys and girls in **14** countries in 2011 and **17** countries in 2015.

Trends 1995-2015: 16 Countries

- In 1995, boys had higher average achievement than girls in almost all countries **(15 of 16)**, with an average difference of **21** points. There were only two countries with no achievement difference.
- In 2015, boys had higher average achievement than girls in only **3** countries, with an average difference of **11** points. There was no achievement difference in **13** countries.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.
http://timss2015.org/download-center/

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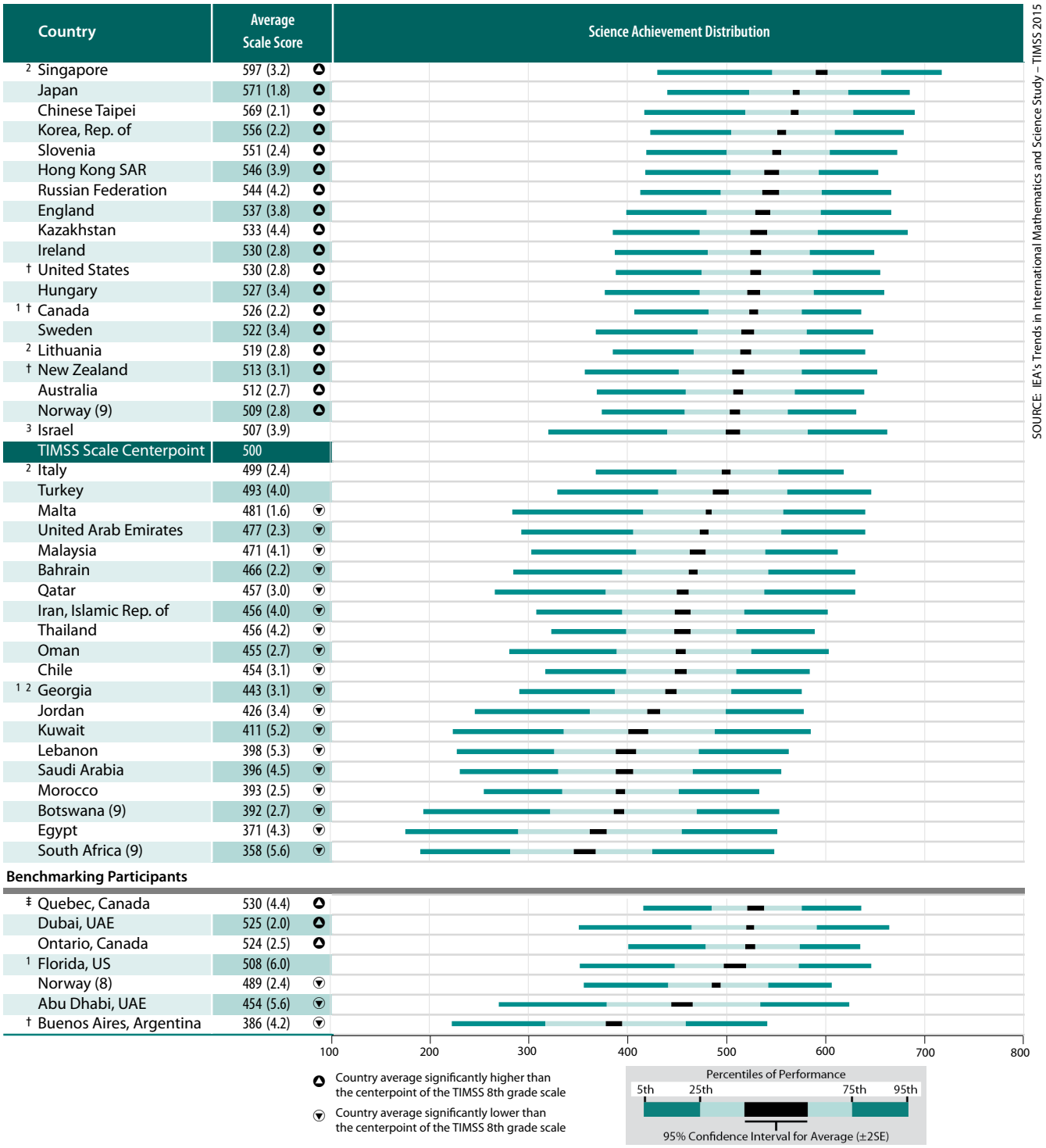
Exhibit 1.2: Distribution of Science Achievement



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

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.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

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

Exhibit 1.4: Multiple Comparisons of Average Science Achievement

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Singapore	Japan	Chinese Taipei	Korea, Rep. of	Slovenia	Hong Kong SAR	Russian Federation	England	Kazakhstan	Ireland	United States	Hungary	Canada	Sweden	Lithuania	New Zealand	Australia	Norway (9)	Israel	Italy	Turkey	Malta	United Arab Emirates	Malaysia	Bahrain	Qatar	Iran, Islamic Rep. of	Thailand	Oman	Chile
Singapore	597 (3.2)		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Japan	571 (1.8)	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Chinese Taipei	569 (2.1)	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Korea, Rep. of	556 (2.2)	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Slovenia	551 (2.4)	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hong Kong SAR	546 (3.9)	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Russian Federation	544 (4.2)	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
England	537 (3.8)	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Kazakhstan	533 (4.4)	▼	▼	▼	▼	▼	▼									▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ireland	530 (2.8)	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
United States	530 (2.8)	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hungary	527 (3.4)	▼	▼	▼	▼	▼	▼	▼									▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Canada	526 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Sweden	522 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Lithuania	519 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
New Zealand	513 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Australia	512 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Norway (9)	509 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Israel	507 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Italy	499 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲
Turkey	493 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲
Malta	481 (1.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲
United Arab Emirates	477 (2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				▲	▲	▲	▲	▲	▲
Malaysia	471 (4.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				▲	▲	▲	▲	▲
Bahrain	466 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲
Qatar	457 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Iran, Islamic Rep. of	456 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Thailand	456 (4.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Oman	455 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Chile	454 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Georgia	443 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Jordan	426 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Kuwait	411 (5.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Lebanon	398 (5.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Saudi Arabia	396 (4.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Morocco	393 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Botswana (9)	392 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Egypt	371 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
South Africa (9)	358 (5.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Benchmarking Participants																															
Quebec, Canada	530 (4.4)	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Dubai, UAE	525 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ontario, Canada	524 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Florida, US	508 (6.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Norway (8)	489 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲
Abu Dhabi, UAE	454 (5.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Buenos Aires, Argentina	386 (4.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

▲ Average achievement significantly higher than comparison country

▼ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.4: Multiple Comparisons of Average Science Achievement (Continued)

Country	Average Scale Score	Georgia	Jordan	Kuwait	Lebanon	Saudi Arabia	Morocco	Botswana (9)	Egypt	South Africa (9)	**Benchmarking Participants**	Quebec, Canada	Dubai, UAE	Ontario, Canada	Florida, US	Norway (8)	Abu Dhabi, UAE	Buenos Aires, Argentina
Singapore	597 (3.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▲	▲	▲	▲	▲	▲	▲
Japan	571 (1.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▲	▲	▲	▲	▲	▲	▲
Chinese Taipei	569 (2.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▲	▲	▲	▲	▲	▲	▲
Korea, Rep. of	556 (2.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▲	▲	▲	▲	▲	▲	▲
Slovenia	551 (2.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▲	▲	▲	▲	▲	▲	▲
Hong Kong SAR	546 (3.9)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▲	▲	▲	▲	▲	▲	▲
Russian Federation	544 (4.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▲	▲	▲	▲	▲	▲	▲
England	537 (3.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲			▲	▲	▲	▲	▲	▲
Kazakhstan	533 (4.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲					▲	▲	▲	▲
Ireland	530 (2.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲					▲	▲	▲	▲
United States	530 (2.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲					▲	▲	▲	▲
Hungary	527 (3.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲					▲	▲	▲	▲
Canada	526 (2.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲					▲	▲	▲	▲
Sweden	522 (3.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲					▲	▲	▲	▲
Lithuania	519 (2.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼				▲	▲	▲
New Zealand	513 (3.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼		▲	▲	▲
Australia	512 (2.7)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼		▲	▲	▲
Norway (9)	509 (2.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼		▲	▲	▲
Israel	507 (3.9)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼		▲	▲	▲
Italy	499 (2.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼		▲	▲	▲
Turkey	493 (4.0)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼		▲	▲
Malta	481 (1.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▲	▲
United Arab Emirates	477 (2.3)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▲	▲
Malaysia	471 (4.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▲	▲
Bahrain	466 (2.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼		▲
Qatar	457 (3.0)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼		▲
Iran, Islamic Rep. of	456 (4.0)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼		▲
Thailand	456 (4.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼		▲
Oman	455 (2.7)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼		▲
Chile	454 (3.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼		▲
Georgia	443 (3.1)		▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼		▲
Jordan	426 (3.4)	▼		▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▼	▲
Kuwait	411 (5.2)	▼	▼			▲	▲	▲	▲	▲		▼	▼	▼	▼	▼	▼	▲
Lebanon	398 (5.3)	▼	▼						▲	▲		▼	▼	▼	▼	▼	▼	
Saudi Arabia	396 (4.5)	▼	▼	▼					▲	▲		▼	▼	▼	▼	▼	▼	
Morocco	393 (2.5)	▼	▼	▼					▲	▲		▼	▼	▼	▼	▼	▼	
Botswana (9)	392 (2.7)	▼	▼	▼					▲	▲		▼	▼	▼	▼	▼	▼	
Egypt	371 (4.3)	▼	▼	▼	▼	▼	▼	▼				▼	▼	▼	▼	▼	▼	▼
South Africa (9)	358 (5.6)	▼	▼	▼	▼	▼	▼	▼				▼	▼	▼	▼	▼	▼	▼
Benchmarking Participants																		
Quebec, Canada	530 (4.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲					▲	▲	▲	▲
Dubai, UAE	525 (2.0)	▲	▲	▲	▲	▲	▲	▲	▲	▲					▲	▲	▲	▲
Ontario, Canada	524 (2.5)	▲	▲	▲	▲	▲	▲	▲	▲	▲					▲	▲	▲	▲
Florida, US	508 (6.0)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼		▲	▲	▲
Norway (8)	489 (2.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼		▲	▲
Abu Dhabi, UAE	454 (5.6)		▲	▲	▲	▲	▲	▲	▲	▲		▼	▼	▼	▼	▼		▲
Buenos Aires, Argentina	386 (4.2)	▼	▼	▼					▲	▲		▼	▼	▼	▼	▼	▼	

▲ Average achievement significantly higher than comparison country

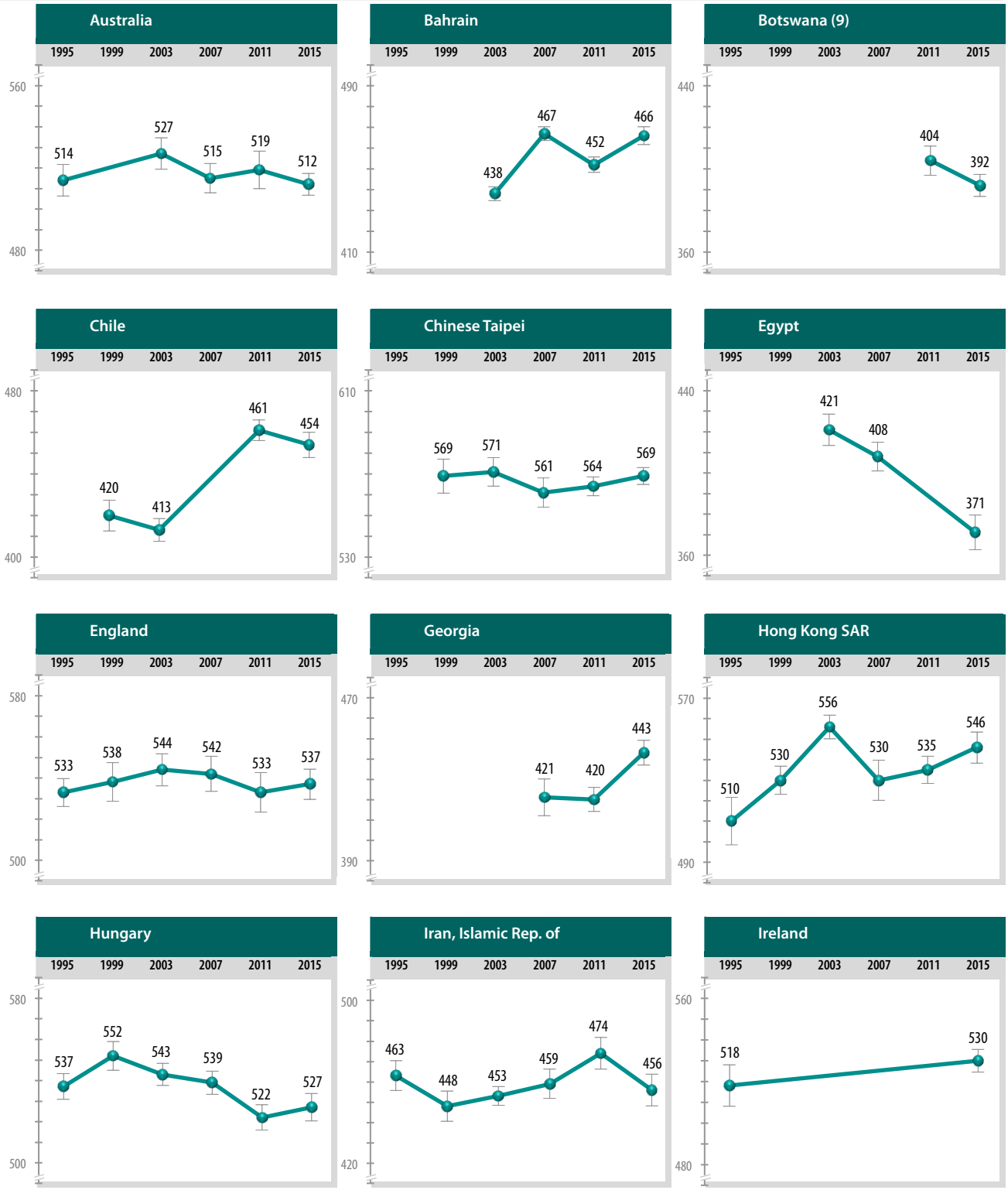
▼ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.6: Trends in Science Achievement

Displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The same scale is used for each country (10-point intervals), but the part of the scale shown differs according to each country's average achievement. The accompanying table (Exhibit 1.8) provides details, including statistical significance.



Scale interval is 10 points for each country, but the part of the scale shown differs according to each country's average achievement. The gray bars represent the 95% confidence interval.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.6: Trends in Science Achievement (Continued)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.6: Trends in Science Achievement (Continued)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.6: Trends in Science Achievement (Continued)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.8: Differences in Science Achievement Across Assessment Years

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Average Scale Score	Differences Between Years					Science Achievement Distribution
		2011	2007	2003	1999	1995	
Australia							
2015	512 (2.7)	-7	-3	-15 ▼		-2	
2011	519 (4.7)		4	-8		6	
2007	515 (3.6)			-12 ▼		1	
2003	527 (3.9)					13 ▲	
‡ 1995	514 (3.9)						
Bahrain							
2015	466 (2.2)	13 ▲	-2	28 ▲			
◗◖ 2011	452 (1.9)		-15 ▼	14 ▲			
2007	467 (1.7)			29 ▲			
2003	438 (1.7)						
Botswana (9)							
2015	392 (2.7)	-13 ▼					
2011	404 (3.6)						
Chile							
2015	454 (3.1)	-7		41 ▲	34 ▲		
2011	461 (2.5)			49 ▲	41 ▲		
2003	413 (2.8)				-8		
1999	420 (3.8)						
Chinese Taipei							
2015	569 (2.1)	6	8 ▲	-2	0		
2011	564 (2.3)		3	-7	-5		
2007	561 (3.6)			-10 ▼	-8		
2003	571 (3.5)				2		
1999	569 (4.2)						
Egypt							
2015	371 (4.3)		-37 ▼	-50 ▼			
2007	408 (3.6)			-13 ▼			
2003	421 (3.9)						
England							
2015	537 (3.8)	4	-5	-7	-2	3	
‡ 2011	533 (4.9)		-9	-11	-5	0	
† 2007	542 (4.4)			-2	3	8	
‡ 2003	544 (4.0)				5	11 ▲	
† 1999	538 (4.8)					5	
3 † 1995	533 (3.5)						
Georgia							
1 2 2015	443 (3.1)	23 ▲	22 ▲				
1 2011	420 (3.0)		-1				
1 2007	421 (4.6)						

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Trend results for Kuwait do not include private schools. Trend results for Lithuania do not include students taught in Polish or in Russian. South Africa (9) tested one year later.

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

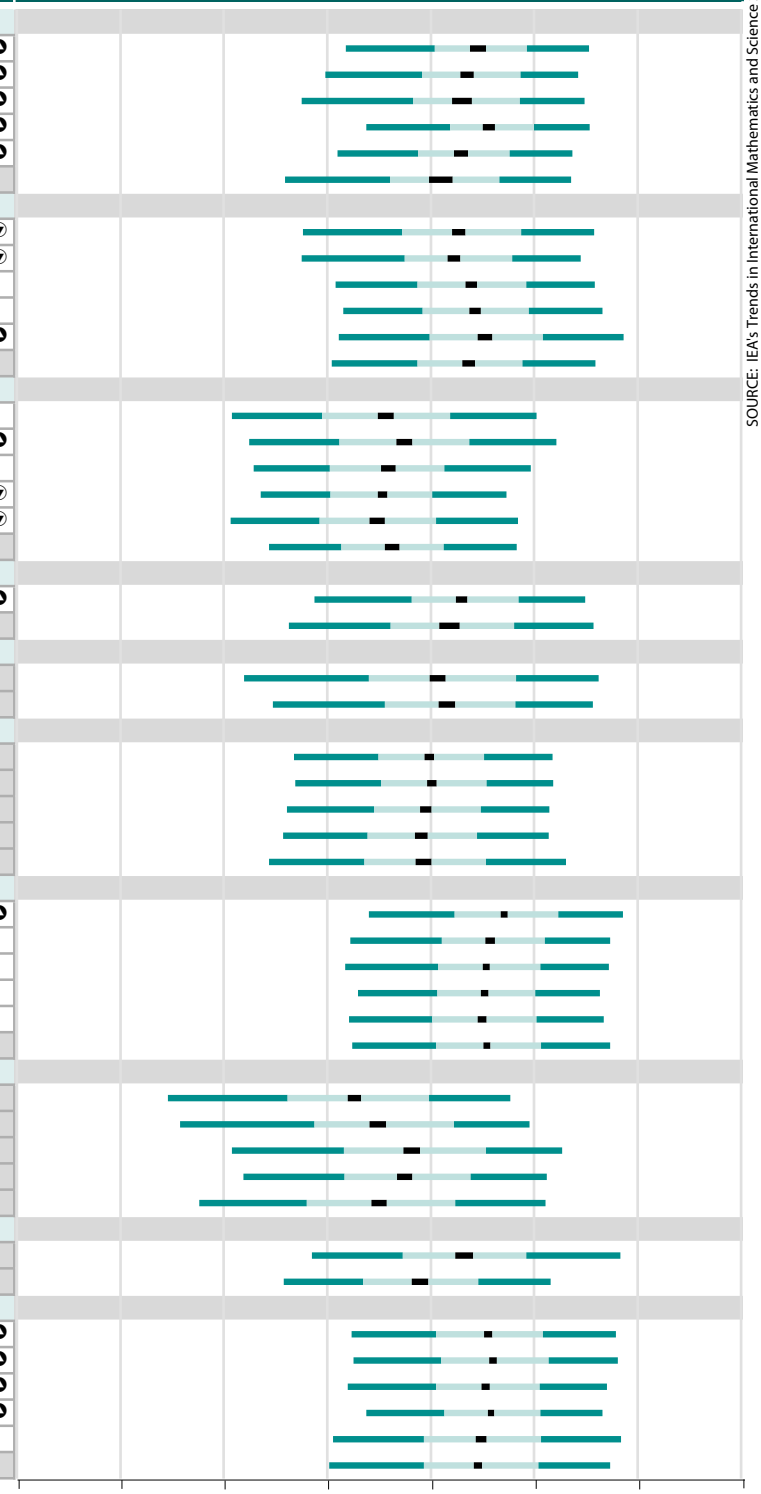
◗◖ Tested the same cohort of students as other countries, but later in the assessment year at the beginning of the next school year.

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

Exhibit 1.8: Differences in Science Achievement Across Assessment Years (Continued)

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Average Scale Score	Differences Between Years					Science Achievement Distribution
		2011	2007	2003	1999	1995	
Hong Kong SAR							
2015	546 (3.9)	11 ▲	16 ▲	-10 ▼	16 ▲	36 ▲	
2011	535 (3.4)		5	-21 ▼	6	25 ▲	
† 2007	530 (5.0)			-26 ▼	1	20 ▲	
† 2003	556 (3.0)				27 ▲	46 ▲	
† 1999	530 (3.5)					20 ▲	
1995	510 (5.9)						
Hungary							
2015	527 (3.4)	5	-12 ▼	-16 ▼	-25 ▼	-9 ▼	
2011	522 (3.1)		-17 ▼	-20 ▼	-30 ▼	-14 ▼	
2007	539 (2.9)			-4	-13 ▼	2	
2 2003	543 (2.8)				-10 ▼	6	
1999	552 (3.6)					16 ▲	
1995	537 (3.2)						
Iran, Islamic Rep. of							
2015	456 (4.0)	-18 ▼	-3	3	8	-6	
2011	474 (4.0)		15 ▲	21 ▲	26 ▲	12 ▲	
2007	459 (3.7)			6	11 ▲	-4	
2 2003	453 (2.4)				5	-9 ▼	
1999	448 (3.8)					-15 ▼	
1995	463 (3.7)						
Ireland							
2015	530 (2.8)					12 ▲	
1995	518 (5.1)						
Israel							
3 2015	507 (3.9)	-9					
3 2011	516 (4.0)						
Italy							
2 2015	499 (2.4)	-2	4	8 ▲	6		
2011	501 (2.4)		6	10 ▲	8		
2007	495 (2.9)			4	2		
2003	491 (3.1)				-2		
2 1999	493 (4.0)						
Japan							
2015	571 (1.8)	13 ▲	17 ▲	19 ▲	21 ▲	16 ▲	
2011	558 (2.4)		4	6	8 ▲	3	
2007	554 (1.8)			2	4	-1	
2003	552 (1.9)				3	-2	
1999	550 (2.1)					-5	
1995	554 (1.8)						
Jordan							
2015	426 (3.4)	-23 ▼	-56 ▼	-49 ▼	-24 ▼		
2011	449 (4.1)		-33 ▼	-26 ▼	-1		
2007	482 (4.0)			7	31 ▲		
2003	475 (3.7)				25 ▲		
1999	450 (3.8)						
Kazakhstan							
2015	533 (4.4)	43 ▲					
2011	490 (4.2)						
Korea, Rep. of							
2015	556 (2.2)	-5	2	-3	7 ▲	10 ▲	
2011	560 (2.0)		7 ▲	2	12 ▲	14 ▲	
2007	553 (2.0)			-5 ▼	4	7 ▲	
◆◆ 2003	558 (1.6)				10 ▲	13 ▲	
1999	549 (2.7)					3	
1995	546 (2.1)						



▲ More recent year significantly higher

▼ More recent year significantly lower

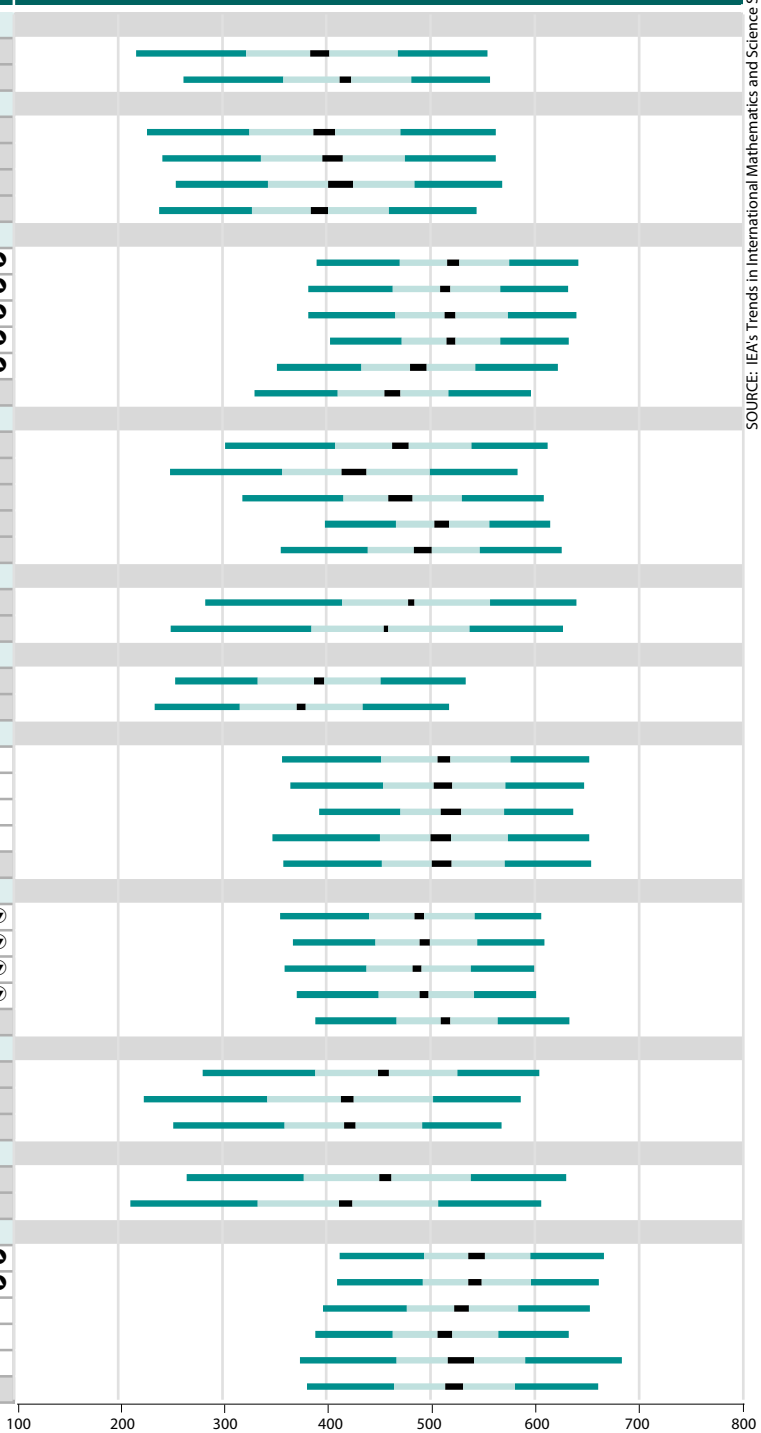
Percentiles of Performance
5th 25th 75th 95th
95% Confidence Interval for Average (±2SE)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.8: Differences in Science Achievement Across Assessment Years (Continued)

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Average Scale Score	Differences Between Years 2011	2007	2003	1999	1995
Kuwait						
2015	394 (4.8)		-24 ▼			
◆◆ 2007	418 (2.8)					
Lebanon						
2015	398 (5.3)	-8	-15	5		
2011	406 (5.0)		-8	13		
2007	414 (6.0)			20 ▲		
2003	393 (4.2)					
Lithuania						
2 2015	522 (3.0)	8 ▲	3	3	34 ▲	58 ▲
1 2011	514 (2.5)		-5	-6	26 ▲	50 ▲
1 2007	519 (2.6)			-1	30 ▲	55 ▲
1 2003	519 (2.2)				31 ▲	56 ▲
1 ◆◆ 1999	488 (4.1)					25 ▲
1 2 1995	464 (4.0)					
Malaysia						
2015	471 (4.1)	44 ▲	0	-40 ▼	-22 ▼	
2011	426 (6.2)		-44 ▼	-84 ▼	-66 ▼	
2007	471 (6.0)			-40 ▼	-22 ▼	
2003	510 (3.6)				18 ▲	
1999	492 (4.3)					
Malta						
2015	481 (1.6)		24 ▲			
2007	457 (1.2)					
Morocco						
2015	393 (2.5)	17 ▲				
2011	376 (2.2)					
New Zealand						
† 2015	513 (3.1)	1		-7	3	2
2011	512 (4.6)			-8	2	1
2003	520 (5.0)				10	9
1999	510 (5.1)					-1
1995	511 (4.9)					
Norway (8)						
2015	489 (2.4)	-5	2	-5		-25 ▼
2011	494 (2.6)		8 ▲	1		-20 ▼
2007	487 (2.2)			-7 ▼		-28 ▼
2003	494 (2.2)					-21 ▼
1995	514 (2.4)					
Oman						
2015	455 (2.7)	35 ▲	32 ▲			
2011	420 (3.2)		-3			
2007	423 (2.9)					
Qatar						
2015	457 (3.0)	38 ▲				
2011	419 (3.2)					
Russian Federation						
2015	544 (4.2)	2	15 ▲	30 ▲	15	22 ▲
2 2011	542 (3.3)		13 ▲	29 ▲	13	20 ▲
2007	530 (3.7)			16 ▲	0	7
2003	514 (3.6)				-16 ▼	-9
1999	529 (6.4)					7
2 1995	523 (4.4)					



▲ More recent year significantly higher

▼ More recent year significantly lower

Percentiles of Performance
5th 25th 75th 95th
95% Confidence Interval for Average (±2SE)

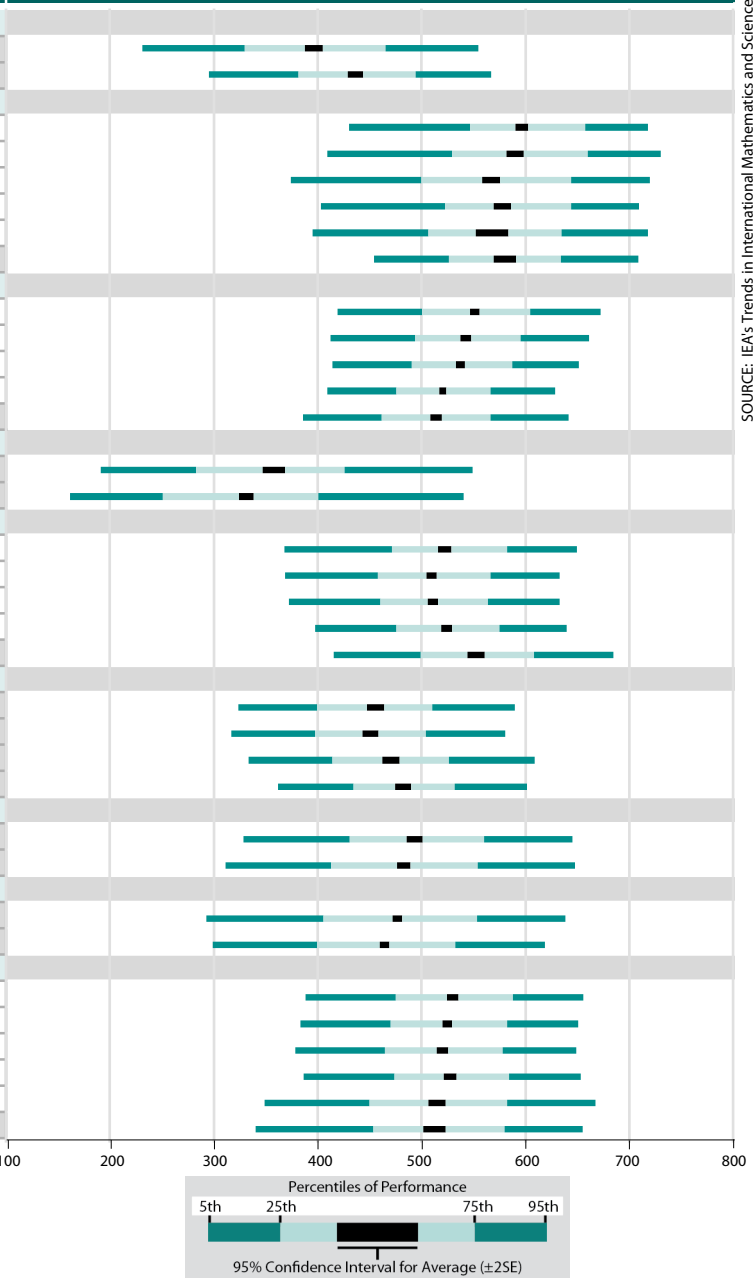
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.8: Differences in Science Achievement Across Assessment Years (Continued)

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Average Scale Score	Differences Between Years 2011	2007	2003	1999	1995
Saudi Arabia						
2015	396 (4.5)	-40 ▼				
2011	436 (3.8)					
Singapore						
[2] 2015	597 (3.2)	7	29 ▲	19 ▲	29 ▲	16 ▲
[2] 2011	590 (4.3)		23 ▲	12 ▲	22 ▲	10
2007	567 (4.4)			-11	-1	-13
2003	578 (4.2)				10	-3
1999	568 (8.0)					-12
1995	580 (5.6)					
Slovenia						
2015	551 (2.4)	8 ▲	14 ▲	31 ▲		37 ▲
2011	543 (2.6)		5	22 ▲		29 ▲
2007	538 (2.2)			17 ▲		24 ▲
2003	520 (1.9)					7 ▲
1995	514 (2.8)					
South Africa (9)						
2015	358 (5.6)	26 ▲				
ψ 2011	332 (3.6)					
Sweden						
2015	522 (3.4)	13 ▲	12 ▲	-2		-30 ▼
2011	509 (2.6)		-1	-15 ▼		-43 ▼
2007	511 (2.5)			-14 ▼		-42 ▼
2003	524 (2.7)					-28 ▼
1995	553 (4.3)					
Thailand						
2015	456 (4.2)	5	-15 ▼		-26 ▼	
2011	451 (4.0)		-20 ▼		-31 ▼	
2007	471 (4.3)				-12 ▼	
1999	482 (3.9)					
Turkey						
2015	493 (4.0)	10 ▲				
2011	483 (3.4)					
United Arab Emirates						
2015	477 (2.3)	12 ▲				
2011	465 (2.4)					
United States						
† 2015	530 (2.8)	5	10 ▲	3	15 ▲	17 ▲
[2] 2011	525 (2.4)		5	-3	10	12 ▲
[2] † 2007	520 (2.9)			-7	5	7
‡ 2003	527 (3.2)				12 ▲	15 ▲
1999	515 (4.4)					2
† 1995	513 (5.5)					

Science Achievement Distribution



▲ More recent year significantly higher

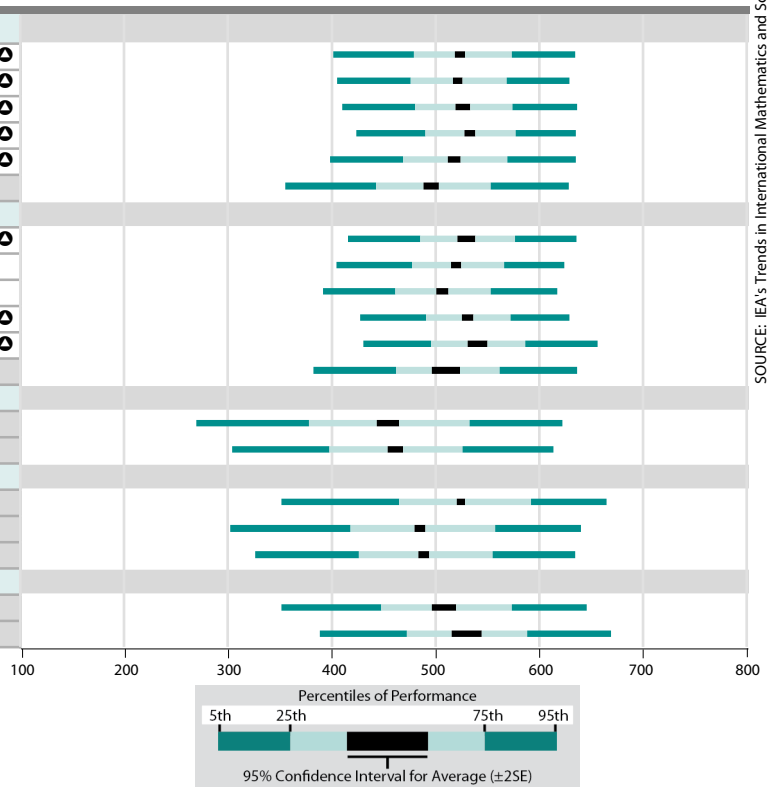
▼ More recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.8: Differences in Science Achievement Across Assessment Years (Continued)

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Average Scale Score	Differences Between Years					Science Achievement Distribution
		2011	2007	2003	1999	1995	
Benchmarking Participants							
Ontario, Canada							
2015	524 (2.5)	3	-2	-9 ▼	6	28 ▲	
[2] 2011	521 (2.4)		-5	-12 ▼	3	25 ▲	
[2] 2007	526 (3.6)			-7	8	30 ▲	
[2] 2003	533 (2.7)				15 ▲	37 ▲	
1999	518 (3.1)					22 ▲	
1995	496 (3.8)						
Quebec, Canada							
‡ 2015	530 (4.4)	10	23 ▲	-1	-11	20 ▲	
2011	520 (2.6)		13 ▲	-11 ▼	-21 ▼	10	
[3] 2007	507 (3.0)			-24 ▼	-34 ▼	-3	
2003	531 (3.0)				-9	21 ▲	
1999	540 (4.9)					30 ▲	
1995	510 (7.0)						
Abu Dhabi, UAE							
2015	454 (5.6)	-7					
2011	461 (3.9)						
Dubai, UAE							
2015	525 (2.0)	40 ▲	36 ▲				
2011	485 (2.6)		-4				
⧓ ‡ 2007	489 (2.7)						
Florida, US							
[1] 2015	508 (6.0)	-22 ▼					
[1 2] 2011	530 (7.4)						



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.9: Relative Achievement of 2011 Fourth Grade Cohort as Eighth Grade Students in 2015 – Countries Assessed Both Grades in Both Assessment Years

Follow the green arrow pointing diagonally downwards to compare relative performance among the TIMSS countries at the fourth grade in 2011 (upper-left panel) to relative performance at the eighth grade in 2015 (lower-right panel).

2011 - Fourth Grade

Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Korea, Rep. of	87 (2.1)	▲
Singapore	83 (3.4)	▲
Japan	59 (1.9)	▲
Russian Federation	52 (3.4)	▲
Chinese Taipei	52 (2.2)	▲
United States	44 (2.1)	▲
Hong Kong SAR	35 (3.7)	▲
Hungary	34 (3.7)	▲
Sweden	33 (2.8)	▲
England	29 (3.0)	▲
Italy	24 (2.7)	▲
Slovenia	20 (2.6)	▲
Australia	16 (2.9)	▲
Lithuania	15 (2.4)	▲
New Zealand	-3 (2.4)	
Kazakhstan	-5 (5.1)	
Norway (4)	-6 (2.5)	▼
Chile	-20 (2.5)	▼
Turkey	-37 (4.7)	▼
Georgia	-45 (3.9)	▼
Iran, Islamic Rep. of	-47 (3.8)	▼
Bahrain	-51 (3.5)	▼
Saudi Arabia	-71 (5.5)	▼
United Arab Emirates	-72 (2.5)	▼
Qatar	-106 (4.3)	▼
Oman	-123 (4.3)	▼
Morocco	-236 (4.4)	▼

2015 - Fourth Grade

Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Singapore	90 (3.7)	▲
Korea, Rep. of	89 (2.0)	▲
Japan	69 (1.8)	▲
Russian Federation	67 (3.2)	▲
Hong Kong SAR	57 (2.9)	▲
Chinese Taipei	55 (1.8)	▲
Kazakhstan	50 (4.4)	▲
United States	46 (2.2)	▲
Slovenia	43 (2.4)	▲
Hungary	42 (3.3)	▲
Sweden	40 (3.6)	▲
England	36 (2.4)	▲
Lithuania	30 (2.7)	▲
Australia	24 (2.9)	▲
Italy	16 (2.6)	▲
New Zealand	6 (2.7)	▲
Norway (4)	-7 (2.2)	▼
Turkey	-17 (3.3)	▼
Chile	-22 (2.7)	▼
Bahrain	-41 (2.6)	▼
Georgia	-49 (3.7)	▼
United Arab Emirates	-49 (2.8)	▼
Qatar	-64 (4.1)	▼
Oman	-69 (3.1)	▼
Iran, Islamic Rep. of	-79 (4.0)	▼
Saudi Arabia	-110 (4.9)	▼
Morocco	-148 (4.7)	▼

2011 - Eighth Grade

Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Singapore	90 (4.3)	▲
Chinese Taipei	64 (2.3)	▲
Korea, Rep. of	60 (2.0)	▲
Japan	58 (2.4)	▲
Slovenia	43 (2.6)	▲
Russian Federation	42 (3.3)	▲
Hong Kong SAR	35 (3.4)	▲
England	33 (4.9)	▲
United States	25 (2.4)	▲
Hungary	22 (3.1)	▲
Australia	19 (4.7)	▲
Lithuania	14 (2.5)	▲
New Zealand	12 (4.6)	▲
Sweden	9 (2.6)	▲
Italy	1 (2.4)	
Norway (8)	-6 (2.6)	▼
Kazakhstan	-10 (4.2)	▼
Turkey	-17 (3.4)	▼
Iran, Islamic Rep. of	-26 (4.0)	▼
United Arab Emirates	-35 (2.4)	▼
Chile	-39 (2.5)	▼
Bahrain	-48 (1.9)	▼
Saudi Arabia	-64 (3.8)	▼
Georgia	-80 (3.0)	▼
Oman	-80 (3.2)	▼
Qatar	-81 (3.2)	▼
Morocco	-124 (2.2)	▼

2015 - Eighth Grade

Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Singapore	97 (3.2)	▲
Japan	71 (1.8)	▲
Chinese Taipei	69 (2.1)	▲
Korea, Rep. of	56 (2.2)	▲
Slovenia	51 (2.4)	▲
Hong Kong SAR	46 (3.9)	▲
Russian Federation	44 (4.2)	▲
England	37 (3.8)	▲
Kazakhstan	33 (4.4)	▲
United States	30 (2.8)	▲
Hungary	27 (3.4)	▲
Sweden	22 (3.4)	▲
Lithuania	22 (3.0)	▲
New Zealand	13 (3.1)	▲
Australia	12 (2.7)	▲
Italy	-1 (2.4)	
Turkey	-7 (4.0)	
Norway (8)	-11 (2.4)	▼
United Arab Emirates	-23 (2.3)	▼
Bahrain	-34 (2.2)	▼
Qatar	-43 (3.0)	▼
Iran, Islamic Rep. of	-44 (4.0)	▼
Oman	-45 (2.7)	▼
Chile	-46 (3.1)	▼
Georgia	-57 (3.1)	▼
Saudi Arabia	-104 (4.5)	▼
Morocco	-107 (2.5)	▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

▲ Country average significantly higher than the centerpoint of the TIMSS scale

▼ Country average significantly lower than the centerpoint of the TIMSS scale

Trend results for Lithuania do not include students taught in Polish or in Russian.

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

Exhibit 1.9: Relative Achievement of 2011 Fourth Grade Cohort as Eighth Grade Students in 2015 – Countries Assessed Both Grades in Both Assessment Years (Continued)

2011 - Fourth Grade

Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Benchmarking Participants		
Florida, US	45 (3.7)	▲
Ontario, Canada	28 (3.1)	▲
Quebec, Canada	16 (2.7)	▲
Dubai, UAE	-39 (2.5)	▼
Abu Dhabi, UAE	-89 (5.0)	▼

2015 - Fourth Grade

Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Benchmarking Participants		
Florida, US	49 (4.8)	▲
Ontario, Canada	30 (2.5)	▲
Quebec, Canada	25 (4.1)	▲
Dubai, UAE	18 (1.8)	▲
Abu Dhabi, UAE	-85 (5.6)	▼

2011 - Eighth Grade

Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Benchmarking Participants		
Florida, US	30 (7.4)	▲
Ontario, Canada	21 (2.4)	▲
Quebec, Canada	20 (2.6)	▲
Dubai, UAE	-15 (2.6)	▼
Abu Dhabi, UAE	-39 (3.9)	▼

2015 - Eighth Grade

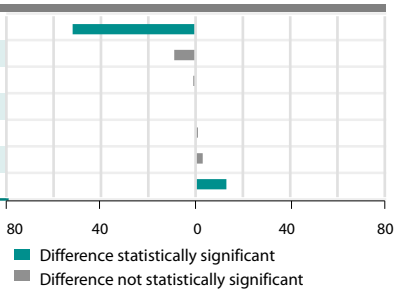
Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Benchmarking Participants		
Quebec, Canada	30 (4.4)	▲
Dubai, UAE	25 (2.0)	▲
Ontario, Canada	24 (2.5)	▲
Florida, US	8 (6.0)	
Abu Dhabi, UAE	-46 (5.6)	▼

▲ Country average significantly higher than the centerpoint of the TIMSS scale
▼ Country average significantly lower than the centerpoint of the TIMSS scale

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.11: Average Science Achievement by Gender

Country	Girls		Boys		Difference (Absolute Value)	Gender Difference	
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher	Boys Scored Higher
Saudi Arabia	51 (1.6)	423 (4.9)	49 (1.6)	368 (8.0)	55 (9.5)		
Bahrain	48 (0.9)	492 (3.2)	52 (0.9)	442 (3.4)	50 (5.0)		
Kuwait	50 (2.5)	434 (5.1)	50 (2.5)	387 (8.2)	47 (8.7)		
Oman	48 (1.7)	478 (2.9)	52 (1.7)	433 (3.6)	45 (4.4)		
Jordan	50 (2.6)	447 (4.0)	50 (2.6)	405 (5.3)	41 (6.7)		
United Arab Emirates	50 (2.5)	492 (3.5)	50 (2.5)	461 (4.4)	31 (6.7)		
Qatar	50 (3.0)	471 (3.6)	50 (3.0)	441 (5.2)	30 (6.0)		
Botswana (9)	51 (0.6)	403 (3.3)	49 (0.6)	381 (3.1)	22 (3.3)		
Thailand	54 (1.5)	465 (4.4)	46 (1.5)	445 (5.2)	20 (4.8)		
Turkey	48 (0.8)	503 (4.1)	52 (0.8)	484 (4.5)	19 (3.1)		
Egypt	53 (2.3)	377 (5.9)	47 (2.3)	364 (5.4)	13 (7.6)		
Lebanon	53 (1.6)	403 (4.9)	47 (1.6)	393 (6.7)	10 (4.7)		
Malaysia	50 (1.8)	476 (4.0)	50 (1.8)	466 (4.8)	10 (3.5)		
South Africa (9)	51 (1.1)	362 (6.7)	49 (1.1)	353 (5.5)	9 (5.1)		
Malta	49 (0.3)	485 (2.2)	51 (0.3)	477 (2.2)	8 (3.1)		
Morocco	46 (0.7)	397 (2.3)	54 (0.7)	390 (3.4)	7 (3.0)		
Kazakhstan	49 (0.9)	536 (5.2)	51 (0.9)	530 (4.5)	6 (3.9)		
[3] Israel	49 (1.2)	510 (4.1)	51 (1.2)	504 (4.7)	6 (4.1)		
Iran, Islamic Rep. of	48 (0.9)	459 (4.4)	52 (0.9)	454 (6.6)	5 (8.0)		
Slovenia	48 (0.7)	553 (2.8)	52 (0.7)	549 (2.7)	4 (2.7)		
Ireland	50 (1.1)	531 (2.8)	50 (1.1)	529 (3.9)	2 (3.7)		
England	51 (1.6)	537 (4.7)	49 (1.6)	536 (4.5)	1 (5.2)		
Japan	51 (1.0)	571 (2.2)	49 (1.0)	570 (2.5)	1 (3.1)		
[2] Lithuania	50 (0.8)	520 (3.3)	50 (0.8)	519 (3.4)	1 (3.7)		
† New Zealand	51 (2.0)	513 (3.2)	49 (2.0)	512 (4.3)	1 (4.2)		
[1 2] Georgia	47 (0.9)	444 (3.3)	53 (0.9)	443 (3.9)	1 (3.7)		
Sweden	48 (1.0)	523 (4.2)	52 (1.0)	522 (3.5)	1 (3.4)		
[2] Singapore	49 (0.6)	596 (3.3)	51 (0.6)	597 (4.0)	1 (3.7)		
Chinese Taipei	49 (0.8)	568 (2.3)	51 (0.8)	571 (2.6)	3 (2.6)		
Korea, Rep. of	47 (0.5)	554 (2.2)	53 (0.5)	557 (2.8)	3 (2.7)		
Norway (9)	50 (0.7)	507 (3.1)	50 (0.7)	511 (3.2)	4 (2.9)		
Russian Federation	49 (0.9)	542 (4.6)	51 (0.9)	546 (4.3)	4 (3.0)		
[1] † Canada	51 (1.0)	524 (2.2)	49 (1.0)	529 (2.7)	5 (2.3)		
Australia	51 (1.6)	510 (3.4)	49 (1.6)	515 (3.0)	5 (3.4)		
† United States	50 (0.6)	527 (3.1)	50 (0.6)	533 (3.0)	5 (2.0)		
[2] Italy	49 (0.8)	494 (3.0)	51 (0.8)	504 (2.6)	10 (2.7)		
Hong Kong SAR	47 (2.1)	540 (4.2)	53 (2.1)	551 (4.9)	10 (4.6)		
Chile	48 (1.8)	448 (3.6)	52 (1.8)	460 (4.1)	12 (4.8)		
Hungary	50 (0.9)	519 (3.9)	50 (0.9)	535 (3.6)	17 (3.2)		
International Avg.	50 (0.2)	491 (0.6)	50 (0.2)	481 (0.7)			
Benchmarking Participants							
Abu Dhabi, UAE	49 (4.4)	481 (6.6)	51 (4.4)	428 (8.2)	52 (11.5)		
Dubai, UAE	52 (3.7)	529 (3.6)	48 (3.7)	520 (4.7)	9 (7.4)		
Norway (8)	50 (0.7)	490 (3.1)	50 (0.7)	489 (2.7)	1 (3.3)		
† Buenos Aires, Argentina	51 (1.7)	386 (4.8)	49 (1.7)	386 (6.2)	0 (7.1)		
Ontario, Canada	50 (1.2)	523 (2.8)	50 (1.2)	524 (3.0)	1 (3.1)		
[1] Florida, US	48 (1.3)	507 (6.8)	52 (1.3)	510 (6.4)	3 (5.5)		
‡ Quebec, Canada	53 (1.9)	523 (4.4)	47 (1.9)	537 (5.5)	13 (4.8)		

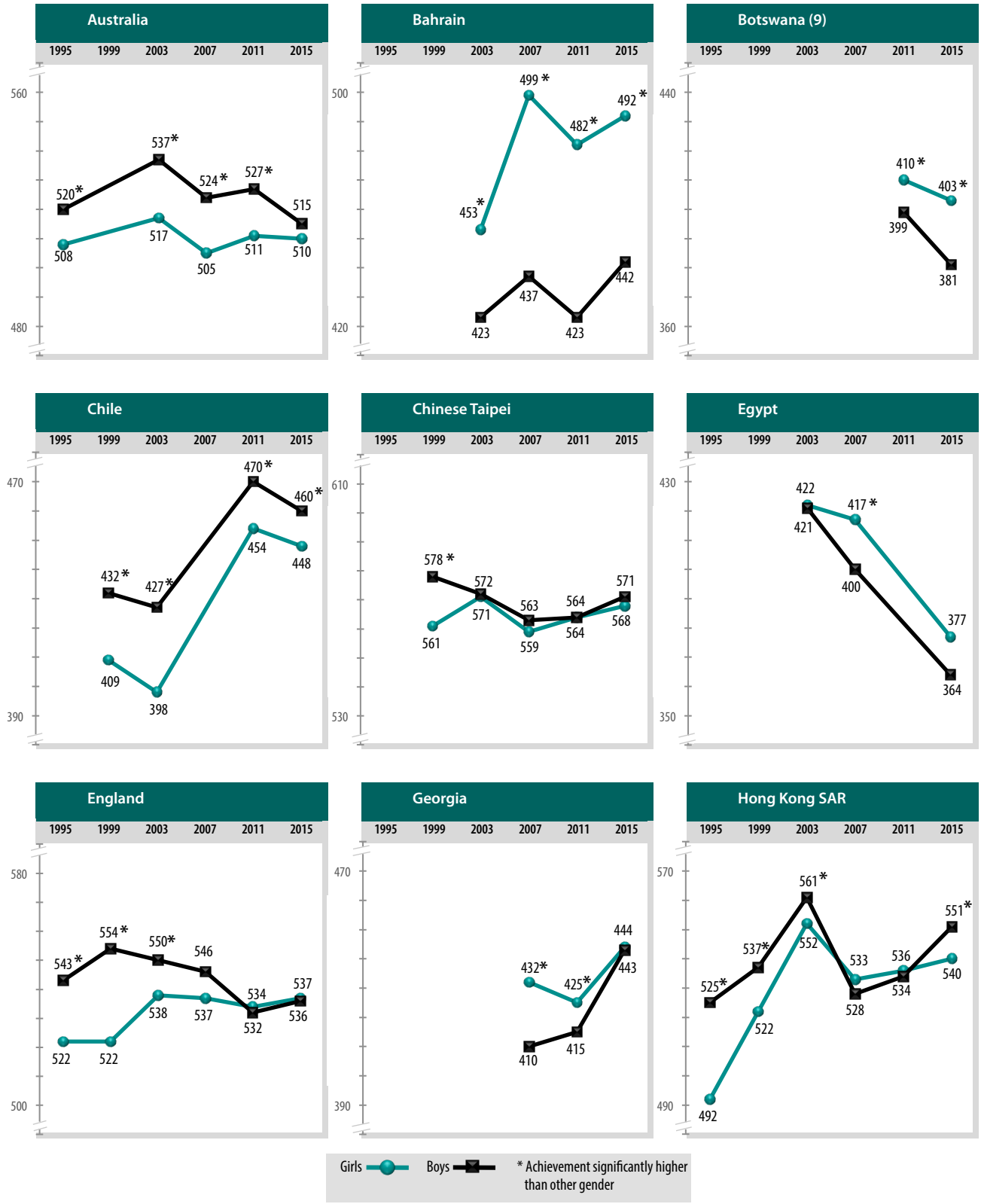


SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

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

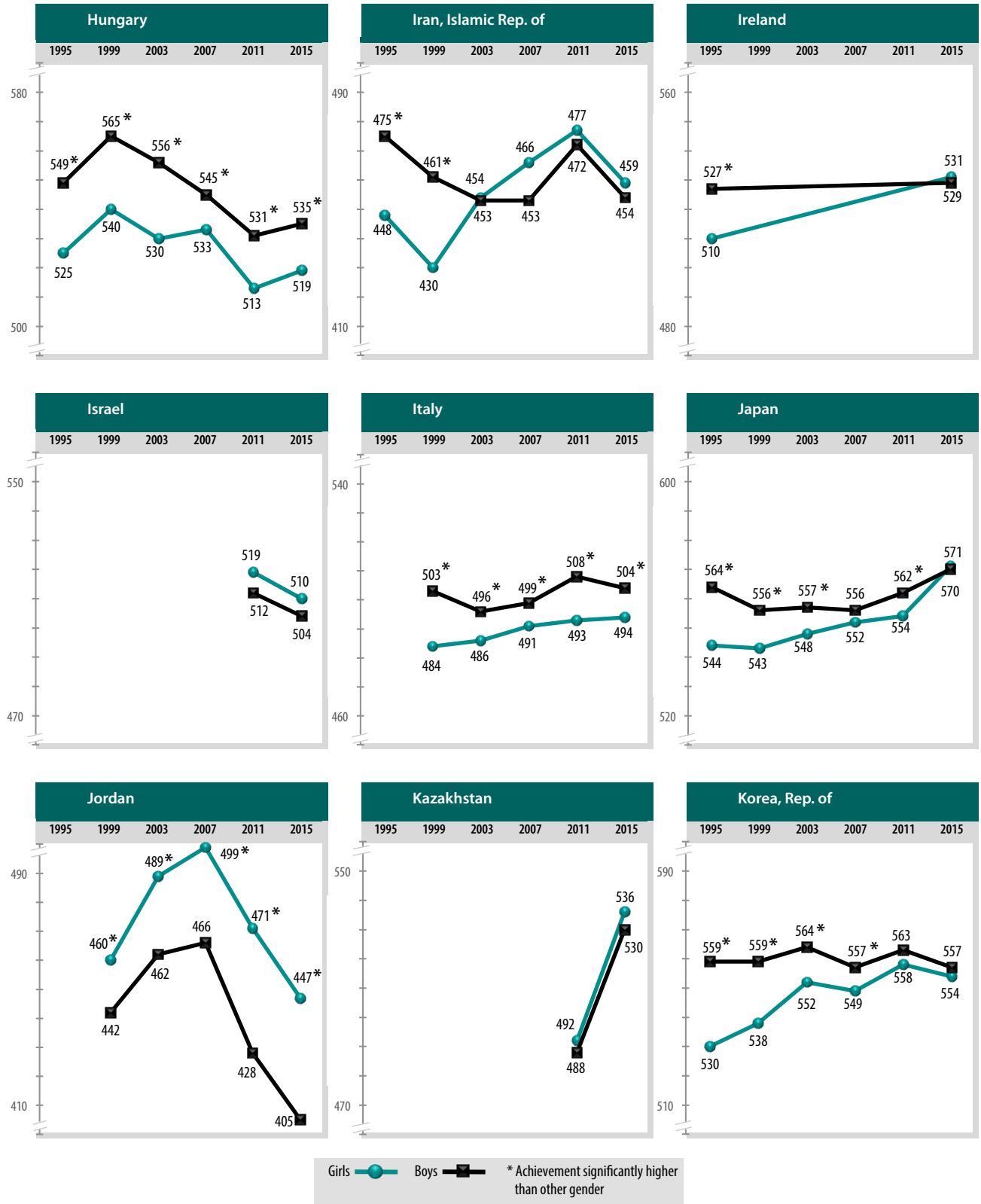
Exhibit 1.13: Trends in Science Achievement by Gender



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

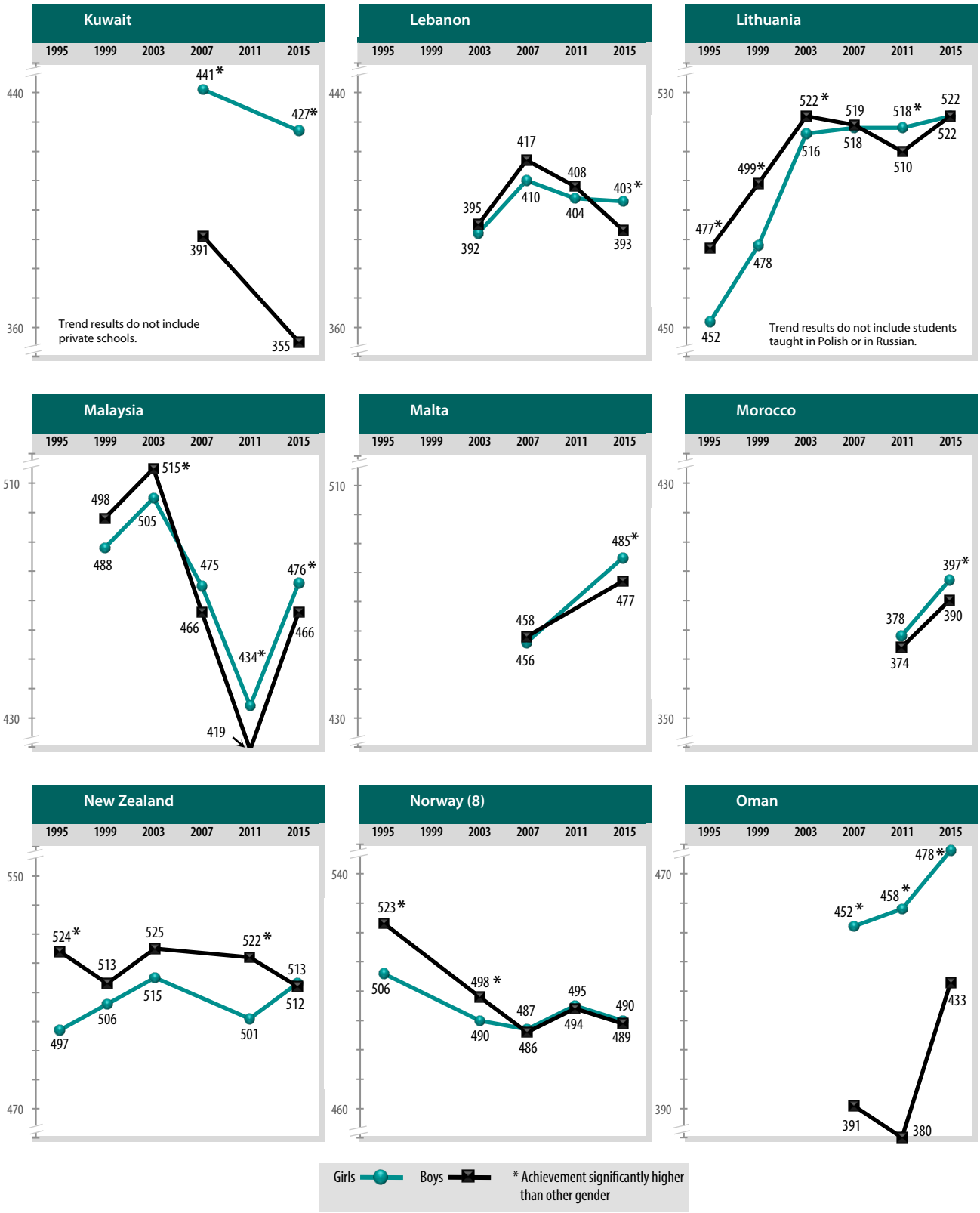
Scale interval is 10 points for each country, but the part of the scale shown differs according to each country's average achievement.

Exhibit 1.13: Trends in Science Achievement by Gender (Continued)



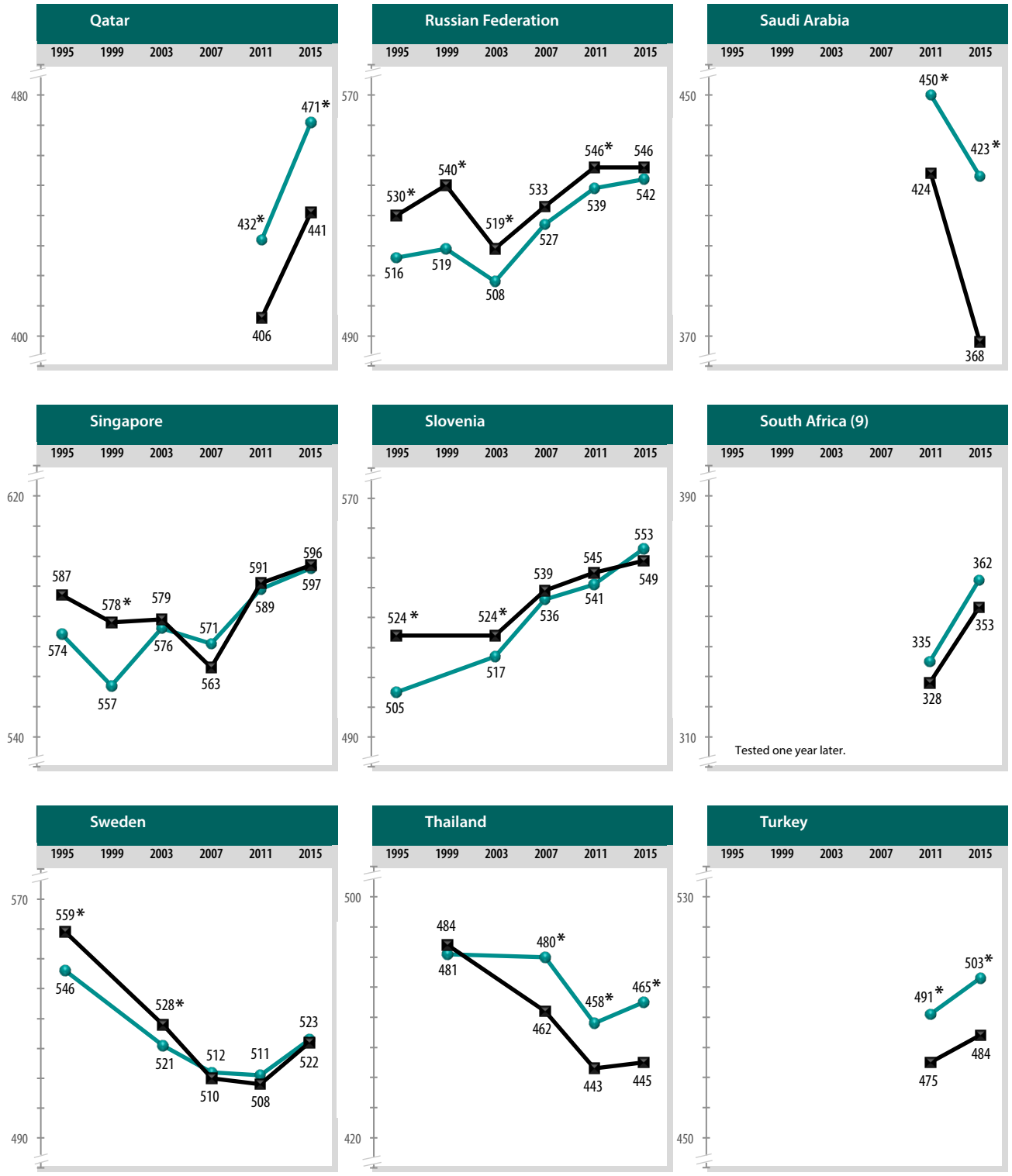
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.13: Trends in Science Achievement by Gender (Continued)



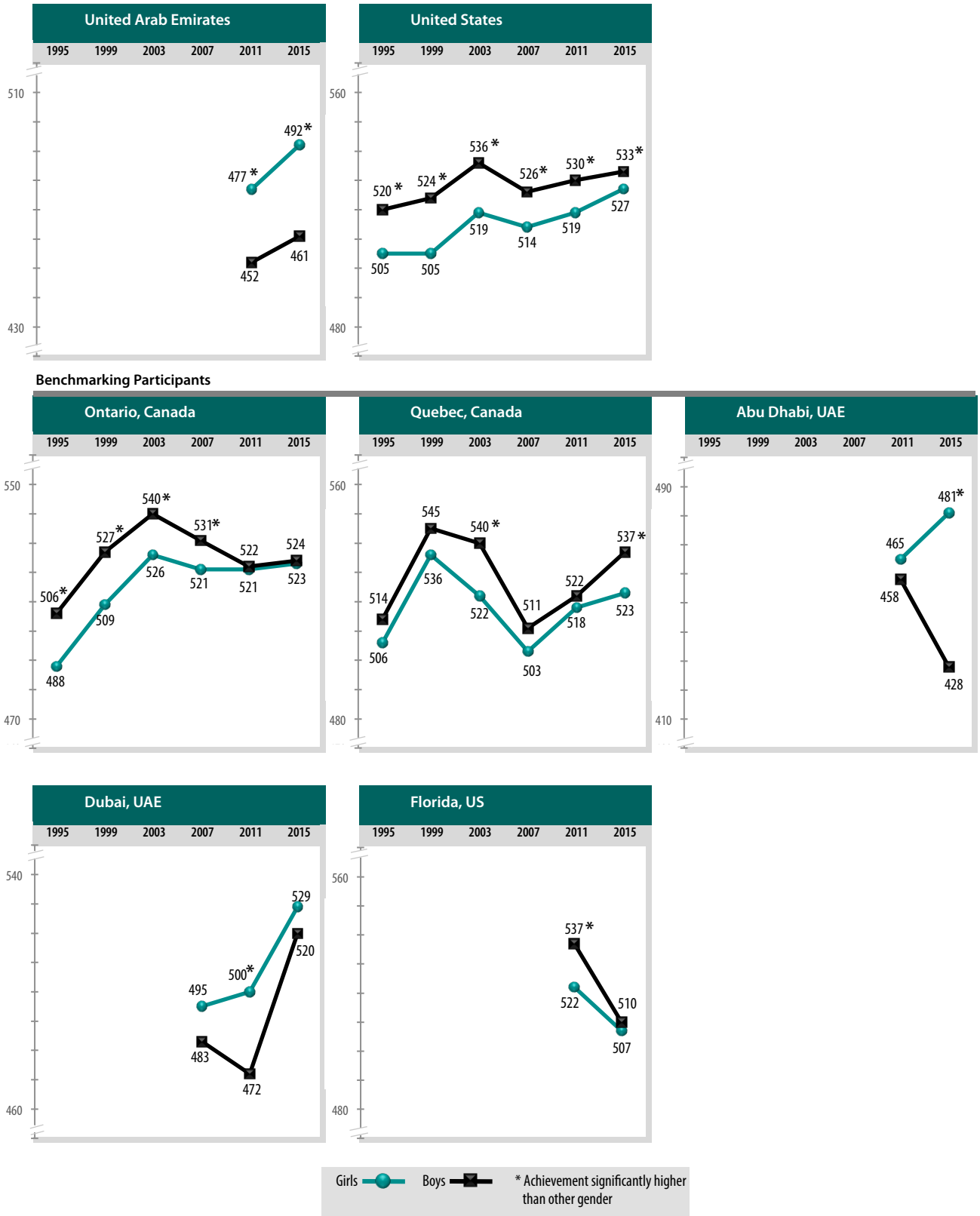
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.13: Trends in Science Achievement by Gender (Continued)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.13: Trends in Science Achievement by Gender (Continued)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

TIMSS 2015

CHAPTER 2: PERFORMANCE AT INTERNATIONAL BENCHMARKS

TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

IEA
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Achievement at TIMSS International Benchmarks

TIMSS describes achievement at four International Benchmarks along the science achievement scale: Advanced, High, Intermediate, and Low.

Percentage of Students Reaching Benchmarks

(averaged across countries)

Advanced Benchmark (625) — 7% — Students communicate understanding of complex concepts related to biology, chemistry, physics and Earth science in practical, abstract, and experimental contexts.

Highest percentages of students reached the Advanced Benchmark in Singapore (42%), Chinese Taipei (27%), and Japan (24%), but 10% or fewer did so in 27 of the 39 countries.

High Benchmark (550) — 29% — Students apply and communicate understanding of concepts from biology, chemistry, physics, and Earth science in everyday and abstract situations.

Intermediate Benchmark (475) — 64% — Students demonstrate and apply their knowledge of biology, chemistry, physics, and Earth science in various contexts.

Low Benchmark (400) — 84% — Students show some basic knowledge of biology, chemistry, physics, and Earth science.

On average, countries were able to educate 84% of their eighth grade students to a basic level of science achievement.

Trends at the TIMSS International Benchmarks

In general, there were more improvements across the International Benchmarks in 2015 than there were declines.

Trends 2011- 2015: 34 Countries

	Countries increased	Countries decreased
Advanced Benchmark (625)	10	0
High Benchmark (550)	12	3
Intermediate Benchmark (475)	12	4
Low Benchmark (400)	10	6

Students communicate understanding of complex concepts related to biology, chemistry, physics and Earth science in practical, abstract, and experimental contexts.

Students apply and communicate understanding of concepts from biology, chemistry, physics, and Earth science in everyday and abstract situations.

Students demonstrate and apply their knowledge of biology, chemistry, physics, and Earth science in various contexts.

Students show some basic knowledge of biology, chemistry, physics, and Earth science.

Trends 1995-2015: 16 Countries

	Countries increased	Countries decreased
Advanced Benchmark (625)	5	3
High Benchmark (550)	8	2
Intermediate Benchmark (475)	8	3
Low Benchmark (400)	8	5

Of the 16 countries with 20-year trends, 4 managed to improve achievement at all four benchmarks: Japan, Slovenia, Hong Kong SAR, and Lithuania.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.
http://timss2015.org/download-center/

IEA TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 2.8: Descriptions of the TIMSS 2015 International Benchmarks of Science Achievement

625 Advanced International Benchmark

Students communicate understanding of complex concepts related to biology, chemistry, physics and Earth science in practical, abstract, and experimental contexts. Students apply knowledge of cells and their functions as well as characteristics and life processes of organisms. They demonstrate understanding of diversity, adaptation, and natural selection among organisms, and of ecosystems and the interaction of organisms with their environment. Students apply knowledge of life cycles, and heredity in plants and animals. Students demonstrate knowledge of the composition and physical properties of matter and apply knowledge of chemical and physical change in practical and experimental contexts. Students communicate understanding of physical states and changes in matter in practical and experimental contexts, apply knowledge of energy transfer, and demonstrate knowledge of electricity and magnetism. Students communicate understanding of forces and pressure and demonstrate knowledge of light and sound in practical and abstract situations. Students communicate understanding of Earth's structure, physical features, and resources as well as of Earth in the solar system. Students show understanding of basic aspects of scientific investigation. They identify which variables to control in an experimental situation, compare information from several sources, combine information to predict and draw conclusions, and interpret information in diagrams, maps, graphs, and tables to solve problems. They provide written explanations to communicate scientific knowledge.

550 High International Benchmark

Students apply and communicate understanding of concepts from biology, chemistry, physics, and Earth science in everyday and abstract situations. Students apply knowledge of cells and their functions and of the characteristics and life processes of organisms. They communicate understanding of ecosystems and the interaction of organisms with their environment and apply some knowledge of human health related to nutrition and infectious disease. Students show some knowledge and understanding of the composition and properties of matter and chemical change. They apply basic knowledge of energy transformation and transfer and of light and sound in practical situations, and demonstrate understanding of simple electrical circuits and properties of magnets. Students apply their knowledge of forces and motion to everyday and abstract situations. They apply knowledge of Earth's physical features, processes, cycles, and history, and show some understanding of Earth's resources, their use, and conservation as well as some knowledge of the interaction between the Earth and the Moon. Students demonstrate some scientific inquiry skills, including selecting and justifying an appropriate experimental method. They combine and interpret information from various types of diagrams, graphs, and tables; select relevant information to analyze and draw conclusions; and provide short explanations conveying scientific knowledge.

475 Intermediate International Benchmark

Students demonstrate and apply their knowledge of biology, chemistry, physics, and Earth science in various contexts. Students demonstrate some knowledge of characteristics and life processes of animals and human health. They apply knowledge of ecosystems, the interaction of living things, and the adaptation of animals to their environments. Students apply some knowledge of the properties of matter. They also show knowledge of some aspects of force, motion, and energy. Students apply knowledge of Earth's processes, resources, and physical features. They interpret information from tables, graphs, and pictorial diagrams to draw conclusions, apply knowledge to practical situations, and communicate their understanding through brief descriptive responses.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

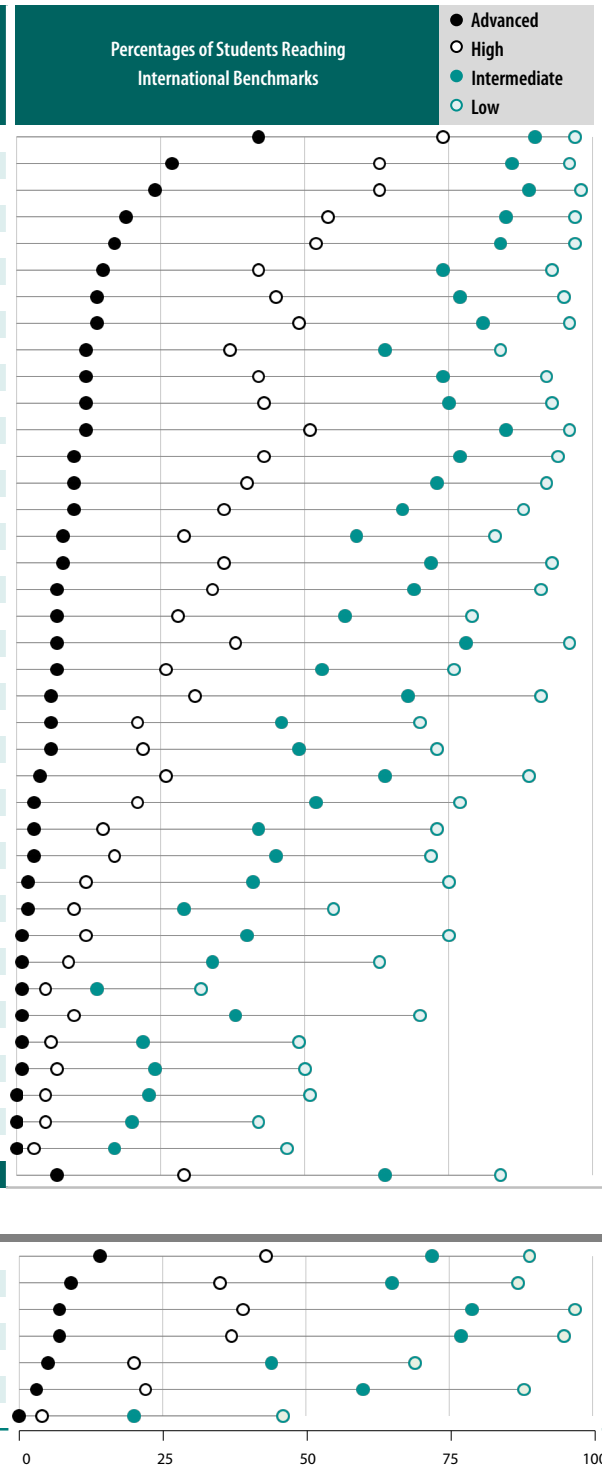
Exhibit 2.8: Descriptions of the TIMSS 2015 International Benchmarks of Science Achievement (Continued)

400 Low International Benchmark

Students show some basic knowledge of biology, chemistry, physics, and Earth science. Students apply basic knowledge of ecosystems and adaptation of animals to their environment, show knowledge of basic facts related to thermal and electrical conductivity and electromagnetism, and show knowledge of some basic Earth science facts. Students interpret simple pictorial diagrams and apply basic knowledge to practical situations.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.9: Performance at the International Benchmarks of Science Achievement



Country	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
[2] Singapore	42 (1.4)	74 (1.7)	90 (1.1)	97 (0.5)
Chinese Taipei	27 (1.1)	63 (1.1)	86 (0.6)	96 (0.3)
Japan	24 (1.0)	63 (1.1)	89 (0.6)	98 (0.2)
Korea, Rep. of	19 (1.0)	54 (1.2)	85 (0.8)	97 (0.4)
Slovenia	17 (1.0)	52 (1.3)	84 (1.0)	97 (0.4)
Kazakhstan	15 (1.5)	42 (2.2)	74 (1.8)	93 (0.8)
England	14 (1.2)	45 (2.1)	77 (1.9)	95 (0.8)
Russian Federation	14 (1.2)	49 (2.2)	81 (1.8)	96 (0.6)
[3] Israel	12 (1.0)	37 (1.6)	64 (1.7)	84 (1.2)
Hungary	12 (1.1)	42 (1.6)	74 (1.7)	92 (0.9)
† United States	12 (0.9)	43 (1.4)	75 (1.2)	93 (0.7)
Hong Kong SAR	12 (1.3)	51 (2.1)	85 (1.5)	96 (0.8)
Ireland	10 (0.7)	43 (1.4)	77 (1.3)	94 (0.9)
Sweden	10 (1.0)	40 (1.8)	73 (1.6)	92 (1.0)
† New Zealand	10 (0.9)	36 (1.3)	67 (1.5)	88 (1.0)
Turkey	8 (0.9)	29 (1.7)	59 (1.6)	83 (1.1)
[2] Lithuania	8 (0.9)	36 (1.4)	72 (1.4)	93 (0.8)
Australia	7 (0.6)	34 (1.2)	69 (1.3)	91 (0.8)
Malta	7 (0.6)	28 (0.7)	57 (0.8)	79 (0.7)
[1] † Canada	7 (0.5)	38 (1.4)	78 (1.1)	96 (0.5)
United Arab Emirates	7 (0.5)	26 (0.9)	53 (0.9)	76 (0.8)
Norway (9)	6 (0.6)	31 (1.3)	68 (1.4)	91 (0.9)
Qatar	6 (0.6)	21 (0.9)	46 (1.2)	70 (1.3)
Bahrain	6 (0.5)	22 (0.7)	49 (1.0)	73 (1.1)
[2] Italy	4 (0.5)	26 (1.3)	64 (1.2)	89 (1.1)
Malaysia	3 (0.3)	21 (1.2)	52 (1.9)	77 (1.9)
Iran, Islamic Rep. of	3 (0.7)	15 (1.5)	42 (1.9)	73 (1.5)
Oman	3 (0.2)	17 (0.8)	45 (1.0)	72 (1.2)
Thailand	2 (0.6)	12 (1.5)	41 (2.3)	75 (1.8)
Kuwait	2 (0.6)	10 (1.3)	29 (1.7)	55 (1.9)
Chile	1 (0.3)	12 (0.9)	40 (1.6)	75 (1.6)
Jordan	1 (0.3)	9 (0.7)	34 (1.2)	63 (1.4)
South Africa (9)	1 (0.4)	5 (1.0)	14 (1.8)	32 (2.3)
[1] [2] Georgia	1 (0.3)	10 (0.9)	38 (1.4)	70 (1.6)
Saudi Arabia	1 (0.3)	6 (0.9)	22 (1.5)	49 (1.9)
Lebanon	1 (0.2)	7 (0.8)	24 (1.7)	50 (2.2)
Botswana (9)	0 (0.1)	5 (0.4)	23 (0.9)	51 (1.1)
Egypt	0 (0.1)	5 (0.6)	20 (1.2)	42 (1.6)
Morocco	0 (0.1)	3 (0.3)	17 (0.8)	47 (1.2)
International Median	7	29	64	84
Benchmarking Participants				
Dubai, UAE	14 (1.0)	43 (1.3)	72 (0.8)	89 (0.6)
[1] Florida, US	9 (1.3)	35 (2.6)	65 (2.9)	87 (1.6)
‡ Quebec, Canada	7 (1.1)	39 (2.4)	79 (2.4)	97 (1.0)
Ontario, Canada	7 (0.7)	37 (1.6)	77 (1.4)	95 (0.7)
Abu Dhabi, UAE	5 (0.8)	20 (1.8)	44 (2.0)	69 (1.9)
Norway (8)	3 (0.4)	22 (1.2)	60 (1.4)	88 (0.9)
† Buenos Aires, Argentina	0 (0.1)	4 (0.5)	20 (1.4)	46 (1.9)

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.10: Percentages of Students Reaching the International Benchmarks of Science Achievement Across Assessment Years

Country	Advanced International Benchmark (625)						High International Benchmark (550)					
	Percent of Students						Percent of Students					
	2015	2011	2007	2003	1999	1995	2015	2011	2007	2003	1999	1995
Singapore	42	40	32 ▲	33 ▲	29 ▲	29 ▲	74	69	61 ▲	66 ▲	60 ▲	64 ▲
Chinese Taipei	27	24	25	26	27		63	60 ▲	60	63	61	
Japan	24	18 ▲	17 ▲	15 ▲	16 ▲	18 ▲	63	57 ▲	55 ▲	53 ▲	52 ▲	54 ▲
Korea, Rep. of	19	20	17	17	19	17	54	57	54	57	50 ▲	50 ▲
Slovenia	17	13 ▲	11 ▲	6 ▲		8 ▲	52	48	45 ▲	33 ▲		32 ▲
Kazakhstan	15	4 ▲					42	23 ▲				
England	14	14	17	15	17	15	45	44	48	48	45	43
Russian Federation	14	14	11 ▲	6 ▲	15	11	49	48	41 ▲	32 ▲	41 ▲	38 ▲
Israel	12	11					37	39				
Hungary	12	9 ▲	13	14	19 ▼	12	42	39	46 ▼	46 ▼	53 ▼	44
United States	12	10	10	11	12	11	43	40	38 ▲	41	37 ▲	38 ▲
Hong Kong SAR	12	9	10	13	7 ▲	7 ▲	51	47	45	58 ▼	40 ▲	33 ▲
Ireland	10					11	43					38
Sweden	10	6 ▲	6 ▲	8 ▲		19 ▼	40	33 ▲	32 ▲	38		52 ▼
New Zealand	10	9		7	10	9	36	34		35	35	34
Lithuania	8	6	8	6	5 ▲	2 ▲	37	33 ▲	36	34	22 ▲	14 ▲
Turkey	8	8					29	26				
Australia	7	11	8	9		10 ▼	34	35	33	40 ▼		36
Malta	7		5 ▲				28		21 ▲			
United Arab Emirates	7	4 ▲					26	19 ▲				
Qatar	6	3 ▲					21	14 ▲				
Bahrain	6	3 ▲	2 ▲	0 ▲			22	17 ▲	17 ▲	6 ▲		
Italy	4	4	4	4	6		26	27	24	23	26	
Malaysia	3	1 ▲	3	4	5		21	11 ▲	18	28 ▼	24	
Iran, Islamic Rep. of	3	5	2	1 ▲	1	1	15	21 ▼	14	9 ▲	11	11
Norway (8)	3	3	2	2		6 ▼	22	22	20	21		32 ▼
Oman	3	2 ▲	1 ▲				17	11 ▲	8 ▲			
Thailand	2	1	3		2		12	10	17 ▼		18 ▼	
Chile	1	1		1 ▲	1		12	12		5 ▲	7 ▲	
Jordan	1	2	5 ▼	3 ▼	4 ▼		9	15 ▼	26 ▼	21 ▼	17 ▼	
South Africa (9)	1	1					5	4				
Georgia	1	0	0 ▲				10	6 ▲	5 ▲			
Saudi Arabia	1	1					6	8 ▼				
Lebanon	1	1	1	0			7	7	8	4 ▲		
Kuwait	1		0				6		6			
Botswana (9)	0	1					5	6				
Egypt	0		1	1 ▼			5		7 ▼	10 ▼		
Morocco	0	0					3	2 ▲				
Benchmarking Participants												
Dubai, UAE	14	7 ▲	6 ▲				43	28 ▲	27 ▲			
Florida, US	9	13					35	42				
Quebec, Canada	7	5 ▲	4 ▲	6	10	7	39	34	27 ▲	39	43	30 ▲
Ontario, Canada	7	6	7	7	7	5	37	35	37	41	34	26 ▲
Abu Dhabi, UAE	5	4					20	17				

▲ 2015 percent significantly higher

▼ 2015 percent significantly lower

An empty cell indicates a country did not participate in that year's assessment.

Trend results for Kuwait do not include private schools. Trend results for Lithuania do not include students taught in Polish or Russian. South Africa (9) tested one year later.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.10: Percentages of Students Reaching the International Benchmarks of Science Achievement Across Assessment Years (Continued)

Country	Intermediate International Benchmark (475)						Low International Benchmark (400)					
	Percent of Students						Percent of Students					
	2015	2011	2007	2003	1999	1995	2015	2011	2007	2003	1999	1995
Singapore	90	87	80 ▲	85 ▲	84 ▲	91	97	96	93 ▲	95 ▲	95 ▲	99 ▼
Chinese Taipei	86	85	83 ▲	88	86		96	96	95 ▲	98 ▼	96	
Japan	89	86 ▲	85 ▲	86 ▲	84 ▲	85 ▲	98	97 ▲	96 ▲	98	97 ▲	97 ▲
Korea, Rep. of	85	86	85	88 ▼	81 ▲	81 ▲	97	97	97	98 ▼	96 ▲	95 ▲
Slovenia	84	82	81 ▲	75 ▲		69 ▲	97	96	97	96		93 ▲
Kazakhstan	74	58 ▲					93	86 ▲				
England	77	76	79	81	76	75	95	93	94	96	94	93 ▲
Russian Federation	81	81	76 ▲	70 ▲	73 ▲	71 ▲	96	96	95	93 ▲	92 ▲	92 ▲
Israel	64	69 ▼					84	88 ▼				
Hungary	74	75	80 ▼	82 ▼	83 ▼	80 ▼	92	92	96 ▼	97 ▼	96 ▼	95 ▼
United States	75	73	71 ▲	75	67 ▲	68 ▲	93	93	92	93	87 ▲	87 ▲
Hong Kong SAR	85	80 ▲	77 ▲	89 ▼	80 ▲	70 ▲	96	95	92 ▲	98	96	90 ▲
Ireland	77					70 ▲	94					90
Sweden	73	68 ▲	69	75		83 ▼	92	91	91	95 ▼		97 ▼
New Zealand	67	67		73 ▼	66	67	88	90		94 ▼	88	89
Lithuania	73	71	72	74	57 ▲	45 ▲	94	92	93	95	86 ▲	79 ▲
Turkey	59	54 ▲					83	79 ▲				
Australia	69	70	70	76 ▼		69	91	92	92	95 ▼		89
Malta	57		48 ▲				79		71 ▲			
United Arab Emirates	53	47 ▲					76	75				
Qatar	46	34 ▲					70	58 ▲				
Bahrain	49	44 ▲	49	33 ▲			73	70 ▲	78 ▼	70 ▲		
Italy	64	65	62	59 ▲	59 ▲		89	90	88	87	86 ▲	
Malaysia	52	34 ▲	50	71 ▼	59 ▼		77	62 ▲	80	95 ▼	87 ▼	
Iran, Islamic Rep. of	42	50 ▼	41	38	38	43	73	79 ▼	76	77	72	81 ▼
Norway (8)	60	62	58	63		72 ▼	88	90	87	91 ▼		94 ▼
Oman	45	34 ▲	32 ▲				72	59 ▲	61 ▲			
Thailand	41	39	48 ▼		54 ▼		75	74	80 ▼		87 ▼	
Chile	40	43		24 ▲	27 ▲		75	79 ▼		56 ▲	60 ▲	
Jordan	34	45 ▼	56 ▼	53 ▼	42 ▼		63	72 ▼	79 ▼	80 ▼	69 ▼	
South Africa (9)	14	11					32	25 ▲				
Georgia	38	28 ▲	27 ▲				70	62 ▲	61 ▲			
Saudi Arabia	22	33 ▼					49	68 ▼				
Lebanon	24	25	28	20			50	54	55	48		
Kuwait	23		28 ▼				49		60 ▼			
Botswana (9)	23	26					51	55 ▼				
Egypt	20		27 ▼	33 ▼			42		55 ▼	59 ▼		
Morocco	17	13 ▲					47	39 ▲				
Benchmarking Participants												
Dubai, UAE	72	57 ▲	58 ▲				89	79 ▲	82 ▲			
Florida, US	65	74					87	93 ▼				
Quebec, Canada	79	76	68 ▲	82	83	69 ▲	97	96	94 ▲	98	98	92
Ontario, Canada	77	76	77	81 ▼	72 ▲	61 ▲	95	96	96	97 ▼	95	88 ▲
Abu Dhabi, UAE	44	45					69	74 ▼				

▲ 2015 percent significantly higher

▼ 2015 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.11: Description of the TIMSS 2015 Low International Benchmark (400) of Science Achievement

400 Low International Benchmark

Summary

Students show some basic knowledge of biology, chemistry, physics, and Earth science. Students apply basic knowledge of ecosystems and adaptation of animals to their environment, show knowledge of basic facts related to thermal and electrical conductivity and electromagnetism, and show knowledge of some basic Earth science facts. Students interpret simple pictorial diagrams and apply basic knowledge to practical situations.

Students apply basic knowledge of ecosystems and adaptation. For example, they use a food web to recognize producers and organisms that eat only plants and state one reason why male penguins' behavior helps their eggs survive.

Students show some basic knowledge of thermal and electrical conductivity and electromagnetism by recognizing the best conductor of both heat and electricity in a list of materials and identifying objects that will be attracted by an electromagnet.

Students show knowledge of some basic Earth science facts. For example, they recognize, from a diagram, the role of pressure in an artesian well.

Students interpret simple pictorial diagrams and apply basic knowledge to practical situations.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.11.1: Low International Benchmark – Example Item 1

Country	Percent Correct	
Chinese Taipei	95 (0.8)	▲
[2] Singapore	94 (0.8)	▲
Thailand	93 (1.1)	▲
Korea, Rep. of	92 (1.0)	▲
Hong Kong SAR	92 (1.2)	▲
[3] Israel	90 (1.1)	▲
Malaysia	88 (1.2)	▲
Sweden	88 (1.6)	▲
Norway (9)	86 (1.4)	▲
Japan	86 (1.3)	▲
Jordan	86 (1.5)	▲
Russian Federation	84 (1.6)	▲
Egypt	84 (1.3)	▲
Turkey	84 (1.5)	▲
Iran, Islamic Rep. of	83 (1.5)	
Oman	83 (1.4)	
England	82 (1.5)	
Slovenia	82 (1.8)	
Bahrain	82 (1.8)	
Morocco	81 (1.0)	
United Arab Emirates	81 (0.9)	
Kazakhstan	81 (1.9)	
International Avg.	81 (0.3)	
Kuwait	80 (2.0)	
Hungary	80 (1.9)	
Qatar	79 (1.7)	
† United States	79 (1.1)	
[2] Italy	78 (2.0)	
Ireland	78 (1.7)	
Australia	77 (1.7)	▼
Chile	75 (1.9)	▼
Malta	75 (1.8)	▼
Saudi Arabia	74 (2.3)	▼
Botswana (9)	74 (1.7)	▼
† New Zealand	73 (1.8)	▼
[1] † Canada	70 (1.6)	▼
[2] Lithuania	69 (2.4)	▼
Lebanon	64 (2.7)	▼
South Africa (9)	63 (1.5)	▼
[1] [2] Georgia	54 (2.7)	▼

Content Domain: Chemistry
Cognitive Domain: Knowing
Description: Recognizes a material that best conducts both heat and electricity

Which of the following is the best conductor of both heat and electricity?

Ⓐ wood
Ⓑ plastic
● copper
Ⓓ glass

Country	Percent Correct	
Benchmarking Participants		
Dubai, UAE	85 (1.6)	▲
[1] Florida, US	80 (2.2)	
Abu Dhabi, UAE	79 (2.1)	
Norway (8)	75 (1.9)	▼
‡ Quebec, Canada	69 (3.0)	▼
Ontario, Canada	69 (2.3)	▼
† Buenos Aires, Argentina	59 (3.1)	▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

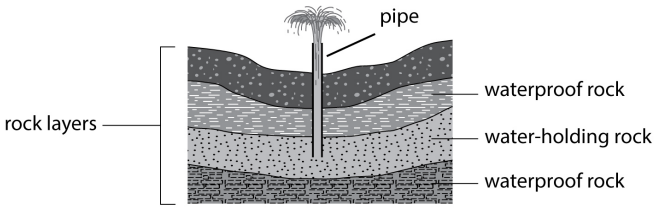
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.11.2: Low International Benchmark – Example Item 2

Country	Percent Correct
Hungary	95 (1.0) ▲
Kazakhstan	92 (1.1) ▲
Russian Federation	91 (1.4) ▲
England	91 (1.3) ▲
Chinese Taipei	91 (1.1) ▲
[2] Lithuania	91 (1.5) ▲
[2] Singapore	91 (1.0) ▲
Slovenia	90 (1.4) ▲
Ireland	90 (1.3) ▲
† United States	90 (0.9) ▲
[1] † Canada	89 (1.0) ▲
[2] Italy	88 (1.6) ▲
Australia	88 (1.0) ▲
Thailand	86 (1.3) ▲
Sweden	85 (1.7) ▲
[1] [2] Georgia	85 (1.8) ▲
Japan	85 (1.5) ▲
Korea, Rep. of	84 (1.3) ▲
Norway (9)	83 (1.7) ▲
Malta	83 (1.9)
† New Zealand	82 (1.6)
Turkey	82 (1.5)
Chile	81 (1.8)
[3] Israel	80 (1.5)
United Arab Emirates	80 (1.1)
International Avg.	**80 (0.3)**
Oman	79 (1.4)
Hong Kong SAR	78 (2.3)
Jordan	78 (1.4)
Iran, Islamic Rep. of	76 (1.6) ▼
Bahrain	75 (2.0) ▼
Qatar	73 (1.9) ▼
Malaysia	69 (2.0) ▼
Kuwait	69 (2.3) ▼
Saudi Arabia	65 (2.2) ▼
Morocco	63 (1.3) ▼
Egypt	60 (2.2) ▼
Botswana (9)	56 (2.0) ▼
Lebanon	54 (2.8) ▼
South Africa (9)	48 (2.2) ▼

Content Domain: Earth Science
Cognitive Domain: Applying
Description: Using a diagram, identifies what moves water from an artesian basin to the surface

An artesian basin holds water underground in a layer of rock. Part of an artesian basin is shown in the diagram.



When people put pipes down into the rock layer, water rises up the pipe and runs onto the ground.

What moves the water up the pipe?

Ⓐ electricity
Ⓑ magnetism
● pressure
Ⓓ gravity

Country	Percent Correct
Benchmarking Participants	
Ontario, Canada	88 (1.3) ▲
‡ Quebec, Canada	88 (1.8) ▲
Dubai, UAE	87 (1.2) ▲
[1] Florida, US	83 (3.3)
Norway (8)	82 (1.7)
Abu Dhabi, UAE	75 (2.3) ▼
† Buenos Aires, Argentina	72 (2.7) ▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.12: Description of the TIMSS 2015 Intermediate International Benchmark (475) of Science Achievement

475 Intermediate International Benchmark

Summary

Students demonstrate and apply their knowledge of biology, chemistry, physics, and Earth science in various contexts. Students demonstrate some knowledge of characteristics and life processes of animals and human health. They apply knowledge of ecosystems, the interaction of living things, and the adaptation of animals to their environments. Students apply some knowledge of the properties of matter. They also show knowledge of some aspects of force, motion, and energy. Students apply knowledge of Earth's processes, resources, and physical features. They interpret information from tables, graphs, and pictorial diagrams to draw conclusions, apply knowledge to practical situations, and communicate their understanding through brief descriptive responses.

Students demonstrate knowledge of characteristics and life processes of animals. They recognize some functions of tissues found in the human stomach, justify an advantage of hollow bones for birds, and describe characteristic features of animal groups. Students apply knowledge of adaptation of animals to their environments. For example, they state an advantage for mice with fur similar in color to their environment. Students apply knowledge of ecosystems and the interaction of living things with their environment, distinguishing, for example, between predatory and competitive relationships. Students show some knowledge about human health, including some benefits of vaccination, that a virus causes influenza, and a food that is a good source of calcium.

Students apply some knowledge of properties of matter. For example, they identify which of two solutions is more dilute and justify their selection and recognize a set of conditions that promotes rusting of nails.

Students show knowledge of some aspects of force, motion, and energy. For example, they state the force that causes a ball thrown in the air to fall back to Earth, use information in a distance-time graph to identify the motion of an object, and recognize the form of energy stored in a compressed spring.

Students apply knowledge of Earth's processes, resources, and physical features. For example, they synthesize information in rainfall and temperature graphs to match animals with the climate in which each is most likely to live, describe ways to reduce air pollution, and state an advantage for plants to have roots that reach into the subsoil. Students recognize that air temperature at high altitudes is very low, that carbon dioxide is increasing over time in Earth's atmosphere, and that Earth's rotating on its axis causes day and night.

Students interpret information from tables, graphs, and pictorial diagrams to draw conclusions, apply knowledge to practical situations, and communicate their understanding through brief descriptive responses.

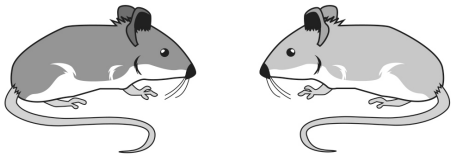
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.12.1: Intermediate International Benchmark – Example Item 1

Country	Percent Full Credit	
England	82 (1.7)	▲
† United States	82 (1.0)	▲
Norway (9)	80 (2.0)	▲
Japan	80 (1.6)	▲
Russian Federation	79 (2.0)	▲
Hungary	77 (2.2)	▲
Ireland	77 (2.0)	▲
1 † Canada	76 (1.6)	▲
Sweden	76 (2.0)	▲
Turkey	73 (1.9)	▲
Chinese Taipei	73 (1.8)	▲
† New Zealand	73 (1.6)	▲
2 Lithuania	72 (2.0)	▲
Australia	71 (1.5)	▲
Slovenia	69 (2.0)	▲
Chile	67 (2.0)	▲
2 Singapore	63 (1.8)	▲
2 Italy	60 (2.6)	▲
Korea, Rep. of	56 (2.1)	▲
Malta	56 (2.1)	▲
Hong Kong SAR	55 (2.4)	
Kazakhstan	53 (2.8)	
International Avg.	51 (0.3)	
3 Israel	51 (2.0)	
Bahrain	43 (2.2)	▼
Oman	43 (1.5)	▼
United Arab Emirates	40 (1.6)	▼
1 2 Georgia	38 (2.4)	▼
Thailand	36 (2.3)	▼
Qatar	31 (1.5)	▼
Iran, Islamic Rep. of	30 (2.0)	▼
Kuwait	27 (2.3)	▼
Malaysia	17 (1.3)	▼
Saudi Arabia	16 (1.8)	▼
Morocco	15 (1.4)	▼
Jordan	14 (1.2)	▼
Egypt	13 (1.4)	▼
South Africa (9)	13 (1.7)	▼
Botswana (9)	12 (1.1)	▼
Lebanon	8 (1.3)	▼

Content Domain: Biology
Cognitive Domain: Applying
Description: Explains the advantage for a species of mice to have coloring matching its environment

Deer mice live across much of the world. Those living in woodlands have dark brown fur. Those living on sandy beaches have light brown fur.



woodland deer mouse beach deer mouse

Why is it an advantage for mice living on the beach to have light brown fur?

It helps the mice blend in with the sand.

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit	
Benchmarking Participants		
Norway (8)	79 (1.7)	▲
Ontario, Canada	77 (2.0)	▲
1 Florida, US	72 (2.2)	▲
‡ Quebec, Canada	71 (2.9)	▲
Dubai, UAE	54 (2.0)	
† Buenos Aires, Argentina	49 (2.6)	
Abu Dhabi, UAE	39 (3.5)	▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.12.2: Intermediate International Benchmark – Example Item 2

Country	Percent Correct	
Russian Federation	90 (1.2)	▲
Chinese Taipei	88 (1.1)	▲
2 Lithuania	87 (1.5)	▲
Sweden	82 (1.9)	▲
Norway (9)	80 (1.4)	▲
Ireland	79 (1.7)	▲
Hungary	77 (1.9)	▲
Malaysia	77 (1.5)	▲
1 † Canada	77 (1.4)	▲
2 Singapore	77 (1.3)	▲
Hong Kong SAR	76 (2.1)	▲
† New Zealand	76 (1.6)	▲
Kazakhstan	76 (2.1)	▲
Japan	76 (1.7)	▲
Slovenia	75 (2.7)	▲
Korea, Rep. of	74 (1.9)	▲
2 Italy	73 (2.5)	
Australia	73 (1.7)	▲
Chile	72 (1.7)	▲
Botswana (9)	71 (1.6)	
† United States	70 (1.5)	
Iran, Islamic Rep. of	70 (1.8)	
England	70 (2.0)	
International Avg.	68 (0.3)	
Thailand	68 (2.3)	
3 Israel	66 (1.8)	
Jordan	64 (2.0)	▼
1 2 Georgia	63 (2.3)	▼
Malta	63 (2.1)	▼
Morocco	62 (1.4)	▼
Egypt	61 (1.7)	▼
Qatar	56 (2.8)	▼
South Africa (9)	55 (1.9)	▼
Bahrain	54 (2.0)	▼
United Arab Emirates	53 (1.1)	▼
Lebanon	52 (2.5)	▼
Turkey	47 (1.7)	▼
Kuwait	46 (2.3)	▼
Oman	45 (1.9)	▼
Saudi Arabia	44 (2.1)	▼

Content Domain: Chemistry
Cognitive Domain: Applying
Description: Uses information from an investigation to recognize the condition under which nails would rust most

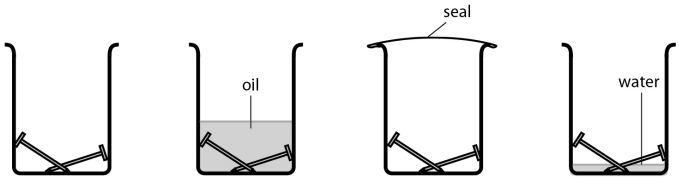
Four students investigated the rusting of nails.

Khaled put 2 nails in Container 1.

Gabriela put 2 nails in Container 2 and covered them with oil.

Harold put 2 nails in Container 3 and sealed it.

Esmeralda put 2 nails in Container 4 and poured a little water in it.



After one week, in which container will the nails have rusted the most?

Ⓐ Container 1
Ⓑ Container 2
Ⓒ Container 3
● Container 4

Country	Percent Correct	
Benchmarking Participants		
‡ Quebec, Canada	80 (2.2)	▲
Norway (8)	76 (1.9)	▲
Ontario, Canada	74 (1.9)	▲
1 Florida, US	61 (3.6)	▼
Dubai, UAE	58 (2.1)	▼
† Buenos Aires, Argentina	54 (2.8)	▼
Abu Dhabi, UAE	49 (2.3)	▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.12.3: Intermediate International Benchmark – Example Item 3

Country	Percent Correct	
[2] Singapore	90 (1.1)	▲
[2] Italy	90 (1.3)	▲
[2] Lithuania	89 (1.4)	▲
Hungary	89 (1.3)	▲
Malaysia	85 (1.5)	▲
Russian Federation	85 (2.1)	▲
Hong Kong SAR	83 (1.7)	▲
Australia	83 (1.7)	▲
Korea, Rep. of	83 (1.8)	▲
† United States	82 (1.2)	▲
Kazakhstan	82 (2.1)	▲
Iran, Islamic Rep. of	80 (1.5)	▲
Slovenia	79 (1.9)	▲
Chile	78 (1.7)	▲
Ireland	77 (2.1)	▲
† New Zealand	76 (2.1)	▲
[1] [2] Georgia	73 (2.4)	▲
England	72 (2.1)	▲
[1] † Canada	72 (1.7)	▲
Turkey	70 (1.8)	
International Avg.	**68 (0.3)**	
Chinese Taipei	68 (1.6)	
Malta	67 (2.1)	
Thailand	66 (2.0)	
[3] Israel	62 (1.8)	▼
Lebanon	62 (2.7)	▼
Norway (9)	61 (2.4)	▼
Bahrain	60 (2.6)	▼
United Arab Emirates	60 (1.3)	▼
Jordan	57 (2.1)	▼
Morocco	56 (1.7)	▼
Qatar	53 (1.9)	▼
Kuwait	52 (2.1)	▼
Egypt	51 (1.9)	▼
Botswana (9)	50 (1.9)	▼
Japan	49 (2.1)	▼
South Africa (9)	47 (1.5)	▼
Saudi Arabia	42 (2.4)	▼
Sweden	41 (2.5)	▼
Oman	35 (1.8)	▼

Content Domain: Physics
Cognitive Domain: Knowing
Description: Recognizes the form of energy in a compressed spring

A horizontal spring is compressed.

What sort of energy does the compressed spring have?

Ⓐ thermal
Ⓑ electrical
● potential
Ⓓ chemical

Country	Percent Correct	
Benchmarking Participants		
[1] Florida, US	87 (2.0)	▲
Ontario, Canada	73 (2.2)	▲
Dubai, UAE	71 (1.6)	▲
‡ Quebec, Canada	71 (3.1)	
† Buenos Aires, Argentina	68 (2.6)	
Norway (8)	58 (2.2)	▼
Abu Dhabi, UAE	58 (2.2)	▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.12.4: Intermediate International Benchmark – Example Item 4

Country	Percent Correct	
Hungary	82 (1.8)	▲
Russian Federation	79 (2.1)	▲
Slovenia	77 (1.6)	▲
Japan	77 (1.7)	▲
Korea, Rep. of	76 (1.9)	▲
Kazakhstan	73 (2.3)	▲
2 Singapore	72 (1.6)	▲
1 2 Georgia	72 (2.3)	▲
2 Italy	72 (2.3)	▲
Turkey	71 (1.7)	▲
Ireland	71 (2.1)	▲
Chile	71 (2.2)	▲
England	68 (1.6)	
Bahrain	68 (2.5)	
Thailand	66 (2.0)	
Sweden	66 (2.8)	
International Avg.	65 (0.3)	
Qatar	64 (1.8)	
2 Lithuania	64 (2.4)	
Norway (9)	64 (2.4)	
South Africa (9)	63 (1.3)	
3 Israel	63 (1.8)	
1 † Canada	63 (1.8)	
Chinese Taipei	63 (1.8)	
Egypt	63 (1.9)	
Malaysia	62 (1.8)	
Saudi Arabia	62 (2.4)	
United Arab Emirates	62 (1.3)	▼
Morocco	62 (1.5)	▼
Hong Kong SAR	62 (2.3)	
Malta	60 (2.1)	▼
Iran, Islamic Rep. of	60 (1.9)	▼
Australia	59 (2.1)	▼
Lebanon	58 (2.4)	▼
Oman	56 (1.7)	▼
Jordan	56 (2.1)	▼
† New Zealand	53 (1.8)	▼
† United States	53 (1.6)	▼
Kuwait	49 (2.4)	▼
Botswana (9)	47 (1.9)	▼

Content Domain: Earth Science
Cognitive Domain: Knowing
Description: Recognizes an effect of Earth rotating on its axis

Earth rotates on its axis.

What does this cause?

Ⓐ the seasons
Ⓑ a solar eclipse
● day and night
Ⓓ high and low tides

Country	Percent Correct	
Benchmarking Participants		
Dubai, UAE	70 (2.4)	▲
Ontario, Canada	65 (2.1)	
Norway (8)	63 (1.9)	
‡ Quebec, Canada	63 (3.2)	
† Buenos Aires, Argentina	60 (3.0)	
Abu Dhabi, UAE	57 (2.3)	▼
1 Florida, US	46 (3.4)	▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.13: Description of the TIMSS 2015 High International Benchmark (550) of Science Achievement

550 High International Benchmark

Summary

Students apply and communicate understanding of concepts from biology, chemistry, physics, and Earth science in everyday and abstract situations. Students apply knowledge of cells and their functions and of the characteristics and life processes of organisms. They communicate understanding of ecosystems and the interaction of organisms with their environment and apply some knowledge of human health related to nutrition and infectious disease. Students show some knowledge and understanding of the composition and properties of matter and chemical change. They apply basic knowledge of energy transformation and transfer and of light and sound in practical situations, and demonstrate understanding of simple electrical circuits and properties of magnets. Students apply their knowledge of forces and motion to everyday and abstract situations. They apply knowledge of Earth's physical features, processes, cycles, and history, and show some understanding of Earth's resources, their use, and conservation as well as some knowledge of the interaction between the Earth and the Moon. Students demonstrate some scientific inquiry skills, including selecting and justifying an appropriate experimental method. They combine and interpret information from various types of diagrams, graphs, and tables; select relevant information to analyze and draw conclusions; and provide short explanations conveying scientific knowledge.

Students apply knowledge of cells and their functions, recognizing, for example, what happens to an animal's cells as it grows, and explaining how a fossil can be classified as a plant or an animal based on its cellular structure. Students apply knowledge of the characteristics and life processes of organisms. For example, they recognize some major human organs in a diagram, indicate the gases involved in animal respiration and photosynthesis, and identify factors in an investigation that affect the rate of photosynthesis. Students communicate understanding of ecosystems and the interaction of organisms with their environment. They evaluate data to draw conclusions about population change, explain why birds of prey cannot survive in an environment without plants, and explain which organism competes most with humans in a food chain. Students apply some knowledge of human health related to nutrition and infectious disease by placing foods into food groups and explaining why it is unlikely for someone to get sick with the measles a second time.

Students show some knowledge and understanding of the composition and properties of matter. For example, they identify a structural model of a carbon dioxide molecule and, given its chemical formula, identify the number of atoms of each element present in an acid. They identify a property of nonmetals and evaluate a method for separating a mixture of small pieces of two different metals. Students interpret information about melting and boiling points to determine the states of matter of various substances and determine whether substances will float based on their densities. They predict the rate at which a substance will dissolve under different conditions, compare the concentrations of two solutions, and support a claim about the effect of temperature on diffusion rates. Students apply some knowledge of chemical change, recognizing that burning is a chemical process that releases energy and explaining why a reaction between two solutions cannot happen a second time.

Students apply basic knowledge of energy transformation and transfer. For example, they identify the energy transformation that occurs when a car begins to move and recognize a graph that shows how two substances eventually reach the same temperature. Students demonstrate understanding of simple electrical circuits as well as properties of magnets. They recognize the best explanation for repulsion between two bar magnets and evaluate a claim about the relative strengths of two magnets based on an experiment. Students apply their knowledge of forces and motion to everyday and abstract situations. For example, they identify the forces acting on objects at rest and analyze force diagrams. Students demonstrate understanding of light and sound in practical situations. They identify

Exhibit 2.13: Description of the TIMSS 2015 High International Benchmark (550) of Science Achievement (Continued)

550 High International Benchmark

the orientation of a hidden mirror in a ray diagram, explain why lightning is seen before thunder is heard, and synthesize information to evaluate statements about the relative speeds of sound in various media.

Students apply knowledge of Earth's physical features, processes, cycles, and history. For example, they recognize sources of fresh and salt water and match processes of the water cycle with their descriptions. They recognize the process that forms rock layers, describe a cause of earthquakes, and identify how the melting of permafrost affects the Earth's climate. Students show some understanding of Earth's resources, their use, and conservation. For example, they state disadvantages of using solar energy and identify geographic factors to consider when selecting a safe location for a nuclear power plant. Students show some knowledge of the interaction between the Earth and the Moon by recognizing a consequence of the gravitational pull of the Moon on Earth.

Students demonstrate some scientific inquiry skills, including selecting and justifying an appropriate experimental method. They combine and interpret information from various types of diagrams, graphs, and tables; select relevant information to analyze and draw conclusions; and provide short explanations conveying scientific knowledge.

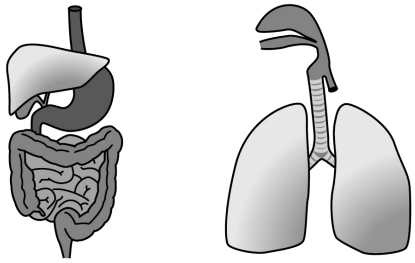
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.13.1: High International Benchmark – Example Item 1

Country	Percent Correct	
[2] Italy	77 (1.9)	▲
Russian Federation	74 (2.5)	▲
[2] Singapore	74 (1.8)	▲
Iran, Islamic Rep. of	72 (1.9)	▲
Hungary	71 (2.5)	▲
Australia	70 (1.6)	▲
Korea, Rep. of	69 (1.6)	▲
Slovenia	67 (2.1)	▲
Thailand	65 (1.7)	▲
Ireland	65 (1.9)	▲
[2] Lithuania	64 (2.3)	▲
[3] Israel	64 (2.1)	▲
[1] † Canada	64 (1.5)	▲
Kazakhstan	64 (3.3)	
† United States	64 (1.5)	▲
Egypt	62 (1.9)	
[1] [2] Georgia	62 (2.9)	
United Arab Emirates	61 (1.2)	
Oman	61 (1.6)	
International Avg.	59 (0.3)	
Kuwait	59 (2.4)	
Sweden	59 (2.8)	
Malaysia	58 (1.6)	
Malta	58 (2.3)	
South Africa (9)	57 (1.5)	
Qatar	57 (1.8)	
† New Zealand	56 (1.7)	
Hong Kong SAR	56 (2.0)	
Bahrain	56 (2.3)	
Lebanon	55 (2.6)	
England	54 (2.2)	▼
Botswana (9)	54 (2.0)	▼
Saudi Arabia	52 (2.4)	▼
Chile	52 (2.2)	▼
Chinese Taipei	51 (1.8)	▼
Norway (9)	48 (2.5)	▼
Turkey	47 (1.9)	▼
Jordan	47 (2.2)	▼
Morocco	39 (1.4)	▼
Japan	31 (1.9)	▼

Content Domain: Biology
Cognitive Domain: Applying
Description: Identifies parts of the human body as organ systems

The diagrams below show parts of the human body.



How would these parts of the body be described?

Ⓐ as cells
Ⓑ as tissues
Ⓒ as organs
● as organ systems

Country	Percent Correct	
Benchmarking Participants		
Dubai, UAE	73 (1.7)	▲
Ontario, Canada	72 (1.9)	▲
[1] Florida, US	65 (2.2)	▲
† Buenos Aires, Argentina	55 (2.6)	
Abu Dhabi, UAE	52 (2.3)	▼
Norway (8)	46 (2.2)	▼
‡ Quebec, Canada	45 (2.9)	▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.13.2: High International Benchmark – Example Item 2

Country	Percent Full Credit	
Korea, Rep. of	69 (1.7)	▲
Kazakhstan	54 (2.4)	▲
2 Singapore	52 (1.8)	▲
† United States	51 (1.6)	▲
Russian Federation	50 (2.2)	▲
Chinese Taipei	48 (2.1)	▲
England	48 (2.5)	▲
Turkey	45 (2.2)	▲
1 † Canada	43 (1.8)	▲
Norway (9)	42 (2.2)	▲
Japan	42 (1.9)	▲
Iran, Islamic Rep. of	42 (2.4)	▲
2 Lithuania	41 (2.6)	▲
3 Israel	40 (1.7)	▲
† New Zealand	40 (2.0)	▲
Sweden	40 (2.5)	▲
Hong Kong SAR	37 (2.5)	
Slovenia	36 (2.4)	
Ireland	36 (2.3)	
Bahrain	36 (1.8)	
Oman	35 (1.6)	
International Avg.	**35 (0.3)**	
United Arab Emirates	33 (1.2)	
Malta	33 (1.9)	
Hungary	32 (2.3)	
Qatar	31 (2.5)	
Morocco	31 (1.4)	▼
Australia	31 (1.6)	▼
Jordan	30 (2.0)	▼
1 2 Georgia	30 (2.6)	▼
Kuwait	25 (2.0)	▼
Saudi Arabia	22 (2.4)	▼
Malaysia	22 (1.4)	▼
2 Italy	20 (1.8)	▼
Egypt	18 (1.6)	▼
Chile	17 (2.1)	▼
South Africa (9)	17 (1.8)	▼
Thailand	17 (1.7)	▼
Lebanon	14 (1.4)	▼
Botswana (9)	12 (1.1)	▼

Content Domain: Biology
Cognitive Domain: Applying
Description: Explains why birds of prey cannot survive in an environment without plants

Birds of prey such as eagles cannot survive in an environment without plants.

Explain why.

Birds of prey eat smaller animals.
Smaller animals eat plants.

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit	
Benchmarking Participants		
1 Florida, US	48 (3.1)	▲
Ontario, Canada	47 (2.5)	▲
Dubai, UAE	44 (2.0)	▲
Norway (8)	40 (1.9)	▲
‡ Quebec, Canada	32 (2.2)	
Abu Dhabi, UAE	30 (2.3)	
† Buenos Aires, Argentina	21 (2.2)	▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.13.3: High International Benchmark – Example Item 3

Country	Percent Full Credit
Japan	79 (1.3) ▲
Slovenia	76 (2.0) ▲
Chinese Taipei	73 (1.7) ▲
Sweden	71 (2.1) ▲
Hungary	69 (2.3) ▲
[2] Lithuania	68 (2.4) ▲
[2] Singapore	66 (1.6) ▲
Russian Federation	65 (2.4) ▲
Hong Kong SAR	65 (2.5) ▲
Ireland	63 (2.0) ▲
England	61 (1.9) ▲
Norway (9)	61 (2.3) ▲
Kazakhstan	58 (2.9) ▲
Malaysia	56 (1.9) ▲
[2] Italy	55 (2.0) ▲
[1 †] Canada	52 (1.7) ▲
Korea, Rep. of	48 (2.5)
International Avg.	**48 (0.3)**
South Africa (9)	46 (1.4)
Turkey	45 (2.2)
Malta	45 (2.3)
† New Zealand	44 (2.3)
Chile	43 (2.2) ▼
Australia	41 (2.0) ▼
Botswana (9)	39 (1.8) ▼
† United States	38 (1.4) ▼
United Arab Emirates	38 (1.4) ▼
Lebanon	37 (2.2) ▼
Oman	37 (1.2) ▼
[3] Israel	36 (2.1) ▼
Jordan	36 (1.9) ▼
Bahrain	36 (2.6) ▼
Qatar	34 (1.9) ▼
Thailand	33 (2.0) ▼
Iran, Islamic Rep. of	32 (2.3) ▼
Saudi Arabia	31 (2.4) ▼
[1 2] Georgia	30 (2.1) ▼
Kuwait	26 (2.2) ▼
Egypt	26 (1.7) ▼
Morocco	23 (1.4) ▼

Content Domain: Chemistry
Cognitive Domain: Applying
Description: Identifies and explains which solution is more dilute than another in a given context

Pogiso put 20 grams of sugar in each of two beakers. Beaker 1 contained 50 mL of water, and Beaker 2 contained 150 mL of water, as shown in the diagrams below.

Which solution is more dilute?

(Check one box.)

☐ The solution in Beaker 1

☑ The solution in Beaker 2

Explain your answer.

There is more water and the same amount of sugar in Beaker 2.

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
Benchmarking Participants	
‡ Quebec, Canada	65 (3.8) ▲
Norway (8)	50 (2.3)
Dubai, UAE	48 (2.3)
Ontario, Canada	46 (2.2)
[1] Florida, US	35 (2.9) ▼
Abu Dhabi, UAE	31 (2.3) ▼
† Buenos Aires, Argentina	29 (2.5) ▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

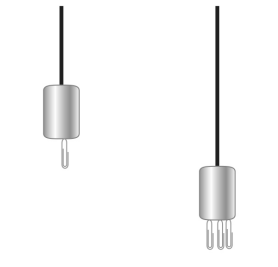
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.13.4: High International Benchmark – Example Item 4

Country	Percent Full Credit
[2] Singapore	85 (1.2) ▲
Chinese Taipei	75 (1.6) ▲
Slovenia	74 (2.0) ▲
Hong Kong SAR	71 (2.4) ▲
Australia	66 (1.8) ▲
Norway (9)	65 (2.2) ▲
† New Zealand	65 (1.6) ▲
England	65 (2.4) ▲
Ireland	62 (2.2) ▲
[1] † Canada	60 (1.9) ▲
† United States	58 (1.7) ▲
[2] Lithuania	58 (2.0) ▲
[2] Italy	57 (1.8) ▲
Korea, Rep. of	56 (1.9) ▲
Malta	55 (1.9) ▲
Sweden	53 (2.8) ▲
Japan	50 (1.9)
Hungary	50 (2.5)
Russian Federation	49 (2.8)
[3] Israel	49 (1.8)
Iran, Islamic Rep. of	48 (1.8)
International Avg.	47 (0.3)
Kazakhstan	46 (2.9)
United Arab Emirates	46 (1.2)
Turkey	44 (2.3)
Bahrain	43 (1.7) ▼
Oman	42 (1.5) ▼
Thailand	40 (2.1) ▼
Malaysia	39 (1.8) ▼
Qatar	36 (1.8) ▼
Chile	35 (2.1) ▼
Botswana (9)	26 (1.6) ▼
Lebanon	26 (2.4) ▼
South Africa (9)	26 (1.5) ▼
Jordan	25 (1.6) ▼
Kuwait	25 (2.5) ▼
Saudi Arabia	22 (1.8) ▼
[1] [2] Georgia	19 (2.0) ▼
Morocco	14 (1.2) ▼
Egypt	12 (1.1) ▼

Content Domain: Physics
Cognitive Domain: Reasoning
Description: Explains whether a conclusion can be made about the relative strength of two magnets in a given context

Two magnets, A and B, are each brought near a tray of metal paper clips and held at a fixed distance.



Tina considers the setup and concludes that Magnet B is stronger than Magnet A.

Do you agree with Tina's conclusion?

(Check one box.)

☐ Yes
☑ No

Explain your answer.

The magnets are not the same distance away from the paperclips.

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
Benchmarking Participants	
Norway (8)	64 (2.3) ▲
‡ Quebec, Canada	63 (3.5) ▲
Dubai, UAE	61 (1.9) ▲
Ontario, Canada	58 (2.6) ▲
[1] Florida, US	53 (3.6)
Abu Dhabi, UAE	40 (2.2) ▼
† Buenos Aires, Argentina	38 (2.5) ▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.13.5: High International Benchmark – Example Item 5

Country	Percent Correct	
Russian Federation	70 (2.3)	▲
† United States	69 (1.5)	▲
† New Zealand	68 (2.2)	▲
Australia	63 (2.0)	▲
2 Lithuania	59 (2.3)	▲
Slovenia	58 (2.4)	▲
Sweden	55 (2.7)	▲
Hong Kong SAR	54 (2.4)	▲
2 Italy	54 (2.2)	▲
Qatar	52 (2.0)	▲
Bahrain	52 (2.2)	▲
2 Singapore	51 (1.7)	▲
Norway (9)	51 (2.2)	▲
Chinese Taipei	51 (1.7)	▲
Oman	50 (2.0)	▲
England	50 (2.3)	▲
Kazakhstan	49 (2.4)	▲
Ireland	48 (2.3)	
Thailand	48 (2.4)	
Chile	46 (2.2)	
1 † Canada	46 (1.8)	
Korea, Rep. of	45 (2.2)	
Kuwait	45 (2.1)	
International Avg.	**44 (0.3)**	
United Arab Emirates	44 (1.6)	
Saudi Arabia	44 (2.4)	
3 Israel	42 (1.8)	
Turkey	38 (2.2)	▼
Iran, Islamic Rep. of	37 (2.0)	▼
Hungary	36 (2.1)	▼
Japan	35 (1.9)	▼
Jordan	34 (2.0)	▼
Malaysia	33 (1.7)	▼
Morocco	33 (1.6)	▼
1 2 Georgia	31 (2.4)	▼
Egypt	30 (2.0)	▼
Malta	29 (1.7)	▼
South Africa (9)	16 (1.7)	▼
Lebanon	13 (1.7)	▼
Botswana (9)	7 (1.0)	▼

Content Domain: Earth Science
Cognitive Domain: Knowing
Description: Recognizes a consequence of the gravitational pull of the Moon on Earth

Which of the following results from the gravitational pull of the moon on Earth?

Ⓐ earthquakes
● high and low tides
Ⓒ full eclipse of the sun
Ⓓ rotation of Earth on its axis

Country	Percent Correct	
Benchmarking Participants		
1 Florida, US	69 (3.3)	▲
Norway (8)	55 (2.3)	▲
Dubai, UAE	53 (1.9)	▲
‡ Quebec, Canada	46 (2.4)	
Ontario, Canada	44 (2.4)	
Abu Dhabi, UAE	41 (3.2)	
† Buenos Aires, Argentina	26 (2.4)	▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.14: Description of the TIMSS 2015 Advanced International Benchmark (625) of Science Achievement

625 Advanced International Benchmark

Summary

Students communicate understanding of complex concepts related to biology, chemistry, physics and Earth science in practical, abstract, and experimental contexts. Students apply knowledge of cells and their functions as well as characteristics and life processes of organisms. They demonstrate understanding of diversity, adaptation, and natural selection among organisms, and of ecosystems and the interaction of organisms with their environment. Students apply knowledge of life cycles and heredity in plants and animals. Students demonstrate knowledge of the composition and physical properties of matter and apply knowledge of chemical and physical change in practical and experimental contexts. Students communicate understanding of physical states and changes in matter in practical and experimental contexts, apply knowledge of energy transfer, and demonstrate knowledge of electricity and magnetism. Students communicate understanding of forces and pressure and demonstrate knowledge of light and sound in practical and abstract situations. Students communicate understanding of Earth's structure, physical features, and resources as well as of Earth in the solar system. Students show understanding of basic aspects of scientific investigation. They identify which variables to control in an experimental situation, compare information from several sources, combine information to predict and draw conclusions, and interpret information in diagrams, maps, graphs, and tables to solve problems. They provide written explanations to communicate scientific knowledge.

Students apply knowledge of cells and their functions as well as characteristics and life processes of organisms. For example, they synthesize information from an investigation about cellular respiration to identify the gas produced and its source. Students classify animals according to a physical or behavioral characteristic and identify a function shared by lungs, skin, and kidneys. Students show understanding of diversity, adaptation, and natural selection among organisms, recognizing an explanation for a change in a physical characteristic over time and for the disappearance of a trait over generations. Students demonstrate understanding of ecosystems and the interaction of organisms with their environment. They predict the consequence of increasing a predator population on its prey and recognize an example of a symbiotic relationship between two organisms. Students apply knowledge of life cycles and heredity in plants and animals. For example, they explain the development stage of the butterfly life cycle and state a similarity in the life cycles of a bird and a frog.

Students demonstrate knowledge of the composition of matter, explaining, for example, the difference between a solid and air in terms of particle spacing, recognizing what happens to atoms in an object when its shape changes, and classifying examples of matter as elements, compounds, or mixtures. Given chemical formulas, students recognize compounds with the same number of atoms. Students communicate understanding of the physical properties of matter. They classify characteristics of a substance as physical or chemical properties, classify materials as metal or non-metal, and predict color changes in acid-base indicators when they are added to everyday solutions. In the context of an investigation, students describe the measurements needed to find the volume of an irregularly shaped object. Students apply knowledge of chemical and physical change in practical and experimental contexts. For example, they distinguish between a physical and a chemical change and explain what happens to mass during a neutralization reaction.

Students communicate understanding of physical states and changes in matter in practical and experimental contexts. For example, they recognize why gases are easier to compress than solids and liquids and explain why a bottle full of water cracks when left in a freezer. Students apply knowledge of energy transfer in practical and abstract contexts. For example, they interpret a diagram to describe the direction of heat flow in metals and explain why wooden containers

Exhibit 2.14: Description of the TIMSS 2015 Advanced International Benchmark (625) of Science Achievement (Continued)

625 Advanced International Benchmark

are better than metal containers for keeping ice frozen. Students apply some knowledge of electricity and magnetism. They indicate whether parts of a lightbulb are electrical conductors or insulators, evaluate statements about battery life and bulb brightness in two circuits, and use a diagram to explain how to increase the strength of an electromagnet. Students communicate understanding of forces and pressure in a variety of contexts. They evaluate methods to move a heavy box onto a truck using the smallest force, explain why a vehicle with tires is more likely to sink into mud than a vehicle with treads, and evaluate conclusions about the pressure at different depths in a lake. Students demonstrate knowledge of light and sound, explaining, for example, whether one person can see another person reflected in a mirror and indicating colors of light absorbed or reflected by colored objects. They indicate the property of sound that allows animals to navigate and find food.

Students communicate understanding of Earth's structure, physical features, and resources. For example, they state one condition below Earth's crust that can be inferred from volcanic eruptions, explain the direction a river flows on a map, and state one way trees protect soil from erosion. Students communicate understanding of the Earth in the solar system by evaluating a claim that an object's weight is less on the Moon than on the Earth, and that the Moon travels around the Sun. From diagrams involving the Earth, Moon, and Sun, they identify the one that explains the changing seasons.

Students show understanding of basic aspects of scientific investigation. They identify which variables to control in an experimental situation, compare information from several sources, combine information to predict and draw conclusions, and interpret information in diagrams, maps, graphs, and tables to solve problems. They provide written explanations to communicate scientific knowledge.

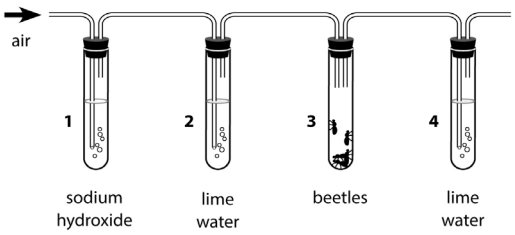
Exhibit 2.14.1: Advanced International Benchmark – Example Item 1

Country	Percent Full Credit
[2] Singapore	59 (1.9) ▲
Japan	53 (2.0) ▲
Hong Kong SAR	50 (3.0) ▲
Korea, Rep. of	43 (2.1) ▲
Kazakhstan	42 (2.7) ▲
Ireland	35 (2.4) ▲
Russian Federation	29 (2.5) ▲
Chinese Taipei	28 (1.5) ▲
England	26 (2.1) ▲
[2] Lithuania	25 (2.5) ▲
[1] † Canada	25 (1.5) ▲
† New Zealand	23 (1.9) ▲
Australia	21 (1.4)
International Avg.	**20 (0.3)**
† United States	19 (1.3)
Slovenia	19 (1.8)
Hungary	19 (1.6)
[3] Israel	18 (1.5)
Sweden	17 (1.7)
Bahrain	16 (2.1)
[2] Italy	16 (1.7) ▼
Malaysia	15 (1.1) ▼
United Arab Emirates	15 (1.2) ▼
Qatar	14 (1.6) ▼
Lebanon	14 (1.7) ▼
Norway (9)	13 (1.5) ▼
Kuwait	12 (1.6) ▼
Turkey	12 (1.3) ▼
Oman	11 (1.2) ▼
Malta	11 (1.4) ▼
Chile	9 (1.3) ▼
Jordan	9 (1.1) ▼
Saudi Arabia	9 (1.4) ▼
Iran, Islamic Rep. of	8 (1.2) ▼
[1 2] Georgia	7 (1.4) ▼
Thailand	7 (1.1) ▼
South Africa (9)	6 (1.2) ▼
Morocco	6 (0.8) ▼
Botswana (9)	5 (0.9) ▼
Egypt	4 (0.8) ▼

Content Domain: Biology
Cognitive Domain: Reasoning
Description: Part B – In the context of an investigation about cellular respiration, identifies the gas produced and its source

Peter wants to know if carbon dioxide is given off during cellular respiration. He sets up his investigation as shown below.

Air is pumped through the system in the direction shown by the arrow.



A. Sodium hydroxide absorbs carbon dioxide. Lime water turns from clear to cloudy in the presence of carbon dioxide.

Why are Test Tubes 1 and 2 included in the setup?

Test Tube 1:

Test Tube 2:

B. The lime water in Test Tube 4 turned cloudy.

What substance caused this to happen and how was it produced?

carbon dioxide.
It was made by the respiration of the beetles.

The answer shown for part B illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
Benchmarking Participants	
‡ Quebec, Canada	26 (1.7) ▲
Ontario, Canada	24 (1.9) ▲
Dubai, UAE	21 (2.5)
Abu Dhabi, UAE	13 (1.9) ▼
[1] Florida, US	12 (1.6) ▼
Norway (8)	9 (1.2) ▼
† Buenos Aires, Argentina	3 (0.9) ▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.14.2: Advanced International Benchmark – Example Item 2

Country	Percent Full Credit
Chinese Taipei	71 (1.6) ▲
Hong Kong SAR	70 (2.4) ▲
Ireland	48 (2.2) ▲
Korea, Rep. of	44 (2.2) ▲
[2] Singapore	42 (1.6) ▲
Russian Federation	41 (2.5) ▲
Turkey	38 (2.1) ▲
England	38 (2.1) ▲
[1] † Canada	37 (1.6) ▲
[2] Lithuania	37 (2.3) ▲
United Arab Emirates	35 (1.4) ▲
[2] Italy	34 (2.2) ▲
Kazakhstan	34 (2.6)
Malaysia	33 (1.9) ▲
[3] Israel	33 (1.8)
Oman	33 (1.6)
Bahrain	32 (2.8)
Japan	32 (1.9)
Slovenia	31 (2.1)
Hungary	30 (1.9)
International Avg.	30 (0.3)
Sweden	29 (2.9)
Qatar	29 (1.9)
† United States	28 (1.4)
Lebanon	27 (2.5)
Australia	26 (1.3) ▼
Norway (9)	26 (2.1)
Malta	26 (1.9) ▼
Iran, Islamic Rep. of	25 (2.3)
† New Zealand	24 (1.6) ▼
Chile	22 (1.6) ▼
Thailand	17 (1.7) ▼
Botswana (9)	15 (1.3) ▼
Jordan	15 (1.3) ▼
Kuwait	15 (1.9) ▼
[1 2] Georgia	13 (1.9) ▼
Egypt	9 (1.3) ▼
South Africa (9)	9 (1.3) ▼
Morocco	8 (0.8) ▼
Saudi Arabia	5 (1.1) ▼

Content Domain: Chemistry
Cognitive Domain: Applying
Description: Determines the color that results after a pH indicator is added to four solutions, based on information provided about the indicator

The juice of red cabbage is a natural pH indicator. The color of the juice is purple.

- When it is added to an **acid**, its color changes to **red**.
- When it is added to a **base**, its color changes to **blue**.
- When it is added to a **neutral** solution, its color remains **purple**.

Write the color of the solution after this indicator is added to each of the following.

	Color
Distilled water	Purple
Lemon juice	red
Vinegar	red
Baking soda solution	blue

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
Benchmarking Participants	
‡ Quebec, Canada	51 (2.4) ▲
Dubai, UAE	44 (2.1) ▲
Abu Dhabi, UAE	34 (2.9)
[1] Florida, US	30 (3.4)
Ontario, Canada	29 (1.9)
Norway (8)	21 (1.7) ▼
† Buenos Aires, Argentina	10 (1.4) ▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.14.3: Advanced International Benchmark – Example Item 3

Country	Percent Full Credit
Russian Federation	78 (1.7) ▲
Kazakhstan	73 (2.0) ▲
1 2 Georgia	54 (3.0) ▲
2 Singapore	52 (1.6) ▲
2 Lithuania	51 (2.2) ▲
Hungary	49 (2.2) ▲
England	46 (2.4) ▲
Japan	45 (1.8) ▲
Slovenia	41 (2.2) ▲
Ireland	41 (2.3) ▲
Korea, Rep. of	39 (2.1)
† United States	39 (1.7)
Hong Kong SAR	36 (2.1)
International Avg.	36 (0.3)
Sweden	35 (2.2)
Australia	35 (1.6)
United Arab Emirates	35 (1.6)
1 † Canada	33 (1.5)
2 Italy	32 (2.1)
† New Zealand	32 (1.9)
Chinese Taipei	32 (1.5) ▼
Botswana (9)	32 (2.1)
Lebanon	31 (2.7)
Qatar	31 (1.6) ▼
3 Israel	30 (1.8) ▼
Bahrain	29 (1.7) ▼
Oman	29 (1.3) ▼
Turkey	28 (1.8) ▼
Thailand	28 (1.9) ▼
Jordan	28 (1.6) ▼
Malta	28 (2.1) ▼
Malaysia	27 (1.4) ▼
Morocco	27 (1.4) ▼
Norway (9)	27 (1.8) ▼
Egypt	26 (1.8) ▼
Kuwait	24 (1.8) ▼
Saudi Arabia	22 (1.7) ▼
South Africa (9)	21 (1.6) ▼
Chile	21 (1.8) ▼
Iran, Islamic Rep. of	20 (1.5) ▼

Content Domain: Chemistry
Cognitive Domain: Knowing
Description: Recognizes whether characteristics of substances are physical or chemical properties

For each characteristic in the list below, fill in a circle to tell whether the characteristic is a physical property or a chemical property.

(Fill in one circle in each row.)

	Physical property	Chemical property
reactivity with water	Ⓐ	●
boiling point	●	Ⓑ
acidity	Ⓐ	●
density	●	Ⓑ

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
Benchmarking Participants	
Dubai, UAE	47 (3.0) ▲
1 Florida, US	40 (3.2)
‡ Quebec, Canada	34 (2.1)
Ontario, Canada	33 (2.0)
Abu Dhabi, UAE	30 (3.2)
Norway (8)	24 (1.9) ▼
† Buenos Aires, Argentina	19 (2.0) ▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.14.4: Advanced International Benchmark – Example Item 4

Country	Percent Full Credit	
[2] Singapore	54 (2.0)	▲
Chinese Taipei	54 (1.9)	▲
Turkey	51 (2.4)	▲
Korea, Rep. of	46 (2.4)	▲
Russian Federation	45 (2.1)	▲
Kazakhstan	43 (2.8)	▲
[3] Israel	30 (1.8)	▲
Slovenia	27 (2.2)	▲
Bahrain	26 (1.9)	▲
Oman	26 (1.3)	▲
Hungary	25 (1.8)	▲
Hong Kong SAR	25 (2.3)	
England	24 (1.8)	
Japan	22 (1.5)	
International Avg.	22 (0.3)	
† United States	22 (1.2)	
Qatar	21 (1.4)	
Norway (9)	19 (1.7)	
[2] Lithuania	19 (1.8)	
Chile	19 (1.8)	
Thailand	19 (1.6)	
[1 2] Georgia	18 (2.0)	▼
[2] Italy	17 (1.9)	▼
United Arab Emirates	17 (0.9)	▼
Saudi Arabia	16 (1.7)	▼
[1 †] Canada	15 (1.3)	▼
Jordan	15 (1.5)	▼
Sweden	14 (1.6)	▼
† New Zealand	13 (1.3)	▼
Iran, Islamic Rep. of	13 (1.6)	▼
Australia	12 (1.1)	▼
Egypt	11 (1.2)	▼
Kuwait	11 (1.3)	▼
Lebanon	10 (1.9)	▼
Malta	9 (1.3)	▼
Morocco	8 (0.9)	▼
Ireland	8 (1.1)	▼
Malaysia	8 (0.8)	▼
Botswana (9)	8 (1.1)	▼
South Africa (9)	4 (0.6)	▼

Content Domain: Physics
Cognitive Domain: Applying
Description: Interprets a diagram to describe the direction of heat flow in metals

Two metal cubes at different temperatures were placed on top of each other, as shown below.

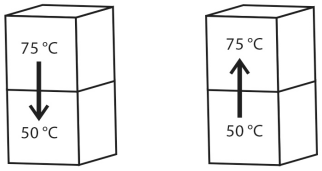


Diagram 1 Diagram 2

Which diagram shows the correct direction of heat flow?

(Check one box.)

☒ Diagram 1
☐ Diagram 2

Explain your answer.

Heat moves to areas with lower temperature.

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit	
Benchmarking Participants		
[1] Florida, US	31 (3.3)	▲
Dubai, UAE	25 (1.5)	▲
Ontario, Canada	16 (1.6)	▼
‡ Quebec, Canada	15 (2.1)	▼
Abu Dhabi, UAE	13 (1.5)	▼
Norway (8)	13 (1.4)	▼
† Buenos Aires, Argentina	7 (1.2)	▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

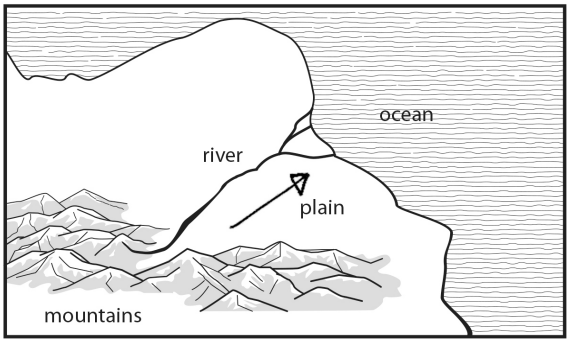
See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 2.14.5: Advanced International Benchmark – Example Item 5

Country	Percent Full Credit
Chinese Taipei	71 (1.6) ▲
Japan	58 (2.1) ▲
Norway (9)	56 (2.6) ▲
Hong Kong SAR	56 (2.5) ▲
Kazakhstan	53 (2.2) ▲
Slovenia	53 (2.6) ▲
Sweden	49 (2.4) ▲
Hungary	49 (2.1) ▲
Russian Federation	48 (2.6) ▲
Ireland	46 (1.9) ▲
2 Singapore	45 (1.7) ▲
Korea, Rep. of	43 (2.3) ▲
† New Zealand	41 (2.2) ▲
2 Lithuania	35 (2.5)
† United States	35 (1.7) ▲
1 † Canada	35 (1.8) ▲
Australia	34 (1.6) ▲
England	34 (1.9)
Malta	31 (2.0)
3 Israel	31 (1.9)
International Avg.	31 (0.3)
2 Italy	30 (2.2)
1 2 Georgia	27 (2.1)
Chile	26 (1.9) ▼
Iran, Islamic Rep. of	25 (1.5) ▼
Thailand	18 (1.5) ▼
Oman	17 (1.2) ▼
Morocco	16 (1.2) ▼
United Arab Emirates	16 (1.0) ▼
Turkey	15 (1.4) ▼
Malaysia	15 (1.5) ▼
Lebanon	14 (1.8) ▼
Bahrain	14 (1.4) ▼
Saudi Arabia	11 (1.3) ▼
Kuwait	10 (1.7) ▼
Qatar	10 (1.3) ▼
South Africa (9)	7 (1.0) ▼
Jordan	7 (0.9) ▼
Egypt	6 (0.9) ▼
Botswana (9)	4 (0.7) ▼

Content Domain: Earth Science
Cognitive Domain: Applying
Description: Draws an arrow on a map to show the direction a river flows and explains why it flows in this direction



Look at the map shown above.

Draw an arrow on the map pointing in the direction the river is flowing.

Explain why the river flows in this direction.

the river flows down from the mountain and into the ocean.

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
Benchmarking Participants	
Norway (8)	43 (2.3) ▲
‡ Quebec, Canada	38 (2.8) ▲
Ontario, Canada	30 (2.0)
Dubai, UAE	22 (1.3) ▼
1 Florida, US	21 (2.9) ▼
Abu Dhabi, UAE	13 (1.7) ▼
† Buenos Aires, Argentina	9 (1.4) ▼

▲ Percent significantly higher than international average
▼ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

TIMSS 2015

CHAPTER 3: ACHIEVEMENT IN CONTENT AND COGNITIVE DOMAINS

TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

IEA
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Achievement by Content Domains

Within science, TIMSS at the eighth grade provided results for four content domains—Biology, Chemistry, Physics, and Earth Science. Most countries demonstrated strengths in one or two content domains compared to science achievement overall, and weaknesses in one or two content domains.

TIMSS 2015: 39 Countries

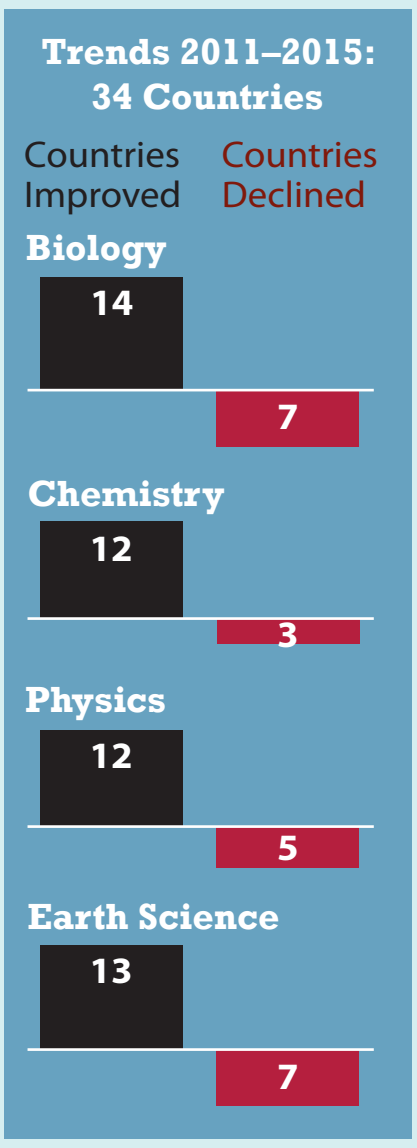
Biology
Relative Strength: **12** Countries
Relative Weakness: **15** Countries

Chemistry
Relative Strength: **12** Countries
Relative Weakness: **15** Countries

Physics
Relative Strength: **9** Countries
Relative Weakness: **17** Countries

Earth Science
Relative Strength: **15** Countries
Relative Weakness: **15** Countries

Trends 2011–2015: 34 Countries



Differences in Achievement by Gender in the Content Domains

Achievement differences in content domains by gender showed a large advantage for girls in Biology and Chemistry. Boys had an advantage in Physics and Earth Science.

Number of Countries Where Boys Outperformed Girls in the Content Domains
- 0 Biology
- 0 Chemistry
- 17 Physics
- 18 Earth Science

Number of Countries Where Girls Outperformed Boys in the Content Domains
- 24 Biology
- 26 Chemistry
- 8 Physics
- 8 Earth Science

Achievement by Cognitive Domains

TIMSS at the eighth grade provided results for three cognitive domains—Knowing, Applying, and Reasoning. Although there was some balance in achievement across cognitive domains, most countries had at least one strength and one weakness compared to science achievement overall.

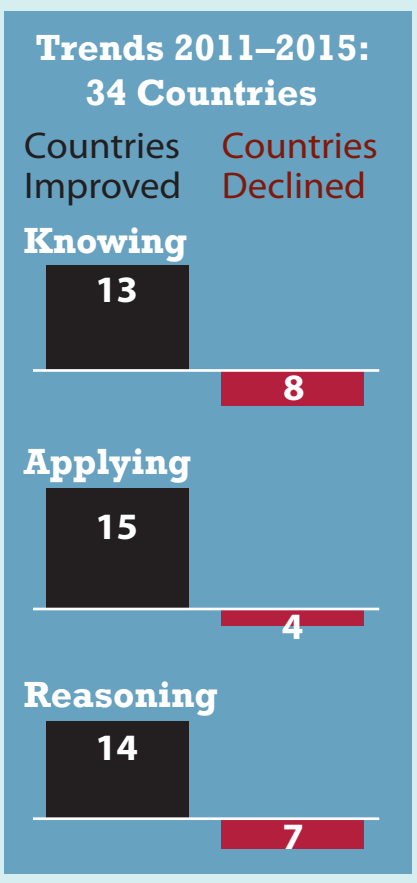
TIMSS 2015: 39 Countries

Knowing
Relative Strength: **9** Countries
Relative Weakness: **18** Countries

Applying
Relative Strength: **7** Countries
Relative Weakness: **12** Countries

Reasoning
Relative Strength: **9** Countries
Relative Weakness: **19** Countries

Trends 2011–2015: 34 Countries



Differences in Achievement by Gender in the Cognitive Domains

Differences in the cognitive domains by gender show an advantage for girls in the Reasoning domain and for boys in the Knowing domain.

Number of Countries Where Boys Outperformed Girls in the Cognitive Domains
- 12 Knowing
- 2 Applying
- 2 Reasoning

Number of Countries Where Girls Outperformed Boys in the Cognitive Domains
- 11 Knowing
- 19 Applying
- 18 Reasoning

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.
http://timss2015.org/download-center/

IEA TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College

Exhibit 3.2: Achievement in Science Content Domains

Country	Overall Science Average Scale Score	Biology (75 items)		Chemistry (43 items)	
		Average Scale Score	Difference from Overall Science Score	Average Scale Score	Difference from Overall Science Score
[2] Singapore	597 (3.2)	609 (3.5)	12 (0.8) ▲	593 (3.6)	-3 (1.3) ▼
Japan	571 (1.8)	570 (2.9)	-1 (2.2)	570 (2.4)	-1 (1.9)
Chinese Taipei	569 (2.1)	565 (2.2)	-4 (1.4) ▼	579 (2.7)	9 (1.9) ▲
Korea, Rep. of	556 (2.2)	554 (2.2)	-2 (1.5)	550 (2.5)	-5 (1.3) ▼
Slovenia	551 (2.4)	548 (2.8)	-3 (1.8)	552 (2.6)	1 (1.7)
Hong Kong SAR	546 (3.9)	549 (4.7)	3 (2.2)	536 (4.1)	-10 (1.4) ▼
Russian Federation	544 (4.2)	539 (4.4)	-5 (1.7) ▼	558 (4.9)	14 (2.4) ▲
England	537 (3.8)	542 (4.0)	5 (1.3) ▲	529 (4.5)	-8 (1.9) ▼
Kazakhstan	533 (4.4)	520 (4.6)	-12 (1.4) ▼	554 (5.2)	21 (2.2) ▲
Ireland	530 (2.8)	534 (2.9)	4 (0.9) ▲	517 (3.6)	-13 (2.2) ▼
† United States	530 (2.8)	540 (2.9)	10 (1.0) ▲	519 (3.2)	-11 (1.0) ▼
Hungary	527 (3.4)	521 (3.3)	-7 (1.9) ▼	534 (3.6)	7 (1.1) ▲
[1] † Canada	526 (2.2)	534 (2.4)	8 (0.9) ▲	512 (2.2)	-14 (1.1) ▼
Sweden	522 (3.4)	520 (3.6)	-2 (1.8)	512 (3.6)	-10 (1.3) ▼
[2] Lithuania	519 (2.8)	521 (3.1)	2 (1.5)	517 (3.2)	-2 (2.1)
† New Zealand	513 (3.1)	520 (3.5)	7 (1.5) ▲	498 (3.5)	-15 (1.3) ▼
Australia	512 (2.7)	522 (2.8)	10 (1.3) ▲	493 (3.3)	-19 (1.3) ▼
Norway (9)	509 (2.8)	502 (2.6)	-7 (1.0) ▼	503 (2.9)	-6 (1.5) ▼
[3] Israel	507 (3.9)	504 (4.2)	-3 (1.7)	516 (4.6)	9 (1.6) ▲
[2] Italy	499 (2.4)	496 (2.6)	-3 (0.9) ▼	487 (2.4)	-12 (1.5) ▼
Turkey	493 (4.0)	491 (4.1)	-2 (1.5)	493 (4.7)	0 (1.2)
Malta	481 (1.6)	473 (2.7)	-9 (2.0) ▼	481 (2.1)	0 (2.2)
United Arab Emirates	477 (2.3)	475 (2.4)	-2 (0.9) ▼	481 (3.2)	4 (1.7) ▲
Malaysia	471 (4.1)	466 (4.4)	-5 (1.0) ▼	473 (4.0)	2 (1.5)
Bahrain	466 (2.2)	469 (2.6)	3 (1.3) ▲	462 (2.8)	-4 (2.0)
Qatar	457 (3.0)	454 (3.0)	-2 (1.6)	455 (3.6)	-2 (1.6)
Iran, Islamic Rep. of	456 (4.0)	448 (3.8)	-8 (1.3) ▼	458 (4.6)	1 (1.2)
Thailand	456 (4.2)	466 (4.1)	10 (1.2) ▲	445 (4.9)	-11 (1.6) ▼
Oman	455 (2.7)	454 (2.7)	0 (1.4)	452 (2.7)	-2 (1.3)
Chile	454 (3.1)	459 (3.6)	5 (1.6) ▲	438 (3.6)	-16 (1.9) ▼
[1] [2] Georgia	443 (3.1)	447 (3.1)	4 (1.7) ▲	456 (3.7)	13 (2.9) ▲
Jordan	426 (3.4)	420 (3.9)	-7 (1.9) ▼	438 (3.8)	11 (1.4) ▲
Kuwait	411 (5.2)	402 (5.9)	-9 (1.6) ▼	413 (5.7)	2 (2.0)
Lebanon	398 (5.3)	366 (6.2)	-32 (3.0) ▼	438 (6.2)	40 (3.8) ▲
Saudi Arabia	396 (4.5)	397 (5.1)	1 (2.8)	377 (5.0)	-19 (2.4) ▼
Morocco	393 (2.5)	380 (2.5)	-14 (0.9) ▼	400 (3.0)	6 (1.3) ▲
Botswana (9)	392 (2.7)	397 (2.9)	5 (1.1) ▲	390 (3.6)	-2 (2.2)
Egypt	371 (4.3)	348 (5.0)	-22 (1.7) ▼	395 (5.0)	24 (2.6) ▲
South Africa (9)	358 (5.6)	356 (5.9)	-1 (1.0)	369 (6.1)	11 (2.4) ▲
Benchmarking Participants					
‡ Quebec, Canada	530 (4.4)	527 (4.3)	-3 (2.0)	531 (4.6)	1 (1.6)
Dubai, UAE	525 (2.0)	525 (2.4)	0 (1.9)	528 (2.5)	3 (1.6) ▲
Ontario, Canada	524 (2.5)	538 (2.9)	14 (1.3) ▲	503 (2.7)	-21 (1.4) ▼
[1] Florida, US	508 (6.0)	518 (5.8)	10 (2.2) ▲	498 (6.9)	-10 (2.6) ▼
Norway (8)	489 (2.4)	486 (2.9)	-4 (2.1)	479 (3.5)	-10 (2.8) ▼
Abu Dhabi, UAE	454 (5.6)	452 (6.1)	-2 (1.8)	459 (6.7)	5 (2.2) ▲
† Buenos Aires, Argentina	386 (4.2)	391 (4.7)	5 (1.8) ▲	354 (5.3)	-32 (3.6) ▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

▲ Subscale score significantly higher than overall science score

▼ Subscale score significantly lower than overall science score

Numbers of items are based on the TIMSS 2015 eighth grade science assessment items included in scaling.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

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

Exhibit 3.2: Achievement in Science Content Domains (Continued)

Country	Physics (53 items)		Earth Science (44 items)	
	Average Scale Score	Difference from Overall Science Score	Average Scale Score	Difference from Overall Science Score
[2] Singapore	608 (3.1)	12 (0.9) ▲	565 (3.6)	-32 (2.1) ▼
Japan	570 (2.3)	-1 (1.3)	574 (2.0)	3 (0.9) ▲
Chinese Taipei	560 (3.0)	-10 (2.2) ▼	581 (2.7)	11 (2.6) ▲
Korea, Rep. of	564 (2.8)	9 (1.9) ▲	554 (2.7)	-1 (2.0)
Slovenia	545 (2.9)	-6 (1.5) ▼	564 (2.9)	13 (2.0) ▲
Hong Kong SAR	540 (4.1)	-6 (1.1) ▼	558 (4.3)	12 (1.1) ▲
Russian Federation	548 (4.2)	4 (1.8)	532 (4.7)	-12 (1.8) ▼
England	535 (3.9)	-1 (1.1)	536 (4.0)	-1 (1.5)
Kazakhstan	543 (5.0)	10 (1.5) ▲	508 (5.4)	-25 (2.3) ▼
Ireland	525 (3.2)	-5 (2.3) ▼	542 (3.1)	12 (1.4) ▲
† United States	516 (2.9)	-14 (0.6) ▼	535 (3.1)	5 (1.0) ▲
Hungary	531 (4.0)	4 (2.1)	521 (3.9)	-6 (1.6) ▼
[1] † Canada	521 (2.2)	-6 (1.1) ▼	532 (2.3)	6 (1.9) ▲
Sweden	524 (3.7)	2 (2.3)	532 (4.5)	10 (3.1) ▲
[2] Lithuania	513 (3.6)	-7 (2.2) ▼	518 (3.3)	-1 (1.8)
† New Zealand	508 (3.2)	-4 (1.0) ▼	517 (3.6)	4 (1.7) ▲
Australia	505 (2.7)	-7 (0.7) ▼	522 (2.9)	10 (1.8) ▲
Norway (9)	512 (3.1)	3 (1.7)	523 (3.3)	14 (1.3) ▲
[3] Israel	508 (4.0)	2 (1.0)	493 (4.0)	-14 (1.3) ▼
[2] Italy	496 (2.5)	-3 (1.7)	514 (2.8)	15 (2.3) ▲
Turkey	506 (4.2)	12 (1.0) ▲	477 (3.9)	-16 (0.9) ▼
Malta	490 (1.8)	9 (2.4) ▲	481 (2.5)	0 (2.1)
United Arab Emirates	475 (2.5)	-2 (1.0) ▼	475 (2.4)	-2 (1.1)
Malaysia	480 (3.9)	9 (1.0) ▲	460 (4.5)	-10 (1.1) ▼
Bahrain	461 (2.6)	-5 (1.4) ▼	461 (3.5)	-5 (2.7)
Qatar	459 (3.4)	3 (2.0)	446 (3.7)	-11 (2.7) ▼
Iran, Islamic Rep. of	475 (4.4)	19 (2.4) ▲	439 (4.5)	-18 (1.6) ▼
Thailand	437 (4.6)	-19 (1.8) ▼	459 (4.5)	3 (1.3) ▲
Oman	449 (3.0)	-6 (1.7) ▼	456 (2.4)	2 (1.7)
Chile	439 (3.8)	-15 (1.9) ▼	464 (3.2)	10 (1.5) ▲
[1] [2] Georgia	429 (4.6)	-14 (2.8) ▼	420 (3.6)	-23 (2.2) ▼
Jordan	424 (3.6)	-2 (1.5)	416 (3.0)	-10 (2.0) ▼
Kuwait	411 (5.1)	1 (1.6)	408 (5.1)	-2 (2.4)
Lebanon	412 (6.6)	14 (4.0) ▲	365 (6.4)	-33 (3.4) ▼
Saudi Arabia	385 (5.3)	-11 (2.5) ▼	403 (4.3)	7 (2.3) ▲
Morocco	395 (2.9)	2 (1.2)	395 (2.2)	1 (1.6)
Botswana (9)	384 (2.8)	-8 (1.5) ▼	368 (3.1)	-23 (1.7) ▼
Egypt	378 (4.7)	7 (1.4) ▲	351 (4.6)	-20 (2.1) ▼
South Africa (9)	359 (5.5)	1 (1.5)	330 (6.4)	-28 (1.4) ▼
Benchmarking Participants				
‡ Quebec, Canada	520 (4.7)	-10 (2.4) ▼	542 (4.2)	13 (2.9) ▲
Dubai, UAE	525 (2.4)	0 (1.4)	518 (2.3)	-7 (1.2) ▼
Ontario, Canada	521 (2.9)	-2 (2.0)	526 (3.2)	2 (2.6)
[1] Florida, US	498 (5.8)	-11 (3.4) ▼	505 (6.7)	-4 (2.3)
Norway (8)	483 (2.6)	-6 (1.3) ▼	506 (3.2)	16 (2.0) ▲
Abu Dhabi, UAE	454 (5.4)	0 (1.9)	453 (5.8)	-1 (1.3)
† Buenos Aires, Argentina	381 (5.2)	-5 (2.7) ▼	388 (5.5)	2 (2.7)

▲ Subscale score significantly higher than overall science score

▼ Subscale score significantly lower than overall science score

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 3.4: Achievement in Science Cognitive Domains

Country	Overall Science Average Scale Score	Knowing (75 items)		Applying (88 items)		Reasoning (52 items)	
		Average Scale Score	Difference from Overall Science Score	Average Scale Score	Difference from Overall Science Score	Average Scale Score	Difference from Overall Science Score
[2] Singapore	597 (3.2)	594 (3.4)	-3 (1.0) ▼	600 (3.4)	3 (0.9) ▲	595 (3.2)	-2 (0.7) ▼
Japan	571 (1.8)	567 (2.2)	-3 (1.2) ▼	575 (1.9)	4 (0.8) ▲	570 (2.1)	-1 (1.1)
Chinese Taipei	569 (2.1)	589 (2.3)	20 (1.3) ▲	565 (2.0)	-4 (1.0) ▼	560 (2.0)	-9 (1.3) ▼
Korea, Rep. of	556 (2.2)	555 (2.9)	0 (2.0)	552 (2.2)	-3 (1.3) ▼	560 (2.8)	5 (1.7) ▲
Slovenia	551 (2.4)	558 (2.6)	7 (1.7) ▲	547 (2.3)	-4 (1.2) ▼	550 (2.3)	-1 (1.3)
Hong Kong SAR	546 (3.9)	547 (3.7)	2 (1.0)	541 (4.3)	-5 (1.5) ▼	550 (4.4)	4 (1.4) ▲
Russian Federation	544 (4.2)	558 (5.2)	14 (2.2) ▲	538 (4.6)	-6 (1.8) ▼	538 (3.9)	-7 (1.7) ▼
England	537 (3.8)	523 (4.1)	-14 (1.2) ▼	538 (3.9)	2 (1.4)	545 (4.0)	8 (1.4) ▲
Kazakhstan	533 (4.4)	529 (5.8)	-4 (2.6)	535 (4.5)	3 (0.9) ▲	528 (4.7)	-5 (2.1) ▼
Ireland	530 (2.8)	523 (3.2)	-7 (1.6) ▼	533 (3.0)	3 (1.8)	532 (3.0)	2 (2.2)
† United States	530 (2.8)	532 (3.4)	2 (1.2)	531 (2.8)	1 (1.2)	526 (2.8)	-4 (0.9) ▼
Hungary	527 (3.4)	525 (3.5)	-2 (1.1) ▼	528 (3.4)	1 (1.6)	524 (3.8)	-3 (2.2)
[1] † Canada	526 (2.2)	518 (2.3)	-8 (1.6) ▼	526 (2.1)	-1 (0.9)	533 (2.2)	7 (0.8) ▲
Sweden	522 (3.4)	519 (3.2)	-3 (1.2) ▼	518 (3.5)	-4 (1.9) ▼	526 (4.0)	4 (2.2)
[2] Lithuania	519 (2.8)	513 (3.1)	-6 (2.1) ▼	517 (3.4)	-3 (2.2)	525 (3.2)	6 (1.9) ▲
† New Zealand	513 (3.1)	503 (3.2)	-10 (0.9) ▼	513 (3.5)	1 (1.2)	520 (3.3)	7 (1.7) ▲
Australia	512 (2.7)	510 (2.7)	-2 (1.1)	512 (2.9)	0 (0.8)	513 (2.8)	1 (1.0)
Norway (9)	509 (2.8)	500 (3.1)	-8 (1.5) ▼	507 (2.9)	-2 (1.7)	518 (3.0)	9 (1.3) ▲
[3] Israel	507 (3.9)	503 (4.3)	-4 (1.3) ▼	504 (3.8)	-3 (1.1) ▼	511 (4.4)	4 (1.6) ▲
[2] Italy	499 (2.4)	505 (2.6)	6 (1.4) ▲	496 (2.4)	-3 (1.5)	493 (2.8)	-6 (1.4) ▼
Turkey	493 (4.0)	489 (4.5)	-4 (1.1) ▼	492 (3.9)	-1 (1.5)	495 (4.2)	2 (1.4)
Malta	481 (1.6)	468 (2.1)	-14 (1.3) ▼	489 (1.8)	8 (1.5) ▲	479 (1.7)	-3 (1.1) ▼
United Arab Emirates	477 (2.3)	478 (2.5)	1 (1.3)	478 (2.4)	1 (0.8)	473 (2.4)	-4 (0.9) ▼
Malaysia	471 (4.1)	466 (5.1)	-5 (2.1) ▼	476 (4.2)	5 (0.8) ▲	467 (3.9)	-4 (0.9) ▼
Bahrain	466 (2.2)	462 (2.5)	-4 (1.7) ▼	464 (2.4)	-2 (1.0)	466 (2.8)	1 (1.8)
Qatar	457 (3.0)	448 (3.6)	-9 (2.3) ▼	460 (3.6)	3 (1.7)	454 (3.2)	-2 (1.7)
Iran, Islamic Rep. of	456 (4.0)	455 (4.8)	-1 (1.7)	457 (4.0)	1 (0.9)	454 (4.0)	-3 (1.1) ▼
Thailand	456 (4.2)	469 (4.3)	14 (1.4) ▲	450 (4.7)	-6 (1.3) ▼	447 (4.0)	-9 (1.1) ▼
Oman	455 (2.7)	455 (2.9)	0 (1.1)	454 (2.9)	-1 (1.3)	454 (2.4)	0 (1.3)
Chile	454 (3.1)	466 (3.2)	12 (1.6) ▲	446 (3.0)	-8 (1.3) ▼	448 (3.6)	-5 (1.2) ▼
[1] [2] Georgia	443 (3.1)	452 (3.3)	9 (2.7) ▲	442 (3.1)	-1 (2.3)	432 (3.5)	-11 (1.8) ▼
Jordan	426 (3.4)	430 (3.3)	4 (1.7) ▲	425 (3.3)	-1 (1.3)	419 (3.6)	-7 (1.7) ▼
Kuwait	411 (5.2)	415 (5.2)	4 (1.9) ▲	406 (5.2)	-5 (1.5) ▼	400 (5.8)	-11 (1.6) ▼
Lebanon	398 (5.3)	403 (5.9)	5 (2.9)	398 (5.3)	0 (2.8)	381 (6.3)	-17 (2.5) ▼
Saudi Arabia	396 (4.5)	395 (5.0)	-2 (3.1)	383 (4.9)	-14 (2.2) ▼	405 (4.7)	8 (1.9) ▲
Morocco	393 (2.5)	395 (2.3)	2 (0.9)	391 (2.8)	-2 (0.8) ▼	385 (2.6)	-9 (1.2) ▼
Botswana (9)	392 (2.7)	371 (3.6)	-21 (1.8) ▼	398 (3.8)	7 (2.2) ▲	390 (2.6)	-2 (2.0)
Egypt	371 (4.3)	372 (5.2)	1 (2.1)	371 (4.4)	0 (1.4)	359 (4.8)	-12 (2.3) ▼
South Africa (9)	358 (5.6)	337 (6.7)	-20 (2.0) ▼	368 (5.9)	10 (1.5) ▲	350 (5.6)	-7 (1.5) ▼
Benchmarking Participants							
‡ Quebec, Canada	530 (4.4)	527 (5.1)	-3 (2.6)	524 (4.6)	-5 (1.1) ▼	535 (4.5)	6 (1.4) ▲
Dubai, UAE	525 (2.0)	527 (2.5)	3 (1.9)	525 (2.2)	0 (1.3)	521 (2.0)	-4 (1.1) ▼
Ontario, Canada	524 (2.5)	514 (2.6)	-10 (1.9) ▼	525 (2.4)	1 (1.3)	532 (2.6)	8 (1.5) ▲
[1] Florida, US	508 (6.0)	511 (6.9)	2 (2.6)	508 (5.8)	-1 (1.6)	506 (6.4)	-3 (2.6)
Norway (8)	489 (2.4)	477 (3.2)	-12 (1.9) ▼	488 (2.6)	-1 (1.6)	498 (2.4)	9 (0.9) ▲
Abu Dhabi, UAE	454 (5.6)	453 (6.1)	-2 (2.1)	457 (5.9)	3 (1.1) ▲	454 (5.7)	-1 (1.7)
† Buenos Aires, Argentina	386 (4.2)	397 (4.8)	11 (2.5) ▲	379 (4.5)	-7 (2.1) ▼	373 (4.8)	-13 (2.7) ▼

▲ Subscale score significantly higher than overall science score

▼ Subscale score significantly lower than overall science score

Numbers of items are based on the TIMSS 2015 eighth grade science assessment items included in scaling.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 3.6: Differences in Achievement for Science Content Domains Across Assessment Years

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Biology Average Scale Score	Biology Differences Between Years		Chemistry Average Scale Score	Chemistry Differences Between Years		Physics Average Scale Score	Physics Differences Between Years		Earth Science Average Scale Score	Earth Science Differences Between Years	
		2011	2007		2011	2007		2011	2007		2011	2007
Australia												
2015	522 (2.8)	-5	3	493 (3.3)	-8	-12 ▼	505 (2.7)	-6	-4	522 (2.9)	-11	1
2011	527 (4.8)		8	501 (5.0)		-3	511 (5.1)		2	533 (5.5)		13
2007	519 (3.8)			504 (4.0)			509 (4.3)			521 (4.4)		
Bahrain												
2015	469 (2.6)	20 ▲	-1	462 (2.8)	15 ▲	-4	461 (2.6)	5	-2	461 (3.5)	9 ▲	0
◆◆ 2011	449 (2.0)		-22 ▼	448 (2.6)		-19 ▼	457 (1.7)		-7 ▼	451 (1.8)		-9 ▼
2007	470 (2.1)			467 (2.9)			463 (1.6)			460 (2.8)		
Botswana (9)												
2015	397 (2.9)	-4		390 (3.6)	-13 ▼		384 (2.8)	-33 ▼		368 (3.1)	-16 ▼	
2011	401 (3.8)			403 (3.5)			417 (3.5)			384 (4.3)		
Chile												
2015	459 (3.6)	-3		438 (3.6)	-9		439 (3.8)	-14 ▼		464 (3.2)	-12 ▼	
2011	462 (2.6)			447 (3.0)			453 (2.6)			476 (2.8)		
Chinese Taipei												
2015	565 (2.2)	8 ▲	11 ▲	579 (2.7)	-7	-6	560 (3.0)	8	1	581 (2.7)	12 ▲	29 ▲
2011	557 (2.5)		3	585 (3.8)		1	552 (3.3)		-6	568 (2.8)		16 ▲
2007	554 (3.7)			585 (4.7)			559 (4.2)			552 (3.4)		
Egypt												
2015	348 (5.0)		-52 ▼	395 (5.0)		-9	378 (4.7)		-28 ▼	351 (4.6)		-65 ▼
2007	400 (3.7)			404 (4.7)			406 (3.8)			417 (4.4)		
England												
2015	542 (4.0)	9	-2	529 (4.5)	0	-11	535 (3.9)	2	-14 ▼	536 (4.0)	-1	4
‡ 2011	533 (4.8)		-11	529 (5.2)		-11	533 (4.7)		-15 ▼	536 (5.3)		5
† 2007	544 (4.7)			539 (4.7)			549 (4.5)			531 (5.2)		
Georgia												
1 2 2015	447 (3.1)	12 ▲	28 ▲	456 (3.7)	61 ▲	48 ▲	429 (4.6)	28 ▲	19 ▲	420 (3.6)	2	4
1 2011	435 (3.2)		16 ▲	395 (3.2)		-13 ▼	401 (4.2)		-9	417 (3.5)		2
1 2007	419 (4.1)			408 (5.4)			411 (5.9)			416 (4.5)		
Hong Kong SAR												
2015	549 (4.7)	13 ▲	19 ▲	536 (4.1)	10	15 ▲	540 (4.1)	2	10	558 (4.3)	19 ▲	23 ▲
2011	535 (3.6)		6	526 (3.6)		5	539 (3.6)		9	539 (3.6)		4
† 2007	529 (5.0)			521 (5.3)			530 (5.4)			535 (5.1)		
Hungary												
2015	521 (3.3)	1	-14 ▼	534 (3.6)	0	-6	531 (4.0)	6	-13 ▼	521 (3.9)	10 ▲	-13 ▼
2011	520 (3.0)		-15 ▼	534 (3.3)		-6	525 (3.7)		-19 ▼	511 (3.3)		-24 ▼
2007	535 (2.9)			540 (4.0)			544 (3.7)			535 (3.3)		
Iran, Islamic Rep. of												
2015	448 (3.8)	-18 ▼	3	458 (4.6)	-12	1	475 (4.4)	-8	8	439 (4.5)	-38 ▼	-33 ▼
2011	466 (3.9)		21 ▲	469 (4.4)		12 ▲	483 (4.1)		16 ▲	477 (4.0)		5
2007	445 (3.7)			457 (4.1)			467 (4.1)			472 (4.3)		
Israel												
3 2015	504 (4.2)	-19 ▼		516 (4.6)	2		508 (4.0)	-5		493 (4.0)	-12 ▼	
3 2011	523 (4.2)			514 (5.0)			514 (4.1)			504 (4.3)		
Italy												
2 2015	496 (2.6)	-8 ▼	-6	487 (2.4)	-4	9 ▲	496 (2.5)	6	8	514 (2.8)	1	12 ▲
2011	503 (3.0)		1	491 (3.0)		13 ▲	490 (2.8)		2	513 (3.8)		11 ▲
2007	502 (3.2)			478 (3.5)			489 (3.5)			502 (3.5)		
Japan												
2015	570 (2.9)	10 ▲	16 ▲	570 (2.4)	10 ▲	11 ▲	570 (2.3)	12 ▲	6 ▲	574 (2.0)	26 ▲	38 ▲
2011	561 (2.3)		6 ▲	560 (2.7)		1	558 (2.8)		-5	548 (2.8)		12 ▲
2007	554 (2.0)			559 (2.4)			563 (2.2)			536 (3.4)		

▲ More recent year significantly higher

▼ More recent year significantly lower

Trend results for Kuwait do not include private schools. Trend results for Lithuania do not include students taught in Polish or in Russian. South Africa (9) tested one year later.

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

◆◆ Tested the same cohort of students as other countries, but later in the assessment year at the beginning of the next school year.

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 3.6: Differences in Achievement for Science Content Domains Across Assessment Years (Continued)

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Biology Average Scale Score	Biology Differences Between Years		Chemistry Average Scale Score	Chemistry Differences Between Years		Physics Average Scale Score	Physics Differences Between Years		Earth Science Average Scale Score	Earth Science Differences Between Years	
		2011	2007		2011	2007		2011	2007		2011	2007
Jordan												
2015	420 (3.9)	-28 ▼	-57 ▼	438 (3.8)	-25 ▼	-55 ▼	424 (3.6)	-22 ▼	-53 ▼	416 (3.0)	-20 ▼	-66 ▼
2011	447 (4.4)		-29 ▼	463 (4.4)		-30 ▼	446 (4.2)		-31 ▼	436 (4.3)		-46 ▼
2007	476 (4.2)			493 (4.7)			478 (4.3)			481 (4.2)		
Kazakhstan												
2015	520 (4.6)	37 ▲		554 (5.2)	45 ▲		543 (5.0)	54 ▲		508 (5.4)	36 ▲	
2011	483 (4.4)			508 (4.7)			489 (4.3)			472 (4.8)		
Korea, Rep. of												
2015	554 (2.2)	-7 ▼	2	550 (2.5)	-1	11 ▲	564 (2.8)	-12 ▼	-12 ▼	554 (2.7)	7	12 ▲
2011	561 (2.3)		9 ▲	551 (2.1)		12 ▲	577 (2.7)		0	548 (3.2)		5
2007	552 (2.0)			539 (3.0)			576 (2.6)			543 (2.4)		
Kuwait												
2015	384 (5.3)		-31 ▼	395 (5.9)		-16 ▼	397 (4.7)		-35 ▼	389 (4.9)		-12 ▼
◆◆ 2007	415 (2.7)			411 (4.2)			432 (3.3)			401 (3.7)		
Lebanon												
2015	366 (6.2)	-29 ▼	-33 ▼	438 (6.2)	3	-2	412 (6.6)	7	-12	365 (6.4)	1	-13
2011	395 (5.2)		-4	435 (5.2)		-5	405 (5.4)		-19 ▼	365 (6.4)		-14
2007	399 (6.7)			440 (6.5)			424 (5.7)			378 (6.8)		
Lithuania												
[2] 2015	524 (3.4)	8	-5	519 (3.2)	2	13 ▲	514 (3.7)	11 ▲	7	521 (3.4)	5	4
[1] 2011	517 (2.7)		-13 ▼	517 (2.3)		11 ▲	503 (3.2)		-4	517 (3.5)		0
[1] 2007	530 (2.7)			506 (2.6)			507 (3.1)			517 (3.0)		
Malaysia												
2015	466 (4.4)	39 ▲	1	473 (4.0)	47 ▲	-2	480 (3.9)	45 ▲	-2	460 (4.5)	59 ▲	4
2011	427 (6.2)		-39 ▼	426 (6.5)		-49 ▼	435 (6.6)		-47 ▼	401 (6.5)		-56 ▼
2007	466 (6.2)			475 (5.9)			482 (6.4)			457 (6.1)		
Malta												
2015	473 (2.7)		23 ▲	481 (2.1)		26 ▲	490 (1.8)		23 ▲	481 (2.5)		31 ▲
2007	449 (1.9)			456 (2.2)			467 (2.1)			450 (1.7)		
Morocco												
2015	380 (2.5)	2		400 (3.0)	25 ▲		395 (2.9)	47 ▲		395 (2.2)	18 ▲	
2011	378 (3.1)			374 (2.3)			349 (2.6)			377 (3.3)		
New Zealand												
† 2015	520 (3.5)	5		498 (3.5)	-3		508 (3.2)	0		517 (3.6)	-6	
2011	514 (4.8)			501 (5.3)			509 (4.6)			523 (4.8)		
Norway (8)												
2015	486 (2.9)	-6	1	479 (3.5)	-9	-1	483 (2.6)	2	10 ▲	506 (3.2)	-10 ▼	4
2011	491 (2.3)		6	488 (2.8)		8	481 (3.4)		8	516 (3.3)		14 ▲
2007	485 (2.7)			480 (2.9)			474 (3.4)			502 (2.7)		
Oman												
2015	454 (2.7)	47 ▲	47 ▲	452 (2.7)	44 ▲	44 ▲	449 (3.0)	22 ▲	10 ▲	456 (2.4)	25 ▲	24 ▲
2011	407 (3.5)		0	408 (3.5)		0	427 (3.3)		-12 ▼	431 (3.0)		-1
2007	408 (3.2)			408 (4.4)			439 (3.1)			432 (2.9)		

▲ More recent year significantly higher
▼ More recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 3.6: Differences in Achievement for Science Content Domains Across Assessment Years (Continued)

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Biology Average Scale Score	Biology Differences Between Years		Chemistry Average Scale Score	Chemistry Differences Between Years		Physics Average Scale Score	Physics Differences Between Years		Earth Science Average Scale Score	Earth Science Differences Between Years	
		2011	2007		2011	2007		2011	2007		2011	2007
Qatar												
2015	454 (3.0)	43 ▲		455 (3.6)	39 ▲		459 (3.4)	33 ▲		446 (3.7)	38 ▲	
2011	411 (4.2)			416 (4.0)			426 (3.8)			408 (3.8)		
Russian Federation												
2015	539 (4.4)	2	12 ▲	558 (4.9)	4	18 ▲	548 (4.2)	1	27 ▲	532 (4.7)	-3	4
2 2011	537 (3.3)		10	554 (3.5)		13 ▲	547 (3.6)		26 ▲	535 (3.6)		7
2007	527 (3.9)			540 (4.2)			521 (4.3)			528 (4.2)		
Saudi Arabia												
2015	397 (5.1)	-32 ▼		377 (5.0)	-50 ▼		385 (5.3)	-52 ▼		403 (4.3)	-38 ▼	
2011	430 (4.5)			428 (4.6)			437 (4.2)			441 (3.6)		
Singapore												
2 2015	609 (3.5)	15 ▲	42 ▲	593 (3.6)	3	27 ▲	608 (3.1)	7	26 ▲	565 (3.6)	-1	17 ▲
2 2011	594 (4.8)		27 ▲	590 (4.7)		24 ▲	602 (4.2)		19 ▲	566 (4.5)		19 ▲
2007	567 (4.5)			566 (4.8)			582 (4.3)			547 (4.9)		
Slovenia												
2015	548 (2.8)	16 ▲	17 ▲	552 (2.6)	-5	6	545 (2.9)	13 ▲	18 ▲	564 (2.9)	4	17 ▲
2011	532 (2.7)		0	558 (3.2)		11 ▲	532 (2.8)		4	560 (3.2)		13 ▲
2007	532 (2.5)			546 (3.0)			528 (2.4)			548 (2.6)		
South Africa (9)												
2015	356 (5.9)	38 ▲		369 (6.1)	33 ▲		359 (5.5)	8		330 (6.4)	36 ▲	
ψ 2011	318 (3.5)			336 (3.8)			351 (3.6)			294 (3.7)		
Sweden												
2015	520 (3.6)	7	5	512 (3.6)	10 ▲	13 ▲	524 (3.7)	26 ▲	17 ▲	532 (4.5)	12 ▲	20 ▲
2011	513 (2.9)		-3	502 (2.6)		3	498 (3.2)		-9 ▼	520 (2.7)		8
2007	515 (2.6)			499 (2.8)			507 (3.0)			511 (3.3)		
Thailand												
2015	466 (4.1)	6	-10	445 (4.9)	9	-10	437 (4.6)	7	-17 ▼	459 (4.5)	-7	-26 ▼
2011	460 (4.2)		-16 ▼	436 (4.5)		-19 ▼	430 (4.4)		-25 ▼	466 (4.0)		-20 ▼
2007	476 (4.5)			455 (4.7)			454 (4.5)			485 (4.3)		
Turkey												
2015	491 (4.1)	7		493 (4.7)	16 ▲		506 (4.2)	12 ▲		477 (3.9)	9	
2011	484 (3.7)			477 (4.0)			494 (3.6)			468 (3.4)		
United Arab Emirates												
2015	475 (2.4)	12 ▲		481 (3.2)	17 ▲		475 (2.5)	13 ▲		475 (2.4)	8 ▲	
2011	463 (2.4)			464 (2.3)			461 (2.3)			466 (2.5)		
United States												
† 2015	540 (2.9)	10 ▲	10 ▲	519 (3.2)	-1	9 ▲	516 (2.9)	3	13 ▲	535 (3.1)	2	9
2 2011	530 (2.5)		0	520 (2.6)		10 ▲	513 (2.5)		10 ▲	533 (2.7)		7
2 † 2007	531 (3.0)			510 (3.1)			503 (3.0)			526 (3.7)		
Benchmarking Participants												
Ontario, Canada												
2015	538 (2.9)	7	0	503 (2.7)	8 ▲	-1	521 (2.9)	0	-1	526 (3.2)	-2	-7
2 2011	531 (2.6)		-6	495 (2.4)		-9 ▼	521 (2.8)		-1	528 (3.4)		-5
2 2007	537 (4.1)			504 (4.1)			523 (4.6)			533 (4.8)		
Quebec, Canada												
‡ 2015	527 (4.3)	2	15 ▲	531 (4.6)	15 ▲	35 ▲	520 (4.7)	18 ▲	28 ▲	542 (4.2)	7	28 ▲
2011	525 (2.8)		12 ▲	515 (3.0)		20 ▲	502 (3.1)		10 ▲	536 (2.9)		21 ▲
3 2007	512 (3.2)			495 (3.4)			492 (3.5)			514 (4.3)		
Abu Dhabi, UAE												
2015	452 (6.1)	-7		459 (6.7)	-2		454 (5.4)	-5		453 (5.8)	-8	
2011	459 (4.2)			461 (4.1)			459 (3.9)			461 (4.6)		
Dubai, UAE												
2015	525 (2.4)	40 ▲	42 ▲	528 (2.5)	41 ▲	36 ▲	525 (2.4)	43 ▲	36 ▲	518 (2.3)	31 ▲	30 ▲
2011	485 (2.7)		2	487 (2.4)		-5	482 (2.1)		-7	487 (3.1)		-1
◆ ‡ 2007	483 (3.3)			492 (3.9)			489 (3.5)			488 (3.7)		
Florida, US												
1 2015	518 (5.8)	-11		498 (6.9)	-27 ▼		498 (5.8)	-32 ▼		505 (6.7)	-31 ▼	
1 2 2011	529 (7.6)			525 (8.0)			530 (7.5)			536 (8.0)		

▲ More recent year significantly higher
▼ More recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 3.8: Differences in Achievement for Science Cognitive Domains Across Assessment Years

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Knowing Average Scale Score	Knowing Differences Between Years		Applying Average Scale Score	Applying Differences Between Years		Reasoning Average Scale Score	Reasoning Differences Between Years	
		2011	2007		2011	2007		2011	2007
Australia									
2015	510 (2.7)	-4	6	512 (2.9)	-5	1	513 (2.8)	-14 ▼	-18 ▼
2011	514 (5.1)		9	517 (4.5)		6	526 (5.0)		-4
2007	505 (3.7)			511 (3.7)			530 (4.1)		
Bahrain									
2015	462 (2.5)	4	-6	464 (2.4)	15 ▲	-1	466 (2.8)	18 ▲	3
◆◆ 2011	457 (3.7)		-10 ▼	450 (2.1)		-16 ▼	449 (2.0)		-15 ▼
2007	468 (2.2)			465 (2.2)			464 (2.4)		
Botswana (9)									
2015	371 (3.6)	-26 ▼		398 (3.8)	-5		390 (2.6)	-15 ▼	
2011	397 (3.6)			404 (3.3)			404 (3.3)		
Chile									
2015	466 (3.2)	-10 ▼		446 (3.0)	-7		448 (3.6)	-11 ▼	
2011	476 (3.1)			454 (2.3)			459 (2.7)		
Chinese Taipei									
2015	589 (2.3)	20 ▲	15 ▲	565 (2.0)	-5	2	560 (2.0)	9 ▲	16 ▲
2011	569 (2.6)		-5	570 (2.6)		6	551 (2.9)		7
2007	574 (3.9)			564 (3.7)			544 (4.0)		
Egypt									
2015	372 (5.2)		-57 ▼	371 (4.4)		-27 ▼	359 (4.8)		-26 ▼
2007	429 (4.1)			398 (3.8)			385 (3.7)		
England									
2015	523 (4.1)	-11	-14 ▼	538 (3.9)	7	-1	545 (4.0)	8	-4
‡ 2011	533 (5.1)		-3	531 (4.7)		-8	537 (4.9)		-12
† 2007	536 (5.2)			540 (4.3)			548 (4.6)		
Georgia									
1 2 2015	452 (3.3)	25 ▲	15 ▲	442 (3.1)	24 ▲	24 ▲	432 (3.5)	20 ▲	47 ▲
1 2011	428 (3.9)		-10	418 (3.8)		0	412 (3.7)		27 ▲
1 2007	438 (5.3)			418 (4.6)			385 (5.0)		
Hong Kong SAR									
2015	547 (3.7)	3	10	541 (4.3)	12 ▲	18 ▲	550 (4.4)	12 ▲	15 ▲
2011	544 (3.2)		7	529 (3.4)		6	538 (4.0)		3
† 2007	537 (4.8)			522 (5.1)			535 (5.6)		
Hungary									
2015	525 (3.5)	14 ▲	-5	528 (3.4)	-4	-23 ▼	524 (3.8)	6	-6
2011	511 (3.2)		-19 ▼	532 (3.5)		-19 ▼	518 (3.3)		-12 ▼
2007	530 (3.2)			551 (3.2)			530 (3.4)		
Iran, Islamic Rep. of									
2015	455 (4.8)	-24 ▼	-13 ▼	457 (4.0)	-13 ▼	6	454 (4.0)	-22 ▼	-2
2011	479 (4.6)		11	470 (3.9)		18 ▲	475 (3.8)		19 ▲
2007	468 (4.1)			452 (4.0)			456 (4.0)		
Israel									
3 2015	503 (4.3)	-15 ▼		504 (3.8)	-8		511 (4.4)	-8	
3 2011	518 (4.2)			512 (4.0)			519 (4.4)		
Italy									
2 2015	505 (2.6)	-8 ▼	8	496 (2.4)	-4	-1	493 (2.8)	4	4
2011	512 (2.7)		16 ▲	500 (2.3)		3	489 (2.6)		-1
2007	496 (3.6)			497 (2.9)			489 (3.1)		
Japan									
2015	567 (2.2)	27 ▲	26 ▲	575 (1.9)	14 ▲	18 ▲	570 (2.1)	3	7 ▲
2011	541 (2.7)		-1	561 (2.6)		4	568 (2.4)		4
2007	542 (2.4)			556 (2.1)			564 (2.3)		

▲ More recent year significantly higher

▼ More recent year significantly lower

Trend results for Kuwait do not include private schools. Trend results for Lithuania do not include students taught in Polish or in Russian. South Africa (9) tested one year later.

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

◆◆ Tested the same cohort of students as other countries, but later in the assessment year at the beginning of the next school year.

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 3.8: Differences in Achievement for Science Cognitive Domains Across Assessment Years (Continued)

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Knowing Average Scale Score	Knowing Differences Between Years		Applying Average Scale Score	Applying Differences Between Years		Reasoning Average Scale Score	Reasoning Differences Between Years	
		2011	2007		2011	2007		2011	2007
Jordan									
2015	430 (3.3)	-23 ▼	-62 ▼	425 (3.3)	-26 ▼	-59 ▼	419 (3.6)	-22 ▼	-47 ▼
2011	453 (4.4)		-39 ▼	451 (4.0)		-33 ▼	441 (4.3)		-25 ▼
2007	492 (4.8)			484 (4.3)			466 (4.2)		
Kazakhstan									
2015	529 (5.8)	46 ▲		535 (4.5)	44 ▲		528 (4.7)	41 ▲	
2011	483 (4.9)			491 (4.1)			487 (4.4)		
Korea, Rep. of									
2015	555 (2.9)	2	6	552 (2.2)	-9 ▼	2	560 (2.8)	-3	-1
2011	554 (3.0)		4	561 (2.1)		11 ▲	564 (2.3)		2
2007	550 (2.3)			550 (2.4)			561 (2.3)		
Kuwait									
2015	396 (4.8)		-30 ▼	392 (4.7)		-22 ▼	382 (4.9)		-20 ▼
◆◆ 2007	426 (2.6)			413 (3.1)			402 (3.1)		
Lebanon									
2015	403 (5.9)	22 ▲	2	398 (5.3)	-10	-20 ▼	381 (6.3)	-27 ▼	-29 ▼
2011	381 (5.7)		-20 ▼	408 (5.2)		-10	408 (5.7)		-2
2007	401 (6.3)			418 (6.1)			410 (6.6)		
Lithuania									
[2] 2015	516 (3.3)	0	-1	519 (3.7)	7	6	529 (3.3)	16 ▲	2
[1] 2011	516 (2.4)		-1	512 (2.3)		-1	513 (2.8)		-14 ▼
[1] 2007	517 (2.5)			513 (2.4)			527 (2.7)		
Malaysia									
2015	466 (5.1)	63 ▲	8	476 (4.2)	52 ▲	6	467 (3.9)	28 ▲	-15 ▼
2011	403 (7.1)		-55 ▼	424 (6.2)		-46 ▼	439 (6.0)		-44 ▼
2007	458 (6.8)			470 (6.2)			483 (5.5)		
Malta									
2015	468 (2.1)		31 ▲	489 (1.8)		28 ▲	479 (1.7)		11 ▲
2007	437 (1.3)			461 (1.3)			468 (1.5)		
Morocco									
2015	395 (2.3)	32 ▲		391 (2.8)	11 ▲		385 (2.6)	18 ▲	
2011	363 (2.8)			381 (2.0)			366 (2.3)		
New Zealand									
† 2015	503 (3.2)	-8		513 (3.5)	4		520 (3.3)	4	
2011	511 (5.0)			509 (4.4)			515 (4.7)		
Norway (8)									
2015	477 (3.2)	-12 ▼	-10 ▼	488 (2.6)	-8	3	498 (2.4)	4	10 ▲
2011	490 (2.7)		3	496 (3.0)		11 ▲	494 (3.0)		6
2007	487 (2.7)			485 (2.4)			488 (3.1)		
Oman									
2015	455 (2.9)	38 ▲	30 ▲	454 (2.9)	34 ▲	34 ▲	454 (2.4)	37 ▲	36 ▲
2011	416 (3.4)		-8	419 (3.4)		0	417 (3.0)		-2
2007	425 (3.5)			419 (3.6)			419 (3.8)		

▲ More recent year significantly higher
▼ More recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 3.8: Differences in Achievement for Science Cognitive Domains Across Assessment Years (Continued)

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Knowing Average Scale Score	Knowing Differences Between Years		Applying Average Scale Score	Applying Differences Between Years		Reasoning Average Scale Score	Reasoning Differences Between Years	
		2011	2007		2011	2007		2011	2007
Qatar									
2015	448 (3.6)	30 ▲		460 (3.6)	40 ▲		454 (3.2)	45 ▲	
2011	418 (4.5)			420 (3.7)			409 (4.6)		
Russian Federation									
2015	558 (5.2)	1	17 ▲	538 (4.6)	0	11	538 (3.9)	5	18 ▲
2 2011	557 (3.8)		16 ▲	539 (3.3)		12 ▲	533 (3.2)		13 ▲
2007	541 (4.4)			527 (4.0)			519 (4.0)		
Saudi Arabia									
2015	395 (5.0)	-53 ▼		383 (4.9)	-49 ▼		405 (4.7)	-19 ▼	
2011	448 (4.2)			432 (3.9)			424 (3.5)		
Singapore									
2 2015	594 (3.4)	6	32 ▲	600 (3.4)	11 ▲	30 ▲	595 (3.2)	2	26 ▲
2 2011	588 (4.9)		26 ▲	589 (4.4)		19 ▲	592 (4.4)		24 ▲
2007	561 (4.9)			570 (4.5)			568 (4.5)		
Slovenia									
2015	558 (2.6)	8 ▲	20 ▲	547 (2.3)	5	12 ▲	550 (2.3)	15 ▲	11 ▲
2011	551 (2.6)		12 ▲	542 (2.5)		7 ▲	536 (2.7)		-4
2007	538 (2.2)			535 (2.5)			540 (2.6)		
South Africa (9)									
2015	337 (6.7)	55 ▲		368 (5.9)	33 ▲		350 (5.6)	12	
ψ 2011	282 (4.1)			335 (3.5)			338 (5.0)		
Sweden									
2015	519 (3.2)	8	12 ▲	518 (3.5)	10 ▲	9 ▲	526 (4.0)	17 ▲	10 ▲
2011	512 (2.5)		4	508 (2.7)		-1	510 (3.0)		-6
2007	508 (2.6)			509 (2.8)			516 (2.9)		
Thailand									
2015	469 (4.3)	27 ▲	-3	450 (4.7)	-1	-20 ▼	447 (4.0)	-6	-20 ▼
2011	443 (4.7)		-30 ▼	451 (4.1)		-19 ▼	453 (4.1)		-14 ▼
2007	473 (4.7)			471 (4.4)			467 (4.4)		
Turkey									
2015	489 (4.5)	-1		492 (3.9)	15 ▲		495 (4.2)	12 ▲	
2011	490 (3.7)			478 (3.4)			483 (3.3)		
United Arab Emirates									
2015	478 (2.5)	7		478 (2.4)	14 ▲		473 (2.4)	17 ▲	
2011	471 (2.4)			464 (2.1)			456 (2.5)		
United States									
† 2015	532 (3.4)	5	16 ▲	531 (2.8)	9 ▲	14 ▲	526 (2.8)	3	-2
2 2011	527 (2.8)		11 ▲	522 (2.3)		5	524 (2.5)		-5
2 † 2007	516 (3.2)			517 (2.9)			529 (3.0)		
Benchmarking Participants									
Ontario, Canada									
2015	514 (2.6)	1	-1	525 (2.4)	7 ▲	1	532 (2.6)	0	-10 ▼
2 2011	513 (2.8)		-2	518 (2.4)		-6	532 (3.0)		-10
2 2007	515 (3.6)			524 (3.8)			542 (4.2)		
Quebec, Canada									
‡ 2015	527 (5.1)	7	28 ▲	524 (4.6)	7	24 ▲	535 (4.5)	13 ▲	13 ▲
2011	519 (2.8)		20 ▲	518 (2.9)		17 ▲	522 (3.1)		-1
3 2007	499 (3.3)			500 (3.4)			523 (3.3)		
Abu Dhabi, UAE									
2015	453 (6.1)	-13		457 (5.9)	-4		454 (5.7)	-1	
2011	466 (4.2)			461 (3.9)			455 (4.3)		
Dubai, UAE									
2015	527 (2.5)	35 ▲	32 ▲	525 (2.2)	39 ▲	37 ▲	521 (2.0)	41 ▲	43 ▲
2011	492 (2.9)		-4	486 (2.8)		-2	479 (2.6)		1
◆ ‡ 2007	496 (3.5)			488 (3.0)			478 (3.5)		
Florida, US									
1 2015	511 (6.9)	-30 ▼		508 (5.8)	-18		506 (6.4)	-19	
1 2 2011	541 (7.9)			526 (7.3)			524 (7.7)		

▲ More recent year significantly higher
▼ More recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 3.10: Achievement in Science Content Domains by Gender

Country	Biology		Chemistry		Physics		Earth Science	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Australia	524 (3.4)	520 (3.3)	494 (4.2)	492 (3.5)	496 (3.3)	513 (3.0) ▲	514 (3.5)	530 (3.4) ▲
Bahrain	499 (3.4) ▲	441 (3.6)	497 (3.7) ▲	430 (4.1)	480 (3.4) ▲	444 (4.0)	479 (4.1) ▲	443 (4.8)
Botswana (9)	412 (3.9) ▲	380 (3.4)	404 (4.3) ▲	375 (4.9)	385 (4.5)	383 (3.5)	375 (4.4) ▲	362 (3.3)
1 † Canada	536 (2.5)	532 (2.8)	513 (2.3)	512 (2.8)	513 (2.4)	528 (2.6) ▲	522 (2.6)	543 (3.0) ▲
Chile	456 (4.4)	462 (4.2)	436 (4.2)	440 (5.4)	429 (4.8)	449 (4.1) ▲	452 (3.9)	475 (4.3) ▲
Chinese Taipei	566 (2.2)	564 (2.9)	584 (2.7) ▲	574 (3.5)	552 (3.6)	567 (3.5) ▲	574 (3.5)	588 (3.4) ▲
Egypt	357 (6.7) ▲	338 (6.1)	402 (6.9) ▲	386 (5.7)	379 (6.6)	376 (6.0)	351 (6.6)	351 (5.4)
England	546 (5.0)	538 (4.7)	534 (5.4)	523 (5.3)	532 (4.6)	539 (4.8)	532 (4.8)	540 (4.8)
1 2 Georgia	450 (3.3)	444 (3.8)	462 (4.9) ▲	451 (4.0)	423 (3.9)	435 (6.6) ▲	414 (3.8)	425 (4.8) ▲
Hong Kong SAR	547 (4.8)	550 (5.5)	537 (4.7)	535 (5.1)	530 (4.4)	549 (5.2) ▲	543 (4.7)	571 (5.0) ▲
Hungary	519 (3.8)	523 (3.3)	530 (4.0)	538 (4.4)	511 (4.9)	550 (4.1) ▲	506 (4.5)	536 (4.2) ▲
Iran, Islamic Rep. of	453 (4.4)	444 (6.3)	468 (5.4) ▲	448 (7.6)	473 (5.2)	477 (7.2)	435 (5.4)	442 (7.1)
Ireland	540 (2.9) ▲	528 (4.0)	524 (3.5) ▲	510 (5.3)	518 (3.9)	532 (3.9) ▲	536 (3.5)	548 (4.1) ▲
3 Israel	510 (4.5) ▲	498 (5.0)	523 (5.0) ▲	509 (5.5)	508 (4.3)	509 (5.1)	488 (4.5)	497 (4.8)
2 Italy	494 (3.0)	497 (3.0)	485 (3.1)	490 (2.9)	484 (3.0)	508 (3.4) ▲	504 (3.5)	524 (3.7) ▲
Japan	574 (3.2) ▲	567 (3.4)	575 (3.3) ▲	565 (3.5)	567 (2.7)	572 (3.7)	572 (2.7)	575 (2.8)
Jordan	444 (4.6) ▲	395 (5.6)	463 (4.9) ▲	412 (6.2)	441 (4.6) ▲	408 (5.7)	429 (4.1) ▲	403 (5.2)
Kazakhstan	527 (5.5) ▲	514 (4.7)	559 (6.1) ▲	548 (5.1)	544 (6.0)	542 (5.0)	504 (6.1)	512 (5.7)
Korea, Rep. of	552 (2.5)	556 (2.7)	554 (2.6) ▲	547 (3.4)	563 (3.1)	565 (3.4)	547 (3.6)	561 (3.8) ▲
Kuwait	429 (5.8) ▲	374 (9.3)	437 (5.7) ▲	388 (9.0)	431 (5.2) ▲	392 (8.1)	432 (5.4) ▲	385 (7.7)
Lebanon	373 (5.7)	358 (8.9)	447 (6.1) ▲	427 (7.5)	413 (7.8)	412 (7.4)	366 (5.9)	364 (8.6)
2 Lithuania	529 (3.6) ▲	513 (3.8)	520 (3.6)	515 (3.8)	508 (4.5)	517 (4.6)	511 (4.2)	525 (4.1) ▲
Malaysia	475 (4.4) ▲	457 (5.1)	482 (4.1) ▲	464 (4.6)	480 (4.2)	480 (4.9)	459 (4.4)	462 (5.5)
Malta	483 (3.2) ▲	463 (3.4)	492 (3.7) ▲	471 (2.7)	489 (3.5)	492 (3.4)	478 (3.0)	484 (3.6)
Morocco	387 (2.8) ▲	373 (3.1)	409 (3.1) ▲	392 (3.7)	391 (3.1)	399 (3.1) ▲	396 (2.9)	394 (2.8)
† New Zealand	526 (3.4) ▲	513 (4.7)	500 (3.8)	495 (4.8)	502 (3.9)	515 (4.4) ▲	510 (3.8)	524 (5.1) ▲
Norway (9)	504 (3.1)	499 (3.0)	507 (3.5)	498 (4.0)	504 (3.6)	520 (4.0) ▲	513 (4.3)	532 (3.8) ▲
Oman	482 (2.8) ▲	428 (3.8)	482 (2.9) ▲	425 (3.9)	466 (3.7) ▲	433 (3.9)	473 (2.7) ▲	441 (3.6)
Qatar	473 (4.0) ▲	435 (5.6)	474 (4.2) ▲	436 (5.7)	469 (3.6) ▲	450 (6.0)	457 (5.6) ▲	434 (6.4)
Russian Federation	544 (4.8) ▲	534 (4.8)	558 (5.4)	558 (5.6)	538 (4.8)	557 (4.6) ▲	528 (5.2)	536 (4.9) ▲
Saudi Arabia	430 (5.9) ▲	363 (8.3)	409 (6.5) ▲	344 (8.7)	410 (5.6) ▲	360 (8.8)	421 (6.6) ▲	384 (6.9)
2 Singapore	612 (3.6)	607 (4.4)	598 (3.9) ▲	588 (4.4)	605 (3.6)	611 (3.9)	557 (4.9)	572 (4.4) ▲
Slovenia	558 (3.0) ▲	539 (3.1)	559 (3.2) ▲	546 (3.4)	539 (3.8)	551 (3.2) ▲	560 (3.3)	569 (3.4) ▲
South Africa (9)	365 (6.9) ▲	347 (5.8)	380 (7.0) ▲	357 (5.8)	353 (6.6)	365 (5.6) ▲	329 (7.4)	331 (6.7)
Sweden	527 (4.7) ▲	514 (3.7)	517 (4.9)	509 (3.9)	519 (4.0)	530 (4.2) ▲	527 (6.0)	537 (4.0) ▲
Thailand	477 (4.2) ▲	453 (5.2)	460 (4.9) ▲	428 (6.3)	441 (5.0)	432 (6.0)	464 (5.0)	453 (5.6)
Turkey	504 (3.9) ▲	479 (4.6)	511 (5.0) ▲	477 (5.3)	515 (4.2) ▲	497 (5.0)	480 (3.8)	475 (4.6)
United Arab Emirates	495 (3.5) ▲	455 (4.5)	502 (4.0) ▲	460 (5.2)	483 (3.7) ▲	466 (4.8)	488 (3.6) ▲	462 (4.5)
† United States	542 (2.9)	538 (3.2)	520 (3.7)	518 (3.5)	508 (3.0)	524 (3.4) ▲	526 (3.5)	544 (3.3) ▲
International Avg.	493 (0.7) ▲	475 (0.8)	495 (0.7) ▲	476 (0.8)	484 (0.7)	486 (0.8)	481 (0.7)	483 (0.8) ▲
Benchmarking Participants								
† Buenos Aires, Argentina	395 (5.8)	388 (6.2)	354 (6.3)	353 (6.6)	374 (5.2)	387 (7.3)	387 (6.6)	389 (7.0)
Ontario, Canada	542 (3.2) ▲	534 (3.2)	505 (3.0)	501 (3.4)	516 (3.3)	527 (3.2) ▲	517 (3.6)	535 (4.0) ▲
‡ Quebec, Canada	524 (4.5)	530 (5.1)	527 (4.6)	534 (5.7)	508 (4.8)	532 (5.5) ▲	528 (4.5)	558 (5.0) ▲
Norway (8)	491 (3.7) ▲	481 (3.1)	484 (3.9) ▲	475 (4.4)	478 (3.0)	489 (3.3) ▲	496 (3.7)	516 (4.2) ▲
Abu Dhabi, UAE	483 (6.6) ▲	422 (8.6)	493 (7.2) ▲	426 (9.3)	473 (6.5) ▲	435 (8.5)	478 (6.8) ▲	429 (8.4)
Dubai, UAE	533 (4.2) ▲	516 (5.1)	536 (4.1)	520 (5.7)	522 (4.0)	528 (5.0)	519 (3.9)	517 (5.1)
1 Florida, US	520 (7.0)	517 (6.0)	502 (8.5)	494 (7.9)	494 (6.7)	501 (6.7)	496 (7.5)	513 (7.7) ▲

▲ Average significantly higher than other gender

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 3.12: Achievement in Science Cognitive Domains by Gender

Country	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Australia	505 (3.2)	516 (3.1) ▲	512 (3.5)	513 (3.4)	511 (3.3)	515 (3.2)
Bahrain	487 (3.5) ▲	438 (3.5)	489 (3.3) ▲	441 (3.7)	493 (3.6) ▲	442 (4.3)
Botswana (9)	379 (5.0) ▲	363 (3.4)	409 (3.9) ▲	387 (4.5)	398 (3.2) ▲	381 (3.0)
1 † Canada	512 (2.3)	524 (3.0) ▲	524 (2.4)	527 (2.6)	533 (2.6)	534 (2.5)
Chile	458 (3.6)	473 (4.5) ▲	442 (3.8)	450 (3.8)	443 (4.4)	454 (4.4) ▲
Chinese Taipei	582 (2.4)	596 (3.2) ▲	563 (2.2)	567 (2.7)	563 (2.5)	558 (2.6)
Egypt	376 (7.3)	368 (6.2)	378 (6.0) ▲	362 (5.6)	367 (6.2) ▲	350 (6.1)
England	520 (4.7)	525 (5.1)	543 (4.7)	534 (5.0)	545 (4.8)	545 (4.7)
1 2 Georgia	456 (3.4)	449 (4.9)	443 (3.3)	442 (3.8)	430 (4.2)	434 (4.3)
Hong Kong SAR	537 (4.1)	556 (4.6) ▲	536 (4.7)	545 (5.5)	548 (4.8)	552 (5.3)
Hungary	512 (4.8)	538 (3.6) ▲	522 (3.8)	535 (3.8) ▲	517 (4.4)	531 (4.0) ▲
Iran, Islamic Rep. of	456 (6.1)	455 (7.1)	461 (4.6)	454 (6.6)	458 (4.6)	450 (6.7)
Ireland	519 (3.2)	527 (4.6)	536 (3.1)	530 (4.4)	534 (2.8)	531 (4.6)
3 Israel	506 (4.5)	500 (5.3)	507 (4.1)	501 (4.7)	514 (4.7)	507 (5.1)
2 Italy	501 (3.7)	508 (3.2)	490 (3.0)	502 (2.7) ▲	489 (4.3)	498 (3.0)
Japan	563 (2.7)	572 (2.7) ▲	578 (2.5) ▲	571 (2.6)	573 (2.7)	568 (2.9)
Jordan	450 (4.5) ▲	410 (5.5)	448 (4.3) ▲	402 (5.3)	440 (4.3) ▲	398 (5.5)
Kazakhstan	528 (6.4)	529 (6.0)	540 (5.3) ▲	531 (4.4)	534 (5.6) ▲	522 (5.0)
Korea, Rep. of	549 (2.8)	561 (3.7) ▲	550 (2.3)	554 (2.8)	562 (2.8)	559 (3.4)
Kuwait	433 (5.6) ▲	396 (8.3)	431 (5.3) ▲	382 (8.4)	430 (5.6) ▲	369 (9.1)
Lebanon	406 (4.9)	399 (8.1)	405 (5.3) ▲	390 (7.4)	387 (6.4) ▲	375 (7.5)
2 Lithuania	511 (3.5)	516 (4.6)	519 (3.9)	514 (4.0)	527 (3.9)	524 (4.0)
Malaysia	470 (5.1) ▲	461 (5.9)	483 (4.0) ▲	469 (5.0)	470 (3.8) ▲	464 (4.6)
Malta	470 (2.3)	465 (3.6)	494 (2.6) ▲	484 (3.2)	485 (2.5) ▲	473 (3.0)
Morocco	396 (2.7)	394 (2.9)	396 (3.0) ▲	388 (3.0)	391 (2.8) ▲	379 (3.1)
† New Zealand	499 (3.3)	507 (4.4)	515 (3.6)	512 (4.6)	523 (3.7)	516 (4.3)
Norway (9)	493 (3.5)	508 (3.6) ▲	506 (3.2)	508 (3.5)	520 (3.5)	517 (3.3)
Oman	477 (3.6) ▲	434 (3.9)	478 (3.2) ▲	431 (4.1)	478 (2.6) ▲	432 (3.7)
Qatar	460 (4.4) ▲	436 (6.2)	475 (4.5) ▲	444 (5.6)	471 (4.2) ▲	437 (5.4)
Russian Federation	555 (5.4)	560 (5.6)	537 (5.1)	540 (4.7)	535 (4.5)	540 (4.5)
Saudi Arabia	417 (5.0) ▲	372 (8.1)	413 (5.4) ▲	351 (8.5)	433 (5.5) ▲	375 (8.2)
2 Singapore	589 (3.4)	598 (4.5) ▲	601 (3.8)	599 (4.5)	595 (3.5)	594 (4.2)
Slovenia	555 (2.8)	561 (3.7)	551 (2.4) ▲	544 (2.9)	557 (3.1) ▲	544 (3.1)
South Africa (9)	342 (7.3)	332 (7.0)	373 (6.9) ▲	363 (5.8)	354 (6.8)	346 (5.7)
Sweden	515 (4.1)	524 (3.6) ▲	520 (4.1)	517 (3.7)	532 (4.7) ▲	522 (4.1)
Thailand	477 (4.5) ▲	460 (5.5)	461 (4.8) ▲	437 (5.9)	456 (4.3) ▲	437 (5.1)
Turkey	497 (4.5) ▲	482 (4.9)	504 (4.0) ▲	482 (4.4)	508 (4.4) ▲	484 (4.8)
United Arab Emirates	490 (3.9) ▲	466 (4.9)	496 (3.6) ▲	460 (4.5)	490 (3.7) ▲	457 (4.4)
† United States	524 (3.6)	539 (3.6) ▲	530 (3.1)	532 (3.1)	525 (2.9)	527 (3.0)
International Avg.	487 (0.7) ▲	483 (0.8)	491 (0.7) ▲	479 (0.8)	490 (0.7) ▲	478 (0.8)
Benchmarking Participants						
† Buenos Aires, Argentina	393 (6.1)	401 (6.0)	381 (5.3)	378 (6.1)	375 (5.0)	371 (7.4)
Ontario, Canada	509 (3.0)	519 (3.4) ▲	526 (2.8)	525 (2.9)	533 (3.1)	531 (3.0)
‡ Quebec, Canada	517 (5.4)	538 (5.6) ▲	518 (4.8)	531 (5.4) ▲	530 (4.7)	541 (5.3) ▲
Norway (8)	471 (3.6)	484 (3.7) ▲	490 (3.2)	486 (3.2)	502 (3.0) ▲	495 (2.9)
Abu Dhabi, UAE	477 (7.4) ▲	429 (9.0)	487 (6.7) ▲	428 (8.5)	481 (6.5) ▲	427 (8.4)
Dubai, UAE	527 (4.1)	528 (5.6)	531 (3.9)	519 (4.9)	526 (3.8)	515 (4.7)
1 Florida, US	504 (8.9)	517 (6.8)	508 (7.0)	508 (6.0)	507 (7.5)	504 (6.5)

▲ Average significantly higher than other gender

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

TIMSS 2015

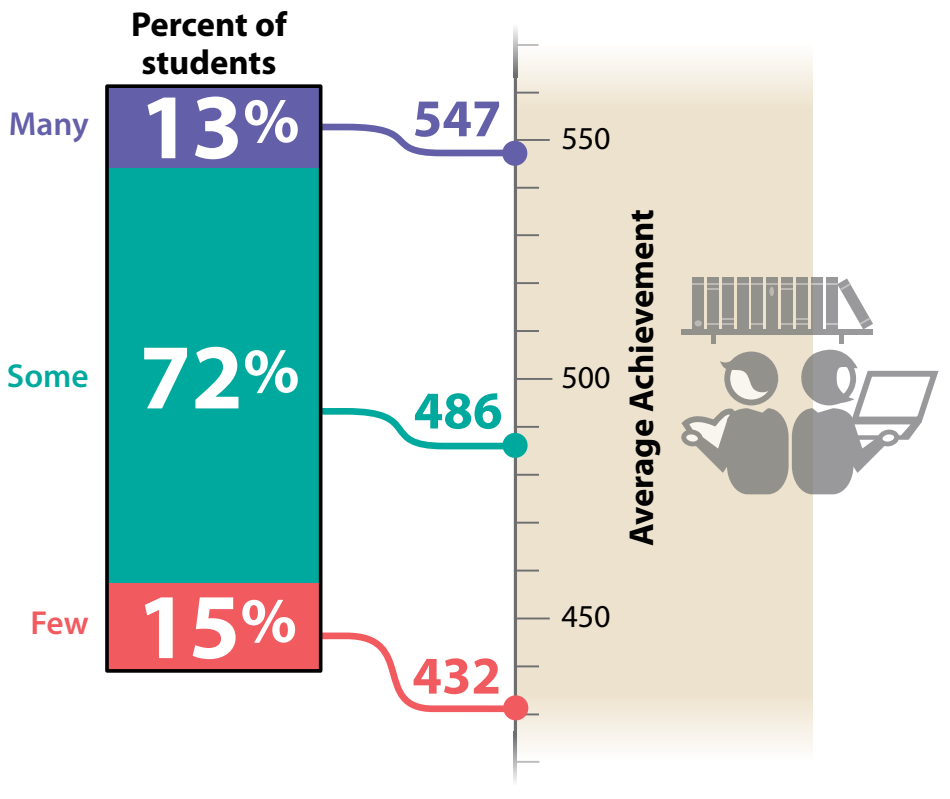
CHAPTER 4: HOME ENVIRONMENT SUPPORT

TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

IEA
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Home Educational Resources

Students who reported many home educational resources had much higher achievement than students who reported some or few resources.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.

http://timss2015.org/download-center/

IEA
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 4.2: Home Educational Resources

Reported by Students

Students were scored according to their responses concerning the availability of three home educational resources on the *Home Educational Resources* scale. Students with **Many Resources** had a score of at least 12.4, which is the point on the scale corresponding to students reporting that they had more than 100 books in the home, 2 home study supports, and that at least one parent had finished university, on average. Students with **Few Resources** had a score no higher than 8.3, which is the scale point corresponding to students reporting that they had 25 or fewer books in the home, neither of the 2 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.

Country	Many Resources		Some Resources		Few Resources		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Korea, Rep. of	37 (1.3)	584 (3.2)	60 (1.2)	541 (2.1)	3 (0.2)	483 (9.1)	11.6 (0.05)	0.3 (0.07) ▲
Norway (9)	29 (1.2)	549 (3.3)	69 (1.1)	494 (2.6)	1 (0.2)	~ ~	11.5 (0.05)	◊ ◊
Georgia	23 (1.1)	481 (3.8)	70 (1.1)	439 (3.6)	7 (0.6)	375 (7.9)	10.9 (0.06)	0.4 (0.08) ▲
Sweden	23 (1.1)	578 (4.0)	74 (1.2)	510 (3.1)	3 (0.5)	437 (12.2)	11.1 (0.04)	-0.2 (0.06) ▼
Australia	23 (0.9)	562 (2.8)	73 (0.9)	503 (2.5)	4 (0.4)	429 (8.4)	11.1 (0.04)	0.0 (0.07)
Hungary	22 (1.5)	592 (3.9)	70 (1.3)	517 (2.8)	7 (0.7)	425 (7.9)	10.8 (0.07)	0.0 (0.09)
United States	22 (0.9)	579 (3.2)	71 (0.9)	521 (2.6)	7 (0.5)	476 (4.6)	10.9 (0.04)	0.0 (0.06)
Canada	21 (0.9)	567 (3.1)	76 (0.8)	518 (2.0)	2 (0.3)	~ ~	11.1 (0.04)	◊ ◊
Ireland	20 (0.9)	580 (3.1)	74 (0.8)	523 (2.6)	6 (0.6)	445 (12.8)	10.9 (0.05)	◊ ◊
Japan	19 (0.9)	610 (3.0)	77 (0.8)	564 (1.7)	4 (0.3)	511 (6.0)	11.0 (0.04)	0.2 (0.06) ▲
England	19 (1.0)	606 (4.6)	76 (1.0)	525 (3.6)	5 (0.4)	470 (7.1)	10.9 (0.05)	0.1 (0.07)
New Zealand	19 (0.7)	575 (3.1)	75 (0.6)	505 (3.0)	6 (0.5)	430 (5.9)	10.9 (0.04)	0.0 (0.07)
Israel r	16 (0.7)	581 (4.4)	82 (0.7)	509 (4.2)	2 (0.3)	~ ~	11.1 (0.04) r	0.1 (0.07)
Chinese Taipei	15 (0.9)	625 (3.0)	73 (0.9)	570 (1.9)	12 (0.6)	501 (4.1)	10.4 (0.04)	0.0 (0.06)
Lithuania	14 (1.1)	573 (5.6)	81 (1.2)	514 (2.4)	5 (0.4)	449 (8.9)	10.7 (0.05)	0.2 (0.06) ▲
Qatar	14 (0.6)	515 (4.3)	78 (0.8)	456 (3.2)	8 (0.5)	374 (6.2)	10.6 (0.03)	-0.1 (0.05)
Slovenia	14 (0.7)	595 (3.4)	83 (0.7)	547 (2.3)	3 (0.4)	469 (10.6)	10.8 (0.04)	-0.1 (0.05)
Malta	13 (0.5)	557 (4.0)	75 (0.7)	481 (1.7)	12 (0.5)	412 (4.7)	10.5 (0.03)	◊ ◊
Italy	13 (0.9)	548 (4.1)	72 (1.0)	502 (2.0)	15 (0.9)	444 (5.5)	10.2 (0.05)	-0.1 (0.07)
Russian Federation	12 (0.6)	576 (4.9)	83 (0.6)	541 (4.3)	5 (0.4)	509 (9.7)	10.7 (0.04)	-0.1 (0.06)
United Arab Emirates	12 (0.4)	533 (3.8)	77 (0.4)	478 (2.2)	11 (0.4)	414 (4.2)	10.4 (0.03)	0.1 (0.04)
Hong Kong SAR	12 (1.0)	584 (4.9)	74 (1.0)	546 (3.7)	15 (0.9)	513 (5.7)	10.2 (0.07)	0.3 (0.08) ▲
Singapore	12 (0.4)	654 (3.0)	77 (0.6)	598 (3.2)	11 (0.5)	532 (5.5)	10.3 (0.03)	0.0 (0.05)
Kazakhstan	11 (1.1)	558 (10.0)	79 (1.1)	533 (4.2)	11 (0.9)	507 (9.6)	10.3 (0.07)	0.3 (0.10) ▲
Iran, Islamic Rep. of	9 (0.8)	532 (7.0)	55 (1.2)	469 (4.3)	36 (1.5)	418 (3.8)	9.3 (0.08)	0.7 (0.12) ▲
Bahrain	8 (0.4)	512 (6.5)	78 (0.7)	468 (2.6)	13 (0.6)	433 (4.7)	10.1 (0.03)	0.0 (0.04)
Lebanon	7 (0.6)	436 (9.5)	73 (1.0)	407 (5.7)	20 (0.9)	363 (6.7)	9.9 (0.04)	0.5 (0.08) ▲
Turkey	7 (0.8)	593 (6.9)	54 (1.2)	510 (3.6)	40 (1.7)	455 (3.9)	9.1 (0.09)	0.7 (0.12) ▲
Chile	6 (0.5)	518 (5.9)	78 (0.9)	458 (3.1)	16 (0.9)	412 (4.4)	9.9 (0.04)	0.2 (0.06)
Oman	6 (0.3)	496 (5.5)	66 (0.8)	460 (2.8)	28 (1.0)	438 (4.0)	9.5 (0.04)	0.5 (0.06) ▲
Saudi Arabia	6 (0.6)	442 (11.6)	69 (1.3)	404 (4.6)	25 (1.4)	370 (5.7)	9.6 (0.06)	0.2 (0.10)
Jordan	5 (0.4)	477 (8.2)	73 (1.0)	439 (3.2)	22 (1.1)	382 (4.4)	9.6 (0.05)	0.1 (0.07)
Kuwait	5 (0.7)	474 (15.2)	82 (1.0)	414 (5.4)	13 (0.8)	370 (6.1)	10.0 (0.05)	◊ ◊
Egypt	5 (0.3)	413 (8.1)	67 (1.0)	383 (4.3)	28 (1.0)	341 (5.7)	9.4 (0.04)	◊ ◊
Malaysia	4 (0.3)	544 (5.9)	72 (1.0)	480 (4.0)	24 (1.0)	432 (5.7)	9.5 (0.04)	0.4 (0.08) ▲
Thailand	3 (0.5)	551 (11.3)	60 (1.1)	464 (4.8)	37 (1.2)	434 (4.1)	9.1 (0.05)	0.6 (0.08) ▲
South Africa (9)	3 (0.4)	489 (24.1)	66 (1.1)	368 (6.5)	31 (1.2)	327 (3.9)	9.1 (0.06)	0.4 (0.07) ▲
Botswana (9)	2 (0.2)	~ ~	51 (1.1)	407 (3.5)	47 (1.2)	376 (2.7)	8.6 (0.05)	0.1 (0.06)
Morocco	2 (0.2)	~ ~	43 (0.9)	401 (3.3)	55 (1.0)	386 (2.4)	8.2 (0.05)	0.2 (0.07)
International Avg.	13 (0.1)	547 (1.2)	72 (0.2)	486 (0.6)	15 (0.1)	432 (1.1)		

▲ Significantly higher than 2011
▼ Significantly lower than 2011

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

A diamond (◊) indicates the country did not participate in the 2011 assessment.

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

An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 4.2: Home Educational Resources (Continued)

Country	Many Resources		Some Resources		Few Resources		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Benchmarking Participants								
Norway (8)	25 (1.1)	527 (3.0)	74 (1.1)	479 (2.3)	1 (0.2)	~ ~	11.4 (0.05)	-0.2 (0.06) ▼
Ontario, Canada	24 (1.3)	566 (3.9)	74 (1.2)	514 (2.1)	2 (0.3)	~ ~	11.3 (0.05)	-0.1 (0.08)
Dubai, UAE	18 (0.6)	570 (4.4)	77 (0.7)	521 (2.1)	6 (0.5)	445 (8.1)	10.8 (0.03)	0.2 (0.04) ▲
Quebec, Canada	18 (1.0)	572 (5.0)	80 (1.1)	525 (4.0)	3 (0.6)	467 (12.0)	10.9 (0.06)	-0.1 (0.07)
Florida, US	13 (1.4)	570 (6.6)	77 (1.2)	506 (5.8)	10 (1.4)	451 (7.7)	10.4 (0.10)	-0.2 (0.13)
Abu Dhabi, UAE	11 (1.0)	518 (10.2)	77 (1.0)	456 (5.3)	12 (0.8)	397 (7.1)	10.3 (0.06)	0.0 (0.08)
Buenos Aires, Argentina	9 (0.9)	461 (6.7)	72 (1.3)	390 (4.4)	18 (1.3)	334 (6.8)	10.0 (0.07)	◊ ◊

Significantly higher than 2011 ▲
Significantly lower than 2011 ▼

Number of books in the home:

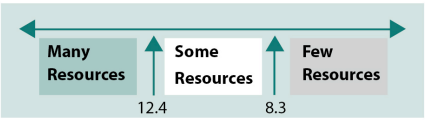
1) 0-10
2) 11-25
3) 26-100
4) 101-200
5) More than 200

Highest level of education of either parent:

1) Finished some primary or lower secondary or did not go to school
2) Finished lower secondary
3) Finished upper secondary
4) Finished post-secondary education
5) Finished university or higher

Number of home study supports:

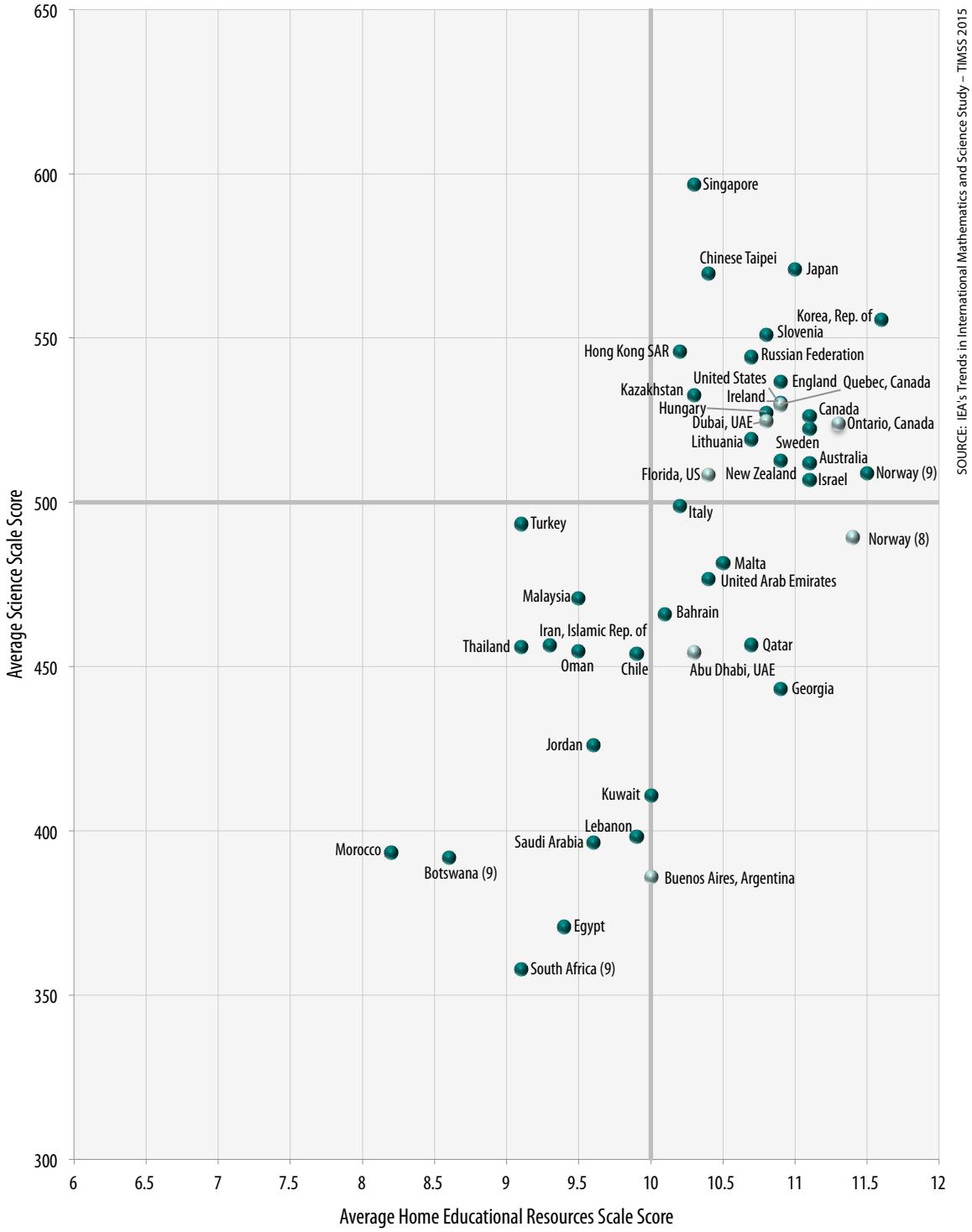
1) None
2) Internet connection or own room
3) Both



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 4.2: Home Educational Resources (Continued)

Average Science Achievement by Home Educational Resources



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 4.4: Students Speak the Language of the Test at Home

Reported by Students

Country	Always		Almost Always		Sometimes		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia	82 (1.3)	514 (2.5)	11 (0.8)	512 (4.6)	6 (0.7)	495 (9.0)	1 (0.1)	~ ~
Bahrain	55 (0.7)	456 (2.9)	19 (0.7)	506 (5.1)	21 (0.7)	465 (5.2)	5 (0.4)	434 (10.2)
Botswana (9)	5 (0.3)	386 (10.5)	8 (0.5)	433 (8.9)	79 (0.8)	395 (2.5)	9 (0.5)	338 (7.7)
Canada	66 (1.4)	529 (2.3)	21 (0.8)	529 (3.2)	10 (0.6)	516 (4.2)	3 (0.4)	522 (7.5)
Chile	87 (0.7)	457 (3.2)	8 (0.4)	467 (5.3)	3 (0.4)	391 (12.1)	1 (0.3)	~ ~
Chinese Taipei	57 (1.1)	572 (2.4)	34 (0.8)	581 (3.0)	9 (0.6)	511 (5.1)	0 (0.1)	~ ~
Egypt	64 (1.6)	368 (5.2)	13 (0.8)	388 (5.8)	19 (1.0)	375 (4.3)	4 (0.5)	348 (10.6)
England	85 (1.2)	537 (3.8)	9 (0.8)	547 (6.6)	4 (0.5)	521 (8.4)	1 (0.1)	~ ~
Georgia	84 (1.3)	444 (3.1)	11 (0.7)	468 (7.1)	5 (0.8)	395 (9.5)	1 (0.2)	~ ~
Hong Kong SAR	75 (1.7)	543 (3.5)	9 (0.5)	549 (6.3)	13 (1.4)	563 (6.3)	3 (0.4)	542 (15.3)
Hungary	87 (0.7)	526 (3.5)	11 (0.6)	545 (5.6)	1 (0.2)	~ ~	0 (0.1)	~ ~
Iran, Islamic Rep. of	51 (1.8)	467 (4.9)	16 (0.9)	486 (6.2)	20 (1.2)	429 (4.1)	13 (1.0)	421 (7.5)
Ireland	82 (0.8)	532 (3.0)	7 (0.5)	533 (4.4)	7 (0.5)	511 (7.2)	4 (0.3)	514 (9.6)
Israel	78 (1.0)	507 (3.9)	15 (0.6)	520 (6.2)	6 (0.6)	494 (10.6)	1 (0.2)	~ ~
Italy	71 (1.4)	511 (2.6)	18 (0.9)	488 (3.5)	9 (0.8)	446 (6.4)	2 (0.3)	~ ~
Japan	96 (0.3)	572 (1.8)	3 (0.3)	555 (7.2)	1 (0.1)	~ ~	0 (0.1)	~ ~
Jordan	77 (1.3)	424 (3.5)	11 (0.6)	460 (6.0)	8 (0.7)	420 (6.4)	4 (0.6)	410 (17.7)
Kazakhstan	80 (1.1)	530 (4.3)	13 (0.7)	549 (6.4)	6 (0.6)	525 (14.6)	0 (0.1)	~ ~
Korea, Rep. of	89 (0.5)	555 (2.3)	11 (0.5)	563 (4.3)	0 (0.1)	~ ~	0 (0.0)	~ ~
Kuwait	10 (1.0)	381 (11.0)	10 (0.7)	439 (14.0)	47 (1.5)	419 (6.1)	33 (1.3)	399 (5.9)
Lebanon	10 (0.8)	393 (9.1)	17 (0.7)	422 (6.6)	59 (1.2)	400 (6.3)	14 (0.9)	369 (8.9)
Lithuania	79 (0.9)	519 (3.2)	18 (0.7)	523 (4.1)	3 (0.3)	487 (9.2)	0 (0.1)	~ ~
Malaysia	34 (1.5)	510 (4.3)	22 (0.8)	482 (4.2)	38 (1.4)	443 (5.3)	6 (0.7)	385 (10.6)
Malta	10 (0.5)	521 (6.3)	15 (0.6)	512 (3.8)	55 (0.8)	477 (2.3)	20 (0.5)	454 (4.1)
Morocco	25 (1.1)	377 (3.2)	14 (0.6)	395 (3.7)	46 (1.1)	402 (3.1)	15 (0.9)	394 (3.3)
New Zealand	79 (1.4)	517 (2.7)	14 (0.9)	507 (5.8)	6 (0.6)	480 (10.6)	1 (0.1)	~ ~
Norway (9)	81 (1.2)	516 (2.5)	12 (0.7)	492 (5.6)	5 (0.6)	457 (6.7)	1 (0.2)	~ ~
Oman	49 (1.4)	458 (3.2)	18 (0.7)	461 (4.4)	27 (0.9)	451 (4.1)	7 (0.4)	439 (5.7)
Qatar	50 (0.7)	434 (3.7)	19 (0.8)	495 (4.4)	26 (0.6)	476 (4.9)	4 (0.3)	446 (9.4)
Russian Federation	83 (1.6)	546 (3.8)	12 (0.6)	549 (6.8)	5 (1.3)	509 (24.1)	1 (0.1)	~ ~
Saudi Arabia	64 (1.7)	392 (5.0)	10 (0.6)	426 (7.8)	17 (1.2)	403 (7.8)	10 (1.0)	389 (11.4)
Singapore	33 (0.7)	611 (3.0)	32 (0.7)	610 (3.3)	31 (0.6)	573 (4.3)	4 (0.2)	558 (8.6)
Slovenia	70 (1.3)	561 (2.5)	21 (1.0)	544 (3.8)	7 (0.6)	491 (6.3)	3 (0.4)	504 (11.1)
South Africa (9)	16 (1.2)	417 (8.5)	14 (0.8)	421 (8.2)	63 (1.5)	335 (4.9)	6 (0.4)	295 (6.9)
Sweden	75 (1.5)	534 (3.3)	16 (1.0)	510 (5.8)	7 (0.7)	445 (9.9)	1 (0.2)	~ ~
Thailand	64 (1.9)	465 (4.7)	15 (0.8)	462 (5.4)	19 (1.7)	423 (4.9)	2 (0.2)	~ ~
Turkey	82 (1.6)	504 (3.9)	9 (0.5)	503 (7.2)	8 (1.0)	407 (8.8)	2 (0.5)	~ ~
United Arab Emirates	43 (0.9)	454 (2.9)	21 (0.6)	524 (2.7)	31 (0.8)	483 (3.7)	5 (0.3)	453 (7.0)
United States	74 (1.1)	535 (2.8)	17 (0.6)	524 (4.2)	8 (0.5)	503 (5.2)	1 (0.1)	~ ~
International Avg.	62 (0.2)	489 (0.7)	15 (0.1)	499 (1.0)	19 (0.1)	459 (1.3)	5 (0.1)	431 (2.1)
Benchmarking Participants								
Buenos Aires, Argentina	86 (0.8)	385 (4.5)	10 (0.6)	401 (7.8)	3 (0.4)	382 (15.0)	1 (0.2)	~ ~
Ontario, Canada	67 (1.6)	525 (2.8)	20 (1.1)	530 (3.7)	11 (0.7)	518 (4.9)	2 (0.4)	~ ~
Quebec, Canada	62 (2.6)	537 (3.6)	24 (1.5)	525 (6.9)	10 (1.5)	517 (7.3)	4 (0.9)	523 (13.7)
Norway (8)	80 (1.1)	495 (2.3)	14 (0.8)	482 (5.1)	5 (0.4)	444 (6.1)	1 (0.2)	~ ~
Abu Dhabi, UAE	50 (2.0)	436 (5.8)	17 (1.4)	505 (8.7)	28 (1.5)	465 (8.1)	5 (0.6)	418 (12.2)
Dubai, UAE	33 (0.9)	515 (2.5)	31 (0.8)	552 (3.5)	32 (0.9)	511 (3.4)	4 (0.4)	513 (8.3)
Florida, US	62 (3.6)	513 (6.2)	22 (1.8)	513 (8.2)	14 (1.9)	494 (12.1)	2 (0.5)	~ ~

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

TIMSS 2015

CHAPTER 5: SCHOOL COMPOSITION AND RESOURCES

TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

IEA
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

School Composition and Resources

Socioeconomic Composition of Schools

Attended schools with more affluent than disadvantaged students	Attended schools with neither more affluent nor more disadvantaged students	Attended schools with more disadvantaged than affluent students
PERCENT OF STUDENTS 31%	PERCENT OF STUDENTS 34%	PERCENT OF STUDENTS 36%
Average Achievement 517	Average Achievement 491	Average Achievement 462

In nearly all the TIMSS 2015 countries, students attending schools with more affluent than disadvantaged students had higher average science achievement.

Instruction Affected by Science Resource Shortages – Principals' Reports

Percent of Students Not Affected	Percent of Students Affected	Percent of Students Affected a Lot
27%	65%	7%
509 Average Achievement	480 Average Achievement	465 Average Achievement

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.
http://timss2015.org/download-center/

IEA TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 5.2: School Composition by Economic Background of the Student Body

Reported by Principals

Country		More Affluent - Schools where more than 25% of the student body comes from economically affluent homes and not more than 25% from economically disadvantaged homes		Neither More Affluent Nor More Disadvantaged		More Disadvantaged - Schools where more than 25% of the student body comes from economically disadvantaged homes and not more than 25% from economically affluent homes	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia		30 (3.6)	548 (3.6)	39 (4.1)	512 (4.0)	30 (3.6)	481 (5.4)
Bahrain		31 (0.3)	493 (5.4)	47 (0.3)	454 (2.9)	22 (0.2)	460 (4.5)
Botswana (9)		10 (2.7)	444 (8.7)	25 (4.6)	403 (7.0)	65 (4.8)	380 (4.1)
Canada		43 (3.9)	539 (2.9)	32 (3.6)	528 (3.7)	25 (3.1)	507 (3.8)
Chile	r	14 (2.5)	514 (10.1)	18 (4.0)	485 (11.0)	68 (4.0)	437 (5.0)
Chinese Taipei		18 (2.6)	595 (8.6)	69 (3.3)	570 (2.4)	13 (2.3)	530 (4.9)
Egypt	r	18 (3.3)	391 (12.3)	32 (3.9)	379 (8.4)	49 (4.1)	357 (7.3)
England	r	33 (3.6)	592 (6.5)	38 (4.4)	533 (7.1)	29 (3.8)	506 (7.9)
Georgia		20 (3.4)	457 (7.3)	29 (4.5)	445 (6.3)	51 (4.5)	435 (4.9)
Hong Kong SAR		19 (3.2)	579 (8.1)	35 (4.1)	552 (6.9)	46 (4.2)	520 (5.5)
Hungary		23 (3.3)	569 (6.1)	36 (4.3)	541 (5.2)	41 (3.9)	489 (6.2)
Iran, Islamic Rep. of		22 (2.7)	499 (8.8)	23 (2.9)	479 (7.4)	55 (2.6)	432 (4.0)
Ireland		27 (4.1)	551 (4.4)	39 (4.6)	540 (3.3)	34 (4.0)	507 (5.2)
Israel		24 (3.3)	557 (7.8)	34 (3.4)	523 (6.1)	43 (3.2)	468 (7.7)
Italy		36 (4.0)	505 (6.1)	46 (4.7)	502 (4.5)	18 (3.9)	482 (7.4)
Japan		44 (3.6)	581 (3.0)	46 (3.9)	567 (2.3)	10 (2.5)	549 (6.1)
Jordan	r	15 (2.5)	459 (9.5)	21 (3.4)	440 (7.8)	65 (3.8)	408 (4.6)
Kazakhstan		65 (3.8)	537 (6.4)	29 (3.6)	529 (8.7)	5 (1.8)	520 (28.7)
Korea, Rep. of		14 (2.8)	584 (6.0)	56 (4.4)	557 (2.9)	30 (3.7)	541 (2.5)
Kuwait	r	17 (3.2)	454 (25.7)	38 (3.8)	404 (8.9)	45 (4.6)	405 (7.7)
Lebanon	r	19 (3.9)	405 (16.6)	29 (4.1)	439 (9.6)	53 (4.5)	375 (8.6)
Lithuania		50 (3.6)	535 (4.2)	34 (3.6)	506 (4.7)	15 (2.9)	495 (7.2)
Malaysia		6 (1.2)	552 (6.7)	26 (3.5)	479 (11.3)	68 (3.4)	458 (5.1)
Malta		32 (0.1)	498 (2.6)	64 (0.1)	477 (2.0)	5 (0.1)	406 (4.4)
Morocco	r	7 (1.6)	445 (12.0)	12 (2.2)	404 (10.2)	81 (2.4)	386 (2.8)
New Zealand		30 (4.7)	550 (3.7)	42 (4.9)	514 (4.8)	28 (2.3)	467 (6.1)
Norway (9)		57 (4.5)	519 (3.7)	35 (4.1)	501 (4.1)	8 (2.2)	479 (6.1)
Oman		37 (3.3)	471 (4.1)	37 (3.8)	452 (4.6)	26 (3.5)	439 (7.9)
Qatar		76 (0.7)	463 (4.2)	14 (0.3)	418 (4.7)	10 (0.7)	466 (9.1)
Russian Federation		68 (3.7)	547 (5.1)	22 (3.4)	541 (6.1)	10 (2.3)	533 (11.7)
Saudi Arabia	r	38 (4.4)	420 (7.2)	46 (5.2)	380 (6.8)	16 (3.6)	372 (15.9)
Singapore		33 (0.0)	635 (4.7)	53 (0.0)	592 (4.7)	14 (0.0)	524 (8.9)
Slovenia		38 (3.9)	558 (3.3)	43 (4.2)	553 (4.2)	19 (3.2)	535 (4.0)
South Africa (9)	r	8 (2.1)	500 (14.9)	13 (3.0)	436 (24.7)	79 (3.3)	335 (5.7)
Sweden		64 (4.6)	537 (3.9)	27 (4.6)	512 (6.3)	9 (2.8)	453 (14.1)
Thailand		16 (2.9)	504 (13.5)	21 (3.2)	462 (10.6)	63 (3.8)	438 (5.3)
Turkey		23 (3.5)	528 (12.3)	24 (3.0)	510 (7.1)	53 (3.9)	473 (3.8)
United Arab Emirates	r	50 (2.0)	496 (4.4)	19 (1.7)	480 (5.8)	31 (1.5)	447 (4.5)
United States		20 (2.5)	570 (5.3)	24 (3.2)	545 (4.5)	56 (3.4)	510 (4.0)
International Avg.		31 (0.5)	517 (1.4)	34 (0.6)	491 (1.2)	36 (0.5)	462 (1.3)

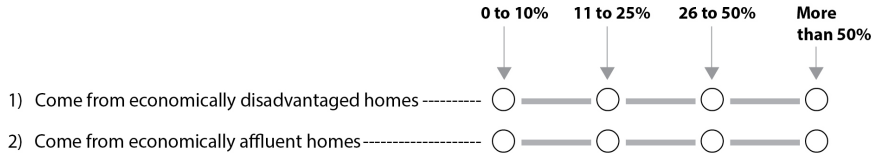
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 5.2: School Composition by Economic Background of the Student Body (Continued)

Country		More Affluent - Schools where more than 25% of the student body comes from economically affluent homes and not more than 25% from economically disadvantaged homes		Neither More Affluent Nor More Disadvantaged		More Disadvantaged - Schools where more than 25% of the student body comes from economically disadvantaged homes and not more than 25% from economically affluent homes	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Benchmarking Participants							
Buenos Aires, Argentina	s	47 (5.5)	417 (8.3)	14 (3.7)	378 (16.3)	39 (5.4)	349 (8.7)
Ontario, Canada	r	40 (5.0)	533 (3.6)	34 (5.0)	522 (5.0)	26 (4.0)	508 (4.7)
Quebec, Canada	r	48 (6.0)	549 (4.6)	26 (6.0)	544 (5.2)	26 (5.6)	503 (7.2)
Norway (8)		57 (4.5)	500 (3.3)	35 (4.2)	484 (3.7)	8 (2.2)	458 (10.9)
Abu Dhabi, UAE		53 (4.2)	465 (10.5)	16 (3.4)	455 (15.3)	32 (3.1)	437 (8.2)
Dubai, UAE	r	57 (0.4)	542 (3.3)	22 (0.3)	532 (3.2)	21 (0.2)	489 (4.5)
Florida, US	s	9 (5.3)	528 (41.9)	31 (9.0)	536 (12.5)	60 (8.4)	495 (13.4)

Approximately what percentage of students in your school have the following backgrounds?



More Affluent - Schools where more than 25% of the student body comes from economically affluent homes and not more than 25% from economically disadvantaged homes

More Disadvantaged - Schools where more than 25% of the student body comes from economically disadvantaged homes and not more than 25% from economically affluent homes

Neither More Affluent nor More Disadvantaged - All other possible response combinations

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 5.4: Schools with Students Having the Language of the Test as Their Native Language

Reported by Principals

Country	School has More than 90% of Students with Language of Test as Their Native Language		School has 51-90% of Students with Language of Test as Their Native Language		School has 50% or Less of Students with Language of Test as Their Native Language	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia	62 (4.0)	515 (3.5)	27 (3.5)	517 (7.1)	11 (2.1)	493 (10.3)
Bahrain	74 (0.2)	455 (2.7)	8 (0.1)	504 (8.4)	18 (0.2)	496 (5.3)
Botswana (9)	6 (1.9)	382 (15.2)	2 (1.2)	~ ~	93 (2.3)	392 (3.1)
Canada	43 (2.9)	535 (3.1)	40 (3.1)	524 (3.3)	18 (2.6)	517 (5.6)
Chile	100 (0.3)	455 (3.5)	0 (0.3)	~ ~	0 (0.0)	~ ~
Chinese Taipei	66 (3.5)	579 (2.9)	28 (3.5)	555 (4.6)	5 (1.3)	527 (5.2)
Egypt	99 (0.7)	371 (4.4)	1 (0.7)	~ ~	0 (0.0)	~ ~
England r	66 (4.4)	543 (6.3)	24 (3.9)	555 (10.2)	10 (2.7)	522 (16.6)
Georgia	89 (2.7)	445 (3.4)	10 (2.8)	433 (12.8)	1 (0.7)	~ ~
Hong Kong SAR	48 (4.7)	532 (5.2)	6 (2.1)	540 (22.2)	46 (5.0)	556 (6.2)
Hungary	100 (0.0)	526 (3.5)	0 (0.0)	~ ~	0 (0.0)	~ ~
Iran, Islamic Rep. of	50 (2.9)	478 (6.0)	11 (2.3)	460 (10.6)	40 (3.1)	428 (4.9)
Ireland	70 (4.1)	534 (3.2)	26 (3.8)	517 (9.1)	4 (1.7)	534 (9.7)
Israel	66 (3.0)	510 (5.3)	28 (3.2)	502 (7.4)	7 (1.9)	504 (19.9)
Italy	63 (3.8)	494 (3.4)	36 (3.8)	506 (4.6)	1 (0.9)	~ ~
Japan	99 (0.9)	571 (1.8)	1 (0.6)	~ ~	1 (0.7)	~ ~
Jordan	99 (0.5)	426 (3.4)	0 (0.4)	~ ~	0 (0.3)	~ ~
Kazakhstan	55 (3.1)	517 (6.0)	26 (3.4)	548 (10.2)	20 (2.9)	555 (13.0)
Korea, Rep. of	100 (0.0)	556 (2.2)	0 (0.0)	~ ~	0 (0.0)	~ ~
Kuwait	84 (2.5)	403 (5.4)	4 (1.5)	343 (21.5)	11 (2.0)	482 (27.4)
Lebanon	4 (1.6)	377 (32.3)	9 (2.6)	425 (19.7)	87 (3.1)	398 (5.9)
Lithuania	88 (2.6)	518 (3.1)	10 (2.4)	526 (10.5)	2 (0.9)	~ ~
Malaysia	48 (3.9)	485 (5.6)	24 (3.8)	466 (7.9)	28 (4.1)	451 (10.4)
Malta	4 (0.0)	522 (8.8)	6 (0.1)	558 (6.2)	90 (0.1)	473 (1.8)
Morocco	74 (2.8)	393 (2.9)	10 (2.0)	395 (7.4)	16 (2.1)	394 (5.1)
New Zealand	68 (4.2)	517 (3.7)	29 (4.1)	504 (8.3)	3 (1.7)	459 (32.2)
Norway (9)	77 (3.4)	514 (3.2)	19 (2.8)	500 (3.9)	4 (1.8)	476 (9.2)
Oman	86 (1.9)	452 (3.0)	3 (1.3)	445 (14.3)	11 (1.2)	476 (8.7)
Qatar	51 (0.7)	412 (4.2)	9 (0.3)	495 (6.3)	40 (0.7)	505 (4.7)
Russian Federation	80 (2.6)	545 (4.0)	15 (2.4)	551 (6.8)	5 (1.7)	516 (32.1)
Saudi Arabia	93 (2.4)	397 (4.8)	3 (1.3)	384 (23.1)	4 (2.0)	394 (11.8)
Singapore	0 (0.0)	~ ~	0 (0.0)	~ ~	100 (0.0)	597 (3.2)
Slovenia	71 (3.6)	555 (3.0)	27 (3.6)	545 (4.9)	2 (1.0)	~ ~
South Africa (9)	12 (2.3)	423 (17.6)	8 (1.7)	462 (20.6)	80 (2.7)	342 (6.7)
Sweden	47 (4.4)	534 (4.9)	43 (4.5)	520 (4.4)	10 (2.4)	481 (16.8)
Thailand	86 (2.8)	460 (4.6)	7 (2.2)	420 (11.2)	7 (1.8)	436 (13.3)
Turkey	80 (2.5)	505 (4.5)	7 (1.6)	487 (13.0)	12 (2.1)	419 (9.9)
United Arab Emirates	48 (1.2)	436 (3.5)	5 (0.9)	531 (9.6)	47 (1.4)	508 (3.9)
United States	58 (2.8)	546 (3.2)	28 (2.8)	514 (5.7)	14 (2.5)	504 (8.7)
International Avg.	64 (0.4)	485 (1.2)	14 (0.4)	491 (2.1)	22 (0.3)	477 (2.5)
Benchmarking Participants						
Buenos Aires, Argentina s	95 (2.6)	390 (5.9)	4 (2.2)	350 (14.0)	1 (1.3)	~ ~
Ontario, Canada	37 (3.9)	527 (4.3)	45 (4.5)	520 (3.9)	18 (3.4)	522 (7.2)
Quebec, Canada	49 (5.5)	544 (3.6)	32 (4.9)	537 (8.4)	19 (5.3)	510 (10.5)
Norway (8)	75 (3.5)	494 (2.6)	21 (3.0)	486 (4.5)	4 (1.8)	452 (11.9)
Abu Dhabi, UAE	59 (2.8)	427 (6.5)	4 (1.6)	525 (30.5)	37 (3.2)	482 (10.6)
Dubai, UAE	24 (0.3)	474 (3.2)	7 (0.2)	563 (6.1)	69 (0.4)	539 (2.7)
Florida, US s	31 (8.2)	545 (6.3)	45 (8.4)	497 (13.4)	24 (7.9)	501 (19.0)

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 5.7: Instruction Affected by Science Resource Shortages – Principals' Reports

Reported by Principals

Students were scored according to their principals' responses concerning thirteen school and classroom resources on the *Science Resource Shortages* scale. Students in schools where instruction was **Not Affected** by resource shortages had a score on the scale of at least 11.2, which corresponds to their principals reporting that shortages affected instruction "not at all" for seven of the thirteen resources and "a little" for the other six, on average. Students in schools where instruction was **Affected A Lot** had a score no higher than 7.4, which corresponds to their principals reporting that shortages affected instruction "a lot" for seven of the thirteen resources and "some" for the other six, on average. All other students attended schools where instruction was **Affected** by resource shortages.

Country	Not Affected		Affected		Affected A Lot		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Singapore	74 (0.0)	599 (4.0)	18 (0.0)	585 (8.6)	8 (0.0)	601 (11.3)	12.2 (0.00)	0.5 (0.00) ▲
Malta	66 (0.1)	486 (1.8)	34 (0.1)	469 (2.6)	0 (0.0)	~ ~	11.6 (0.00)	◊ ◊
Korea, Rep. of	61 (3.9)	555 (2.7)	37 (3.8)	558 (3.5)	3 (1.3)	537 (5.8)	11.8 (0.17)	0.2 (0.23)
Australia	53 (3.6)	524 (3.1)	46 (3.5)	501 (4.8)	1 (0.8)	~ ~	11.5 (0.12)	0.2 (0.19)
Slovenia	50 (4.7)	551 (3.3)	50 (4.7)	552 (3.9)	0 (0.0)	~ ~	11.5 (0.12)	-0.3 (0.17)
England r	48 (4.3)	552 (6.0)	52 (4.3)	536 (6.6)	0 (0.0)	~ ~	11.4 (0.15)	r 0.1 (0.22)
Japan	47 (3.5)	574 (2.8)	53 (3.6)	568 (2.4)	1 (0.6)	~ ~	10.9 (0.11)	0.3 (0.17)
Canada	47 (3.4)	533 (3.1)	53 (3.3)	522 (3.0)	0 (0.3)	~ ~	11.3 (0.14)	◊ ◊
Hong Kong SAR	45 (4.8)	546 (6.6)	52 (4.8)	544 (5.6)	3 (1.6)	529 (7.2)	11.0 (0.18)	0.2 (0.26)
Qatar	45 (0.4)	478 (2.9)	34 (0.4)	433 (4.2)	20 (0.4)	448 (9.1)	10.5 (0.03)	1.3 (0.07) ▲
New Zealand	45 (5.2)	521 (5.7)	55 (5.2)	504 (4.1)	0 (0.0)	~ ~	11.1 (0.16)	-0.2 (0.23)
Sweden	45 (4.2)	521 (5.1)	54 (4.1)	523 (4.8)	1 (0.9)	~ ~	11.0 (0.11)	r 0.0 (0.17)
Norway (9)	44 (4.1)	516 (5.3)	56 (4.1)	504 (3.0)	0 (0.0)	~ ~	11.2 (0.10)	◊ ◊
United Arab Emirates	32 (2.3)	516 (4.6)	50 (2.4)	452 (4.6)	17 (1.8)	469 (7.4)	10.0 (0.13)	0.2 (0.16)
United States	32 (3.4)	542 (5.7)	65 (3.4)	526 (3.6)	3 (0.9)	501 (12.3)	10.8 (0.13)	-0.1 (0.17)
Kazakhstan	31 (3.9)	525 (9.0)	63 (4.0)	537 (6.5)	5 (1.8)	522 (23.6)	10.3 (0.20)	0.1 (0.27)
Ireland	29 (3.5)	532 (7.2)	69 (3.8)	528 (3.4)	2 (1.5)	~ ~	10.7 (0.13)	◊ ◊
Chile	28 (3.2)	483 (6.2)	68 (3.6)	443 (5.1)	4 (1.8)	442 (14.7)	10.2 (0.14)	0.6 (0.17) ▲
Chinese Taipei	28 (3.7)	583 (5.4)	72 (3.6)	564 (2.8)	1 (0.5)	~ ~	10.7 (0.12)	0.1 (0.20)
Georgia	25 (3.3)	449 (6.6)	74 (3.3)	441 (3.9)	1 (0.8)	~ ~	10.6 (0.12)	0.5 (0.15) ▲
Russian Federation	20 (2.8)	552 (8.3)	78 (2.9)	542 (4.7)	1 (0.7)	~ ~	10.3 (0.10)	0.1 (0.17)
Lithuania	17 (3.3)	517 (9.0)	80 (3.7)	519 (3.1)	2 (1.5)	~ ~	10.2 (0.14)	-0.1 (0.18)
Israel	17 (2.7)	547 (9.2)	75 (2.9)	505 (4.5)	9 (1.8)	433 (15.6)	9.6 (0.11)	-0.5 (0.22)
Bahrain	17 (0.2)	513 (5.7)	58 (0.3)	455 (2.8)	25 (0.2)	466 (4.8)	9.2 (0.01)	-0.2 (0.02) ▼
Kuwait	16 (3.3)	467 (26.6)	63 (3.0)	396 (5.1)	21 (3.3)	411 (12.4)	9.1 (0.21)	◊ ◊
Oman	15 (2.2)	471 (6.8)	79 (2.5)	448 (3.1)	5 (1.4)	476 (10.5)	9.5 (0.10)	0.5 (0.14) ▲
Hungary	15 (3.2)	538 (13.9)	82 (3.4)	523 (3.6)	3 (1.6)	546 (13.0)	9.9 (0.11)	-0.6 (0.18) ▼
Lebanon	15 (2.7)	456 (12.8)	73 (3.0)	384 (6.7)	12 (2.5)	411 (15.1)	9.7 (0.15)	-0.1 (0.22)
Saudi Arabia	12 (3.5)	407 (20.9)	73 (4.3)	387 (5.0)	15 (3.2)	431 (12.9)	9.1 (0.19)	-0.3 (0.23)
Iran, Islamic Rep. of	10 (2.2)	507 (19.4)	78 (2.9)	451 (3.9)	13 (2.4)	450 (10.8)	9.1 (0.11)	0.3 (0.14)
Italy	9 (2.4)	509 (10.8)	90 (2.6)	497 (2.7)	1 (0.8)	~ ~	9.8 (0.08)	-0.2 (0.11)
South Africa (9)	7 (1.4)	461 (22.7)	83 (2.6)	354 (6.1)	10 (2.4)	316 (14.6)	9.3 (0.11)	-0.1 (0.15)
Thailand	7 (2.1)	485 (15.4)	78 (2.9)	454 (4.6)	15 (2.8)	453 (12.3)	8.9 (0.13)	0.4 (0.17)
Jordan	7 (1.5)	476 (12.8)	79 (3.1)	416 (3.7)	14 (2.9)	461 (11.6)	9.0 (0.13)	-0.1 (0.18)
Malaysia	5 (2.2)	420 (11.7)	70 (4.1)	470 (4.6)	25 (3.8)	482 (10.8)	8.4 (0.15)	-1.0 (0.21) ▼
Morocco	3 (0.9)	426 (20.0)	95 (1.2)	391 (2.5)	2 (0.7)	~ ~	9.6 (0.05)	0.1 (0.08)
Turkey	2 (1.0)	~ ~	79 (3.2)	493 (4.0)	19 (3.2)	490 (8.7)	8.4 (0.11)	0.1 (0.14)
Egypt	1 (0.7)	~ ~	89 (2.3)	366 (4.8)	10 (2.2)	417 (13.5)	8.7 (0.08)	◊ ◊
Botswana (9)	1 (0.0)	~ ~	89 (2.8)	390 (3.2)	10 (2.8)	402 (14.5)	8.6 (0.08)	-0.2 (0.12)
International Avg.	27 (0.5)	509 (1.8)	65 (0.5)	480 (0.7)	7 (0.3)	465 (2.6)		

Significantly higher than 2011 ▲
Significantly lower than 2011 ▼

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

A diamond (◊) indicates the country did not participate in the 2011 assessment.

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

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 5.7: Instruction Affected by Science Resource Shortages – Principals' Reports (Continued)

Country	Not Affected		Affected		Affected A Lot		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Benchmarking Participants								
Quebec, Canada	80 (4.6)	537 (3.8)	20 (4.6)	531 (9.5)	0 (0.0)	~ ~	12.6 (0.19)	0.6 (0.23) ▲
Dubai, UAE	57 (0.3)	548 (3.0)	29 (0.3)	491 (3.0)	14 (0.2)	511 (7.1)	11.3 (0.02)	0.9 (0.03) ▲
Buenos Aires, Argentina r	47 (4.7)	424 (6.1)	49 (4.6)	350 (8.1)	4 (2.6)	401 (9.0)	10.7 (0.20)	◊ ◊
Norway (8)	44 (4.0)	494 (3.9)	56 (4.0)	489 (3.1)	0 (0.0)	~ ~	11.2 (0.11)	0.1 (0.15)
Ontario, Canada	29 (4.6)	531 (5.7)	71 (4.5)	519 (3.1)	1 (0.6)	~ ~	10.7 (0.18)	0.0 (0.23)
Florida, US s	27 (8.5)	518 (16.0)	73 (8.5)	511 (11.2)	0 (0.0)	~ ~	10.4 (0.30)	s -0.9 (0.46)
Abu Dhabi, UAE	25 (4.1)	478 (12.5)	59 (4.4)	433 (9.5)	16 (3.4)	473 (11.3)	9.5 (0.24)	0.2 (0.30)

Significantly higher than 2011 ▲
Significantly lower than 2011 ▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

How much is your school's capacity to provide instruction affected by a shortage or inadequacy of the following?

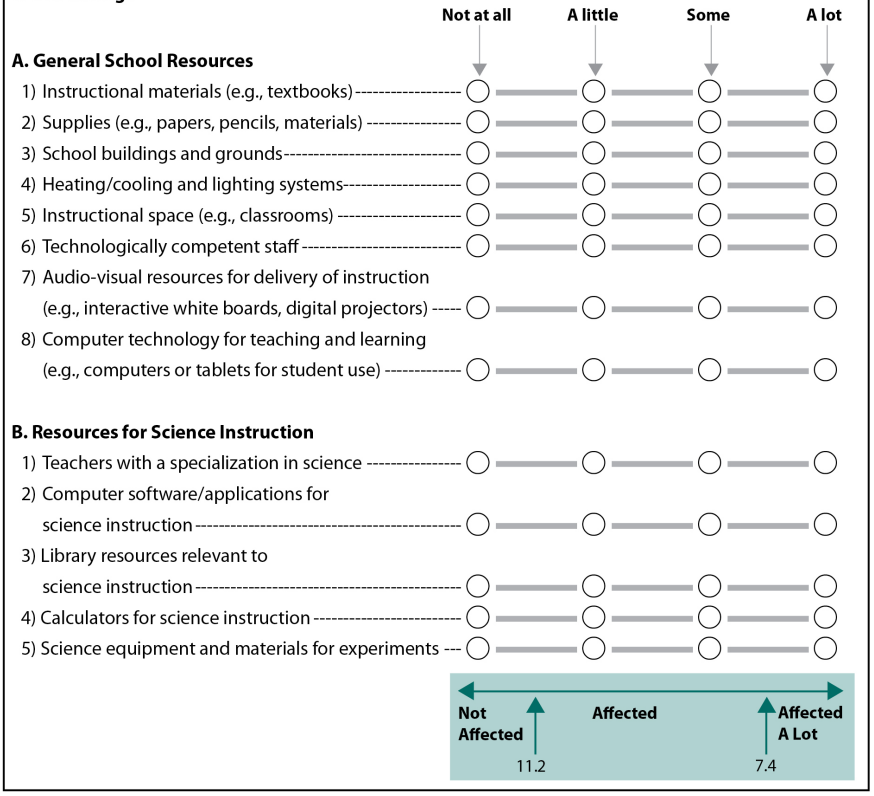


Exhibit 5.9: Problems with School Conditions and Resources – Teachers' Reports

Reported by Teachers

Students were scored according to their teachers' responses concerning seven conditions and resources on the *Problems with School Conditions and Resources* scale. Students whose teachers reported **Hardly Any Problems** with their school conditions and resources had a score on the scale of at least 10.9, which corresponds to their teachers reporting "not a problem" for four of seven conditions and resources and "minor problem" for the other three, on average. Students whose teachers reported **Moderate to Severe Problems** had a score no higher than 8.5, which corresponds to their teachers reporting "moderate problem" for four of seven conditions and resources and "minor problem" for the other three, on average. All other students had teachers that reported **Minor Problems** with their school conditions and resources.

Country	Hardly Any Problems		Minor Problems		Moderate to Severe Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Qatar	67 (3.0)	449 (4.8)	25 (3.0)	473 (8.0)	8 (0.5)	463 (9.7)	11.6 (0.13)
United Arab Emirates r	57 (2.4)	489 (3.8)	33 (2.3)	458 (7.5)	10 (1.9)	463 (9.6)	11.1 (0.10)
Singapore	53 (2.6)	607 (4.7)	41 (2.8)	587 (6.5)	5 (1.2)	569 (15.2)	11.0 (0.09)
Australia	50 (2.5)	524 (3.2)	40 (3.0)	508 (5.7)	10 (2.0)	503 (8.0)	10.8 (0.10)
Lebanon	50 (4.6)	412 (10.7)	36 (3.9)	394 (7.8)	14 (3.1)	358 (13.3)	10.6 (0.17)
England r	47 (3.4)	545 (5.1)	40 (2.9)	531 (6.7)	13 (2.6)	534 (15.8)	10.6 (0.14)
Chile r	45 (3.9)	470 (5.7)	41 (3.9)	446 (6.2)	15 (3.1)	442 (10.1)	10.4 (0.16)
Slovenia	44 (2.9)	554 (2.7)	44 (2.4)	550 (2.8)	11 (1.5)	545 (6.6)	10.7 (0.12)
Kuwait	43 (4.1)	424 (9.1)	33 (4.0)	394 (9.7)	24 (3.7)	403 (12.2)	10.3 (0.20)
Canada	42 (3.2)	535 (3.0)	48 (3.3)	523 (3.6)	10 (1.9)	518 (10.9)	10.6 (0.11)
Bahrain	42 (3.0)	477 (4.3)	44 (3.2)	459 (4.3)	14 (2.3)	451 (7.8)	10.5 (0.11)
Oman	42 (3.8)	460 (3.9)	43 (3.4)	455 (5.6)	15 (2.3)	442 (9.6)	10.5 (0.15)
Korea, Rep. of	41 (3.8)	557 (2.5)	47 (3.9)	554 (3.5)	11 (2.6)	555 (8.1)	10.5 (0.15)
Kazakhstan	40 (2.9)	540 (5.7)	40 (2.9)	534 (6.4)	20 (2.6)	519 (12.5)	10.3 (0.13)
United States r	40 (2.7)	543 (4.0)	46 (2.9)	528 (4.6)	14 (2.0)	514 (7.9)	10.4 (0.11)
Malta	39 (0.5)	493 (2.1)	46 (0.5)	477 (1.9)	15 (0.3)	459 (3.1)	10.4 (0.02)
Chinese Taipei	39 (3.5)	579 (3.9)	49 (4.0)	562 (3.4)	12 (2.6)	566 (5.5)	10.3 (0.12)
Hong Kong SAR	38 (4.8)	552 (6.5)	49 (5.3)	537 (6.3)	13 (3.1)	549 (9.7)	10.3 (0.13)
Ireland	38 (3.2)	537 (4.5)	47 (3.5)	527 (4.5)	16 (2.4)	530 (6.3)	10.3 (0.13)
New Zealand	37 (3.4)	529 (4.5)	47 (3.1)	507 (6.0)	16 (3.2)	507 (8.2)	10.1 (0.14)
Norway (9)	36 (3.1)	510 (4.5)	50 (3.7)	511 (3.9)	14 (2.7)	507 (6.1)	10.2 (0.11)
Russian Federation	35 (2.6)	551 (4.6)	48 (2.3)	543 (5.2)	16 (2.0)	533 (7.6)	10.1 (0.11)
Lithuania	33 (3.1)	519 (4.5)	52 (2.7)	517 (3.1)	15 (1.8)	524 (6.3)	10.2 (0.13)
Israel	28 (3.2)	498 (9.6)	46 (3.4)	521 (6.1)	26 (2.8)	496 (8.0)	9.8 (0.14)
Hungary	26 (2.1)	518 (5.9)	47 (2.5)	527 (4.4)	26 (2.6)	530 (5.6)	9.7 (0.10)
Jordan	25 (3.0)	455 (8.4)	39 (3.9)	423 (5.3)	36 (4.0)	407 (5.3)	9.3 (0.15)
Thailand	25 (3.4)	472 (9.8)	50 (3.9)	458 (6.1)	26 (3.2)	437 (8.4)	9.7 (0.13)
Japan	24 (3.7)	573 (4.4)	62 (3.9)	572 (2.2)	14 (2.6)	564 (6.0)	9.9 (0.13)
Sweden	23 (3.7)	521 (8.7)	50 (3.9)	528 (4.2)	26 (3.4)	514 (6.7)	9.6 (0.15)
Egypt	22 (2.7)	398 (8.7)	40 (3.7)	374 (7.3)	38 (3.6)	351 (7.3)	9.1 (0.15)
Saudi Arabia	22 (4.1)	424 (8.8)	48 (4.8)	394 (7.6)	31 (4.4)	380 (7.6)	9.3 (0.21)
Georgia	21 (2.5)	454 (5.0)	45 (2.5)	442 (3.7)	34 (2.9)	439 (5.3)	9.4 (0.12)
Iran, Islamic Rep. of	21 (2.6)	481 (12.1)	52 (3.2)	461 (4.7)	27 (3.1)	428 (5.2)	9.5 (0.11)
Italy	16 (3.0)	490 (8.3)	52 (4.2)	506 (3.6)	32 (3.5)	489 (5.8)	9.4 (0.12)
Turkey	16 (2.6)	522 (11.2)	39 (3.5)	497 (6.7)	45 (3.7)	480 (5.1)	8.9 (0.14)
South Africa (9)	15 (2.6)	452 (13.9)	29 (3.5)	364 (10.8)	56 (3.6)	329 (6.0)	8.5 (0.17)
Malaysia	13 (2.7)	465 (13.4)	42 (4.1)	483 (7.2)	45 (4.0)	455 (8.2)	8.9 (0.12)
Morocco	12 (1.4)	420 (8.0)	43 (2.5)	394 (3.6)	44 (2.6)	386 (2.8)	8.9 (0.08)
Botswana (9)	2 (0.7)	~ ~	15 (3.4)	421 (6.9)	82 (3.3)	387 (3.4)	7.4 (0.11)
International Avg.	34 (0.5)	500 (1.2)	43 (0.5)	486 (0.9)	23 (0.5)	475 (1.3)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

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

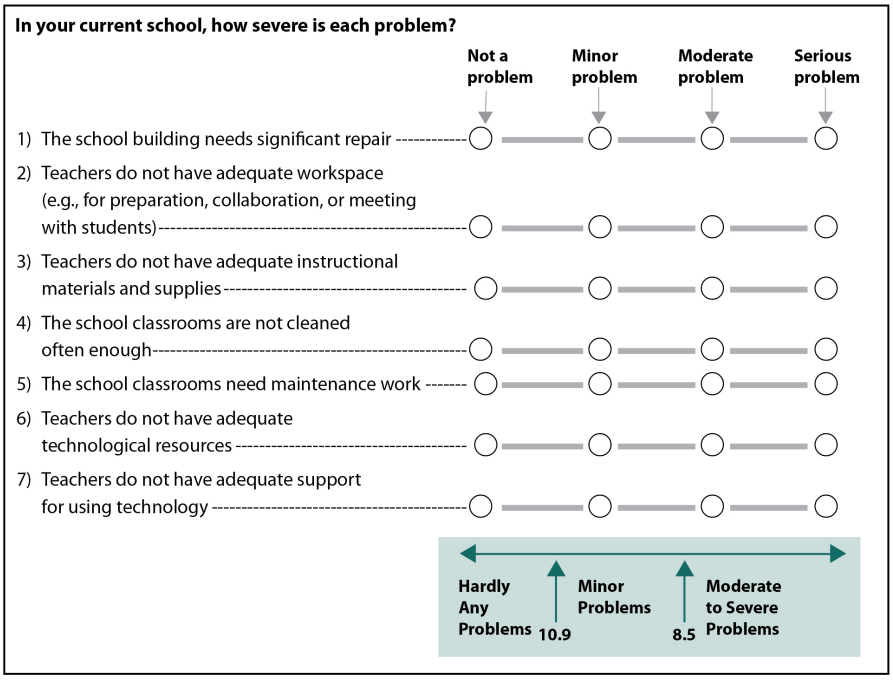
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 5.9: Problems with School Conditions and Resources – Teachers' Reports (Continued)

Country		Hardly Any Problems		Minor Problems		Moderate to Severe Problems		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Benchmarking Participants								
Dubai, UAE	r	71 (1.9)	537 (3.3)	25 (1.8)	487 (5.8)	4 (1.4)	492 (27.0)	11.7 (0.06)
Abu Dhabi, UAE		47 (5.0)	451 (8.5)	39 (4.9)	446 (15.0)	13 (3.3)	465 (14.6)	10.7 (0.20)
Ontario, Canada	r	44 (4.3)	530 (3.6)	46 (4.1)	523 (4.5)	10 (2.7)	523 (8.9)	10.6 (0.15)
Quebec, Canada		38 (4.0)	541 (5.9)	53 (3.9)	524 (7.2)	9 (1.4)	510 (30.2)	10.5 (0.15)
Florida, US	s	33 (6.9)	532 (13.8)	48 (6.5)	521 (10.5)	20 (5.5)	493 (14.1)	10.0 (0.26)
Norway (8)		29 (3.6)	493 (4.4)	55 (3.8)	490 (3.1)	16 (3.1)	489 (6.1)	10.0 (0.14)
Buenos Aires, Argentina		x x	x x	x x	x x	x x	x x	x x

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



TIMSS 2015

CHAPTER 6: SCHOOL CLIMATE

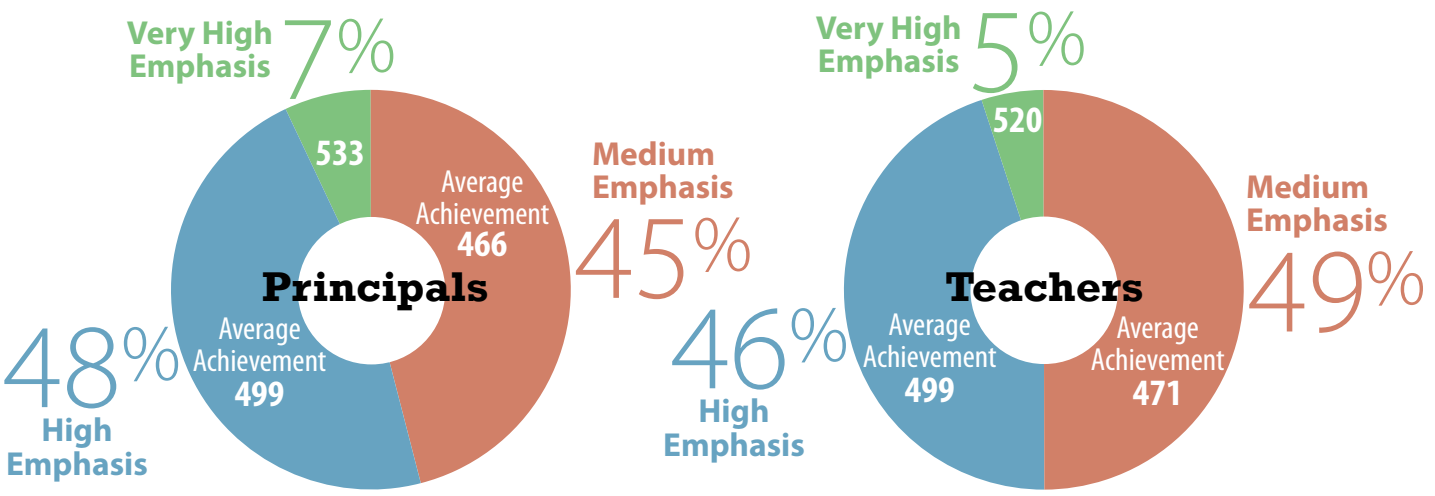
TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

IEA
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

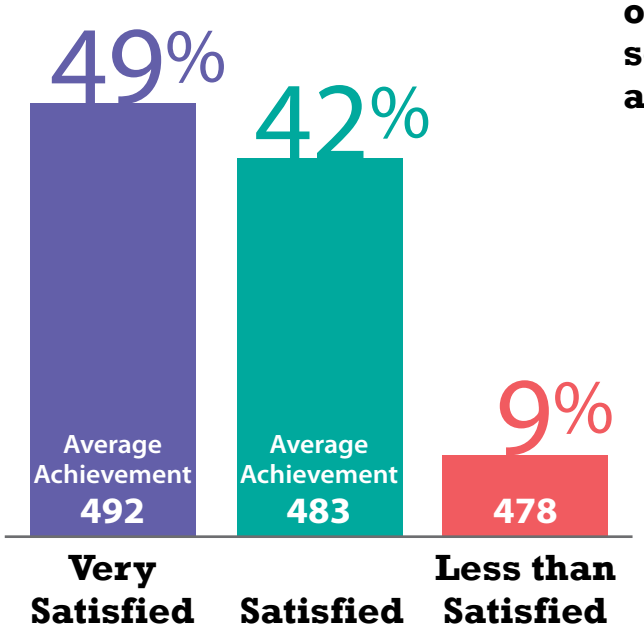
Schools Have Positive Environments

Generally, eighth grade students were in positive school environments, according to their principals, teachers, and the students themselves.

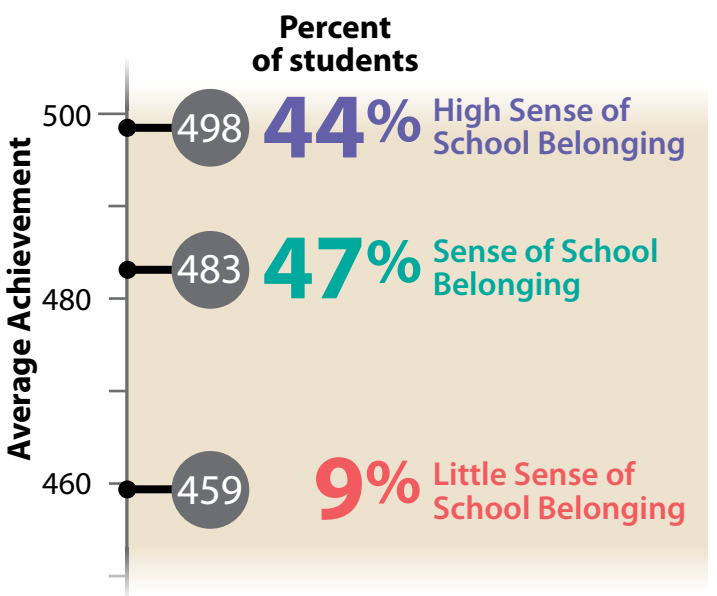
PRINCIPALS and TEACHERS agree that the schools emphasize academic success.



TEACHERS of eighth grade science reported a high degree of job satisfaction.



EIGHTH GRADE STUDENTS were positive about their schools, about evenly divided between having a high sense and a sense of school belonging. A higher sense of school belonging was related to higher average science achievement.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.
http://timss2015.org/download-center/

IEA TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 6.3: School Emphasis on Academic Success – Principals' Reports

Reported by Principals

Students were scored according to their principals' responses characterizing thirteen aspects on the *School Emphasis on Academic Success* 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, which corresponds to their principals characterizing seven of the thirteen aspects as "very high" and the other six as "high," on average. Students in schools with a **Medium Emphasis** on academic success had a score no higher than 9.6, which corresponds to their principals characterizing seven of the thirteen aspects as "medium" and the other six as "high," on average. All other students attended schools with a **High Emphasis** on academic success.

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
England r	26 (3.7)	587 (9.7)	53 (4.8)	540 (6.0)	22 (3.5)	502 (9.9)	11.6 (0.17)
Qatar	25 (0.4)	499 (4.2)	57 (0.5)	452 (4.0)	19 (0.4)	415 (6.1)	11.7 (0.02)
United Arab Emirates	19 (1.7)	533 (5.8)	59 (2.2)	478 (3.3)	22 (1.5)	416 (5.8)	11.2 (0.07)
Korea, Rep. of	17 (3.5)	567 (6.2)	65 (4.3)	557 (2.7)	18 (3.4)	539 (3.4)	11.2 (0.17)
Ireland	15 (2.9)	556 (6.7)	65 (4.0)	534 (2.9)	21 (3.1)	498 (8.7)	11.2 (0.15)
Australia	14 (2.3)	556 (5.8)	42 (3.5)	519 (4.6)	44 (3.0)	495 (4.1)	10.5 (0.11)
Canada	13 (2.1)	548 (4.6)	46 (3.2)	530 (2.7)	41 (3.3)	517 (3.0)	10.6 (0.15)
Bahrain	12 (0.2)	514 (8.7)	52 (0.2)	472 (2.9)	36 (0.2)	441 (3.0)	10.3 (0.01)
Malaysia	10 (2.1)	524 (12.1)	65 (3.6)	471 (5.6)	25 (3.9)	448 (7.6)	11.0 (0.12)
Singapore	10 (0.0)	661 (8.7)	64 (0.0)	601 (4.4)	26 (0.0)	562 (6.1)	10.7 (0.00)
New Zealand	9 (2.8)	539 (12.9)	69 (4.4)	517 (4.5)	22 (3.6)	480 (7.1)	11.0 (0.14)
Kazakhstan	9 (2.6)	533 (16.8)	72 (3.8)	534 (5.7)	19 (3.4)	527 (10.1)	11.0 (0.16)
Malta	8 (0.1)	520 (5.0)	57 (0.1)	497 (2.0)	35 (0.1)	444 (2.7)	10.4 (0.01)
United States	8 (2.0)	570 (9.3)	46 (3.5)	543 (3.9)	46 (3.2)	512 (4.9)	10.0 (0.13)
Chinese Taipei	7 (1.9)	621 (7.7)	46 (3.8)	579 (3.0)	47 (3.5)	552 (3.4)	10.0 (0.13)
Hong Kong SAR	6 (1.2)	586 (11.6)	39 (3.8)	568 (5.6)	56 (3.8)	524 (5.3)	9.7 (0.14)
Sweden	5 (1.9)	560 (11.7)	45 (4.4)	536 (4.9)	50 (4.2)	506 (5.0)	9.9 (0.13)
Saudi Arabia	5 (1.7)	433 (22.2)	43 (4.1)	418 (7.1)	52 (4.2)	377 (5.6)	9.8 (0.15)
Oman	5 (1.3)	469 (12.5)	57 (2.9)	462 (4.2)	38 (2.6)	440 (4.1)	10.2 (0.09)
Kuwait	5 (1.7)	462 (28.8)	53 (4.1)	430 (8.3)	42 (3.9)	379 (6.1)	10.0 (0.13)
Iran, Islamic Rep. of	5 (1.0)	542 (22.8)	43 (3.0)	473 (5.8)	53 (3.2)	435 (3.7)	9.6 (0.12)
Thailand	5 (1.5)	479 (27.0)	61 (4.0)	467 (5.4)	34 (3.8)	432 (5.5)	10.3 (0.14)
Israel	4 (1.6)	578 (15.5)	56 (3.6)	519 (5.5)	39 (3.3)	482 (7.9)	10.2 (0.11)
Turkey	4 (1.3)	614 (11.8)	29 (3.1)	518 (6.8)	67 (3.3)	476 (3.8)	8.9 (0.14)
Lebanon	4 (1.7)	476 (18.5)	53 (4.4)	418 (8.7)	43 (4.0)	368 (7.5)	10.0 (0.13)
Jordan	3 (1.0)	467 (19.8)	40 (3.7)	449 (5.5)	57 (3.7)	408 (4.5)	9.4 (0.12)
Egypt	3 (0.9)	410 (35.9)	33 (3.5)	384 (8.5)	64 (3.6)	362 (5.0)	9.5 (0.11)
Chile	2 (1.1)	~ ~	29 (3.4)	488 (7.7)	69 (3.6)	438 (4.2)	8.7 (0.16)
Japan	2 (1.2)	~ ~	53 (4.0)	581 (2.3)	45 (4.0)	558 (2.6)	9.8 (0.12)
Lithuania	2 (1.1)	~ ~	58 (3.7)	527 (3.9)	40 (3.8)	506 (3.9)	9.9 (0.10)
South Africa (9)	1 (0.5)	~ ~	27 (3.5)	386 (15.5)	72 (3.5)	344 (5.5)	8.7 (0.13)
Georgia	1 (0.6)	~ ~	57 (4.3)	446 (4.0)	42 (4.3)	440 (4.8)	9.9 (0.11)
Slovenia	1 (0.9)	~ ~	38 (4.6)	560 (4.4)	61 (4.5)	546 (3.1)	9.5 (0.11)
Hungary	1 (0.9)	~ ~	64 (3.9)	545 (3.8)	35 (3.9)	489 (7.0)	10.1 (0.10)
Norway (9)	1 (0.8)	~ ~	52 (4.1)	520 (4.2)	47 (4.0)	497 (3.2)	9.9 (0.12)
Botswana (9)	1 (0.0)	~ ~	12 (2.7)	440 (9.6)	88 (2.7)	385 (3.0)	7.7 (0.13)
Italy	1 (0.7)	~ ~	29 (3.6)	505 (5.1)	71 (3.7)	496 (3.4)	9.0 (0.12)
Morocco	0 (0.2)	~ ~	12 (1.8)	432 (10.1)	88 (1.8)	388 (2.6)	7.8 (0.10)
Russian Federation	0 (0.0)	~ ~	27 (3.1)	560 (5.7)	73 (3.1)	538 (5.4)	9.1 (0.08)
International Avg.	7 (0.3)	533 (3.0)	48 (0.6)	499 (1.0)	45 (0.5)	466 (0.9)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

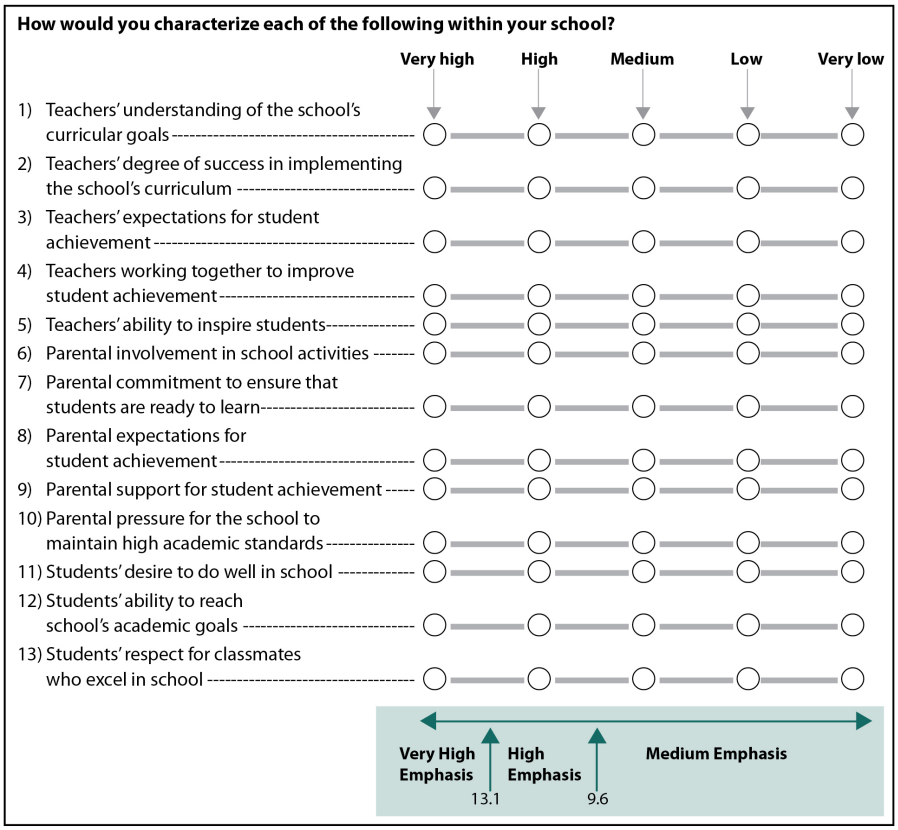
A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 6.3: School Emphasis on Academic Success – Principals' Reports (Continued)

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Benchmarking Participants							
Dubai, UAE	42 (0.3)	554 (3.9)	48 (0.4)	518 (2.5)	10 (0.2)	443 (6.0)	12.5 (0.02)
Quebec, Canada	27 (4.2)	560 (4.9)	54 (5.6)	528 (4.4)	18 (4.4)	521 (8.1)	11.8 (0.23)
Florida, US s	12 (6.0)	547 (20.0)	35 (9.7)	536 (13.9)	53 (8.8)	492 (12.9)	10.4 (0.44)
Abu Dhabi, UAE	8 (2.5)	489 (24.4)	58 (3.9)	468 (6.3)	34 (3.6)	412 (9.4)	10.4 (0.15)
Ontario, Canada	6 (2.2)	529 (4.4)	42 (4.1)	530 (3.6)	52 (4.2)	516 (3.7)	10.0 (0.19)
Norway (8)	1 (0.8)	~ ~	52 (4.0)	501 (3.2)	47 (3.9)	478 (2.9)	9.9 (0.12)
Buenos Aires, Argentina r	1 (0.7)	~ ~	26 (4.5)	432 (10.3)	74 (4.6)	371 (6.7)	8.9 (0.16)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 6.5: School Emphasis on Academic Success – Teachers' Reports

Reported by Teachers

Students were scored according to their teachers' responses characterizing fourteen aspects on the *School Emphasis on Academic Success* scale. Students in schools where their teachers reported a **Very High Emphasis** on academic success had a score on the scale of at least 13.4, which corresponds to their teachers characterizing seven of the fourteen aspects as "very high" and the other seven as "high," on average. Students in schools with a **Medium Emphasis** on academic success had a score no higher than 9.8, which corresponds to their teachers characterizing seven of the fourteen aspects as "medium" and the other seven as "high," on average. All other students attended schools with a **High Emphasis** on academic success.

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
United Arab Emirates r	14 (1.7)	520 (7.4)	61 (2.5)	487 (3.9)	25 (1.8)	425 (5.6)	11.3 (0.08)
Korea, Rep. of	13 (2.7)	566 (6.1)	61 (3.8)	558 (2.8)	26 (3.5)	545 (3.2)	11.2 (0.17)
Qatar	12 (2.4)	490 (20.1)	62 (3.5)	461 (5.2)	26 (2.5)	428 (6.9)	11.0 (0.09)
Ireland	11 (1.8)	546 (6.7)	63 (2.9)	541 (2.6)	26 (2.6)	504 (6.4)	11.1 (0.13)
Kazakhstan	10 (1.8)	536 (12.3)	74 (2.5)	533 (5.1)	17 (2.2)	528 (9.7)	11.3 (0.11)
Canada	10 (1.9)	544 (7.9)	52 (3.4)	533 (3.0)	39 (3.3)	515 (4.0)	10.7 (0.13)
South Africa (9)	9 (2.8)	439 (22.5)	39 (3.4)	363 (8.4)	52 (3.5)	339 (6.9)	10.0 (0.19)
Malaysia	9 (1.9)	481 (16.9)	68 (3.3)	474 (5.0)	24 (3.2)	447 (11.2)	11.1 (0.12)
Oman	9 (2.3)	472 (6.9)	47 (3.9)	456 (4.6)	45 (3.6)	449 (4.7)	10.2 (0.15)
Bahrain	8 (1.5)	521 (8.3)	50 (3.2)	475 (4.0)	42 (3.3)	447 (5.0)	10.3 (0.09)
England r	8 (1.3)	575 (12.0)	52 (2.7)	549 (5.9)	40 (2.7)	516 (6.8)	10.5 (0.13)
Chinese Taipei	6 (1.8)	599 (9.6)	38 (3.9)	588 (4.1)	56 (3.9)	554 (3.0)	9.9 (0.14)
Australia	6 (1.4)	548 (10.9)	45 (3.1)	526 (4.5)	49 (3.2)	501 (3.3)	9.9 (0.14)
Malta	6 (0.2)	501 (5.3)	50 (0.4)	498 (2.0)	45 (0.4)	459 (2.0)	10.2 (0.01)
United States r	5 (1.2)	582 (7.9)	45 (3.1)	543 (4.9)	50 (3.2)	517 (4.3)	10.0 (0.13)
Kuwait	5 (1.5)	476 (37.6)	45 (4.1)	424 (8.0)	51 (4.0)	389 (6.9)	10.0 (0.14)
Israel	4 (1.4)	529 (15.8)	53 (3.2)	523 (5.9)	43 (3.4)	487 (6.1)	10.3 (0.12)
Thailand	4 (1.5)	498 (29.1)	53 (3.7)	463 (5.8)	44 (3.7)	443 (6.0)	10.3 (0.12)
New Zealand	4 (1.5)	541 (24.7)	53 (3.4)	533 (3.7)	43 (3.5)	491 (5.1)	10.3 (0.14)
Singapore	4 (1.1)	629 (18.1)	53 (2.7)	621 (4.7)	43 (2.7)	564 (5.7)	10.3 (0.08)
Japan	4 (1.3)	579 (14.3)	36 (3.9)	584 (3.2)	60 (3.9)	563 (2.2)	9.6 (0.12)
Norway (9)	4 (1.9)	550 (14.2)	48 (4.3)	514 (4.2)	48 (4.0)	503 (3.3)	10.0 (0.11)
Saudi Arabia	4 (1.7)	431 (29.8)	42 (4.4)	410 (7.9)	55 (4.4)	384 (6.0)	9.5 (0.17)
Iran, Islamic Rep. of	3 (1.2)	526 (16.7)	44 (3.3)	479 (6.2)	52 (3.4)	433 (3.8)	9.8 (0.13)
Egypt	3 (1.2)	441 (20.2)	37 (3.6)	391 (6.8)	60 (3.9)	354 (5.7)	9.5 (0.14)
Chile r	3 (1.5)	527 (34.7)	38 (4.2)	472 (6.9)	59 (4.4)	443 (5.0)	9.6 (0.16)
Georgia	3 (0.8)	466 (10.6)	52 (2.6)	452 (3.6)	45 (2.7)	432 (4.2)	10.2 (0.08)
Lebanon	3 (1.1)	402 (28.3)	48 (4.3)	414 (10.2)	49 (4.2)	380 (7.7)	9.9 (0.16)
Turkey	3 (1.1)	565 (27.8)	32 (3.7)	525 (6.8)	66 (3.8)	475 (4.1)	9.1 (0.14)
Jordan	2 (0.9)	~ ~	36 (3.4)	450 (5.5)	62 (3.3)	411 (4.2)	9.5 (0.12)
Sweden	2 (1.0)	~ ~	39 (3.6)	535 (4.8)	58 (3.7)	512 (4.3)	9.6 (0.15)
Lithuania	2 (0.6)	~ ~	57 (2.5)	522 (2.9)	40 (2.5)	514 (3.9)	10.2 (0.08)
Botswana (9)	2 (1.1)	~ ~	18 (3.3)	429 (8.2)	80 (3.4)	386 (3.1)	8.7 (0.14)
Hong Kong SAR	2 (1.4)	~ ~	42 (4.1)	562 (5.6)	56 (4.3)	531 (4.6)	9.6 (0.15)
Italy	1 (0.7)	~ ~	34 (3.7)	501 (5.6)	65 (3.8)	498 (3.1)	9.2 (0.12)
Morocco	1 (0.4)	~ ~	11 (1.7)	423 (6.2)	88 (1.8)	389 (2.5)	7.8 (0.10)
Slovenia	1 (0.3)	~ ~	41 (2.4)	556 (3.4)	58 (2.4)	548 (2.5)	9.7 (0.07)
Hungary	1 (0.3)	~ ~	38 (2.7)	550 (4.5)	62 (2.8)	511 (3.9)	9.5 (0.09)
Russian Federation	1 (0.3)	~ ~	35 (2.5)	559 (4.0)	64 (2.5)	536 (4.9)	9.5 (0.06)
International Avg.	5 (0.2)	520 (3.5)	46 (0.5)	499 (0.9)	49 (0.5)	471 (0.8)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

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

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 6.5: School Emphasis on Academic Success – Teachers' Reports (Continued)

Country		Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Benchmarking Participants								
Dubai, UAE	r	21 (1.6)	555 (5.9)	65 (2.1)	523 (3.0)	14 (1.6)	471 (10.6)	12.1 (0.07)
Quebec, Canada		18 (4.0)	545 (9.5)	52 (4.9)	536 (6.4)	29 (3.8)	508 (8.0)	11.3 (0.20)
Florida, US	s	8 (3.8)	508 (47.7)	42 (5.3)	543 (8.7)	50 (5.6)	501 (11.1)	9.9 (0.32)
Abu Dhabi, UAE		8 (2.7)	494 (19.8)	58 (4.6)	469 (8.0)	35 (3.7)	412 (7.8)	10.6 (0.15)
Ontario, Canada	r	6 (2.2)	541 (16.1)	50 (4.8)	531 (3.3)	44 (4.4)	518 (4.9)	10.3 (0.15)
Norway (8)		2 (1.2)	~ ~	49 (3.9)	496 (4.1)	48 (3.7)	483 (3.1)	10.0 (0.09)
Buenos Aires, Argentina		x x	x x	x x	x x	x x	x x	x x

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

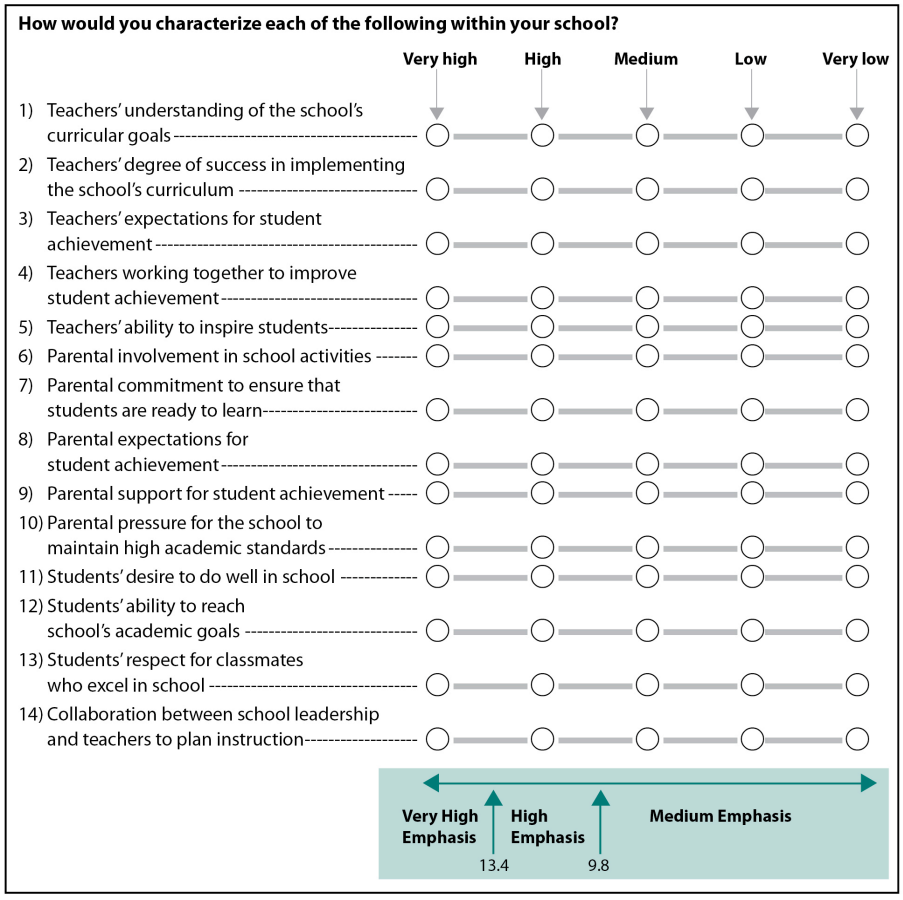


Exhibit 6.7: Teacher Job Satisfaction

Reported by Teachers

Students were scored according to how often their teachers responded positively to the seven statements on the *Teacher Job Satisfaction* scale. Students with **Very Satisfied** teachers had a score on the scale of at least 10.3, which corresponds to their teachers responding "very often" to four of the seven statements and responding "often" to the other three, on average. Students with **Less than Satisfied** teachers had a score no higher than 7.0, which corresponds to their teachers responding "sometimes" to four of the seven statements and "often" to the other three, on average. All other students had **Satisfied** teachers.

Country	Very Satisfied		Satisfied		Less than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Egypt	78 (3.2)	377 (4.8)	21 (3.2)	349 (11.2)	2 (0.9)	~ ~	11.0 (0.12)
Lebanon	75 (3.1)	402 (6.4)	23 (3.0)	383 (10.4)	2 (0.7)	~ ~	11.0 (0.12)
Chile	74 (3.6)	455 (4.8)	22 (3.4)	466 (7.2)	4 (1.7)	425 (17.8)	11.0 (0.14)
Qatar	73 (2.9)	450 (4.4)	27 (2.9)	472 (7.2)	0 (0.0)	~ ~	10.9 (0.10)
United Arab Emirates r	65 (2.2)	483 (4.1)	32 (2.2)	464 (6.4)	3 (0.7)	441 (14.7)	10.7 (0.08)
Thailand	65 (4.1)	461 (5.2)	32 (3.8)	447 (6.8)	3 (1.4)	443 (21.9)	10.7 (0.15)
Iran, Islamic Rep. of	64 (3.1)	465 (4.5)	28 (3.1)	443 (6.5)	8 (2.1)	435 (8.6)	10.5 (0.13)
Oman	64 (3.3)	454 (3.7)	27 (2.7)	458 (5.5)	9 (2.4)	455 (11.3)	10.5 (0.15)
Israel	63 (3.0)	505 (5.6)	33 (2.9)	520 (7.1)	4 (1.1)	459 (18.3)	10.6 (0.11)
Kuwait	62 (4.4)	414 (7.1)	30 (4.3)	414 (12.6)	7 (2.5)	361 (24.9)	10.5 (0.19)
Malaysia	61 (4.0)	465 (5.9)	37 (4.0)	473 (7.6)	3 (1.1)	449 (39.1)	10.5 (0.15)
Saudi Arabia	61 (4.2)	410 (5.8)	33 (4.1)	378 (8.0)	7 (2.2)	366 (18.5)	10.4 (0.16)
Kazakhstan	57 (3.1)	529 (5.3)	42 (3.1)	537 (6.1)	1 (0.3)	~ ~	10.5 (0.10)
South Africa (9)	56 (3.5)	368 (8.1)	32 (2.9)	352 (9.8)	12 (2.2)	324 (11.2)	10.1 (0.14)
Ireland	55 (3.2)	539 (3.1)	37 (2.6)	521 (4.8)	8 (1.8)	532 (11.2)	10.2 (0.14)
Canada	55 (3.2)	528 (3.6)	41 (3.0)	528 (3.3)	4 (1.0)	518 (9.3)	10.4 (0.12)
Georgia	54 (2.5)	446 (3.3)	42 (2.4)	443 (4.0)	4 (0.8)	426 (8.1)	10.3 (0.08)
Morocco	53 (2.7)	399 (3.6)	41 (2.4)	387 (3.1)	6 (1.1)	392 (5.5)	10.1 (0.10)
Norway (9)	49 (3.9)	508 (3.8)	46 (3.9)	512 (4.3)	6 (2.0)	512 (8.5)	10.1 (0.16)
Bahrain	47 (3.5)	473 (4.3)	44 (3.7)	462 (3.6)	9 (2.2)	464 (10.9)	10.1 (0.12)
United States r	46 (3.0)	537 (5.5)	43 (2.7)	529 (4.1)	11 (1.7)	532 (8.8)	9.9 (0.13)
Jordan	45 (3.5)	440 (4.7)	42 (3.3)	418 (5.4)	13 (2.4)	403 (7.8)	9.7 (0.15)
Turkey	44 (3.5)	509 (5.6)	45 (3.0)	482 (6.0)	12 (2.5)	480 (12.3)	9.7 (0.14)
Australia	44 (3.0)	524 (4.3)	41 (2.8)	508 (3.9)	15 (2.4)	513 (5.9)	9.6 (0.14)
Malta	44 (0.4)	498 (2.4)	43 (0.4)	475 (1.8)	13 (0.2)	443 (3.5)	9.6 (0.02)
Chinese Taipei	42 (3.5)	575 (3.6)	43 (3.4)	565 (3.6)	15 (2.5)	564 (7.1)	9.6 (0.17)
Slovenia	42 (2.2)	551 (3.4)	51 (2.1)	551 (2.6)	8 (1.3)	553 (5.5)	9.8 (0.09)
New Zealand	40 (3.8)	520 (4.9)	47 (3.8)	511 (4.9)	13 (2.3)	514 (8.2)	9.6 (0.16)
Korea, Rep. of	39 (3.6)	557 (3.0)	49 (3.9)	555 (3.0)	12 (2.4)	555 (7.3)	9.5 (0.14)
Italy	36 (4.1)	505 (4.7)	54 (4.3)	491 (4.2)	10 (2.6)	507 (6.1)	9.5 (0.17)
Hong Kong SAR	34 (4.1)	562 (7.1)	48 (5.0)	541 (5.4)	19 (3.7)	523 (10.0)	9.1 (0.18)
Singapore	33 (2.9)	604 (6.6)	54 (3.0)	594 (5.7)	13 (1.8)	590 (11.6)	9.3 (0.13)
Russian Federation	33 (2.3)	544 (5.1)	62 (2.3)	545 (4.6)	6 (1.0)	534 (7.2)	9.5 (0.09)
Botswana (9)	32 (4.0)	402 (6.1)	46 (4.6)	387 (4.7)	22 (3.4)	395 (6.2)	8.9 (0.18)
Hungary	31 (2.4)	540 (5.0)	59 (2.5)	523 (3.9)	10 (1.5)	503 (12.7)	9.3 (0.10)
Sweden	30 (4.0)	523 (7.0)	58 (3.8)	524 (3.9)	12 (3.5)	517 (10.0)	9.2 (0.20)
Lithuania	28 (1.9)	519 (3.7)	57 (2.3)	519 (3.2)	16 (1.8)	520 (4.9)	9.1 (0.09)
England r	27 (2.3)	550 (7.3)	52 (2.5)	539 (5.8)	21 (2.5)	521 (7.7)	8.8 (0.12)
Japan	19 (3.0)	580 (3.8)	61 (3.8)	570 (2.3)	20 (3.0)	563 (3.7)	8.7 (0.14)
International Avg.	49 (0.5)	492 (0.8)	42 (0.5)	483 (1.0)	9 (0.3)	478 (2.2)	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

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

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

Exhibit 6.7: Teacher Job Satisfaction (Continued)

Country	Very Satisfied		Satisfied		Less than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Benchmarking Participants							
Abu Dhabi, UAE	67 (4.1)	458 (9.0)	29 (3.9)	435 (11.1)	4 (1.3)	435 (16.7)	10.7 (0.17)
Dubai, UAE r	63 (1.8)	533 (2.9)	35 (1.7)	506 (6.7)	2 (0.7)	~ ~	10.8 (0.06)
Ontario, Canada r	61 (4.8)	524 (4.0)	34 (4.5)	531 (4.4)	5 (1.3)	519 (10.0)	10.6 (0.18)
Norway (8)	46 (3.8)	494 (3.7)	46 (3.7)	491 (3.2)	8 (2.4)	472 (10.3)	9.9 (0.17)
Quebec, Canada	44 (4.1)	538 (8.1)	53 (3.9)	524 (5.1)	3 (1.5)	502 (30.5)	10.1 (0.17)
Florida, US s	41 (6.5)	541 (13.3)	44 (5.6)	503 (10.8)	15 (3.5)	504 (16.5)	9.5 (0.29)
Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

How often do you feel the following way about being a teacher?

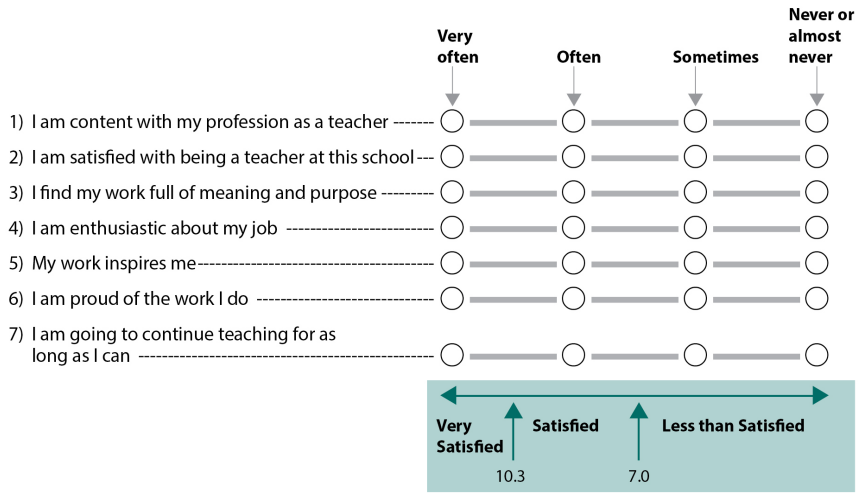


Exhibit 6.9: Challenges Facing Teachers

Reported by Teachers

Students were scored according to their teachers' responses concerning eight challenging conditions on the *Challenges Facing Teachers* scale. Students whose teachers faced **Few Challenges** had a score on the scale of at least 10.3, which corresponds to their teachers "disagreeing a little" with four of eight statements and "agreeing a little" with the other four, on average. Students whose teachers faced **Many Challenges** had a score no higher than 6.7, which corresponds to their teachers reporting "agreeing a lot" with four of eight statements and "agreeing a little" with the other four, on average. All other students had teachers that reported facing **Some Challenges**.

Country	Few Challenges		Some Challenges		Many Challenges		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Georgia	84 (1.9)	443 (3.3)	16 (1.9)	444 (4.4)	0 (0.2)	~ ~	11.7 (0.09)
Russian Federation	77 (1.8)	545 (4.5)	22 (1.7)	541 (5.5)	1 (0.3)	~ ~	11.2 (0.07)
Turkey	77 (2.9)	491 (4.4)	22 (2.9)	499 (9.2)	1 (0.8)	~ ~	11.5 (0.14)
Kazakhstan	76 (2.0)	535 (4.7)	24 (2.0)	526 (7.5)	0 (0.1)	~ ~	10.9 (0.06)
Lithuania	70 (2.0)	517 (3.0)	28 (1.8)	523 (3.7)	1 (0.6)	~ ~	11.1 (0.09)
Lebanon	63 (4.1)	401 (8.0)	33 (4.2)	395 (9.3)	4 (1.5)	371 (28.9)	11.1 (0.19)
Chinese Taipei	61 (3.8)	564 (3.4)	38 (3.8)	577 (4.5)	1 (0.7)	~ ~	10.6 (0.15)
Kuwait	61 (4.2)	410 (6.5)	35 (4.2)	410 (13.1)	4 (1.5)	381 (29.7)	10.6 (0.18)
Qatar	60 (2.9)	463 (5.0)	38 (3.0)	445 (5.9)	2 (0.7)	~ ~	10.8 (0.09)
Italy	59 (3.5)	495 (3.8)	41 (3.5)	504 (4.2)	0 (0.4)	~ ~	10.5 (0.12)
United Arab Emirates r	52 (2.5)	485 (4.1)	43 (2.6)	469 (4.9)	5 (0.9)	441 (10.0)	10.4 (0.08)
Morocco	51 (2.3)	400 (3.5)	46 (2.3)	387 (2.9)	3 (0.8)	393 (6.9)	10.3 (0.09)
Japan	48 (3.8)	574 (2.5)	47 (4.0)	566 (2.8)	5 (1.9)	584 (15.4)	9.9 (0.12)
Egypt	48 (3.3)	385 (6.3)	46 (3.5)	360 (6.4)	6 (2.0)	336 (17.4)	10.0 (0.12)
United States r	45 (2.5)	536 (4.4)	47 (2.6)	529 (4.9)	8 (1.5)	536 (12.0)	9.9 (0.13)
Saudi Arabia	45 (4.0)	391 (6.3)	50 (4.2)	393 (6.7)	5 (2.0)	383 (16.3)	10.0 (0.17)
Oman	42 (3.4)	460 (4.2)	54 (3.5)	452 (4.3)	3 (0.8)	456 (10.3)	10.0 (0.11)
Bahrain	42 (3.2)	470 (5.2)	54 (3.0)	463 (3.7)	3 (1.7)	452 (19.3)	10.1 (0.13)
Ireland	42 (3.5)	533 (5.1)	50 (3.6)	531 (4.0)	8 (1.4)	526 (7.5)	9.8 (0.14)
New Zealand	41 (3.4)	517 (4.9)	53 (3.9)	517 (5.5)	7 (2.3)	502 (15.9)	9.8 (0.13)
Jordan	41 (3.7)	433 (5.4)	55 (3.8)	422 (4.9)	4 (1.2)	411 (12.2)	9.9 (0.13)
Israel	39 (3.4)	510 (6.8)	51 (3.6)	509 (5.9)	10 (2.3)	496 (15.8)	9.6 (0.15)
Iran, Islamic Rep. of	39 (3.3)	449 (6.7)	57 (3.2)	459 (4.6)	3 (1.3)	494 (23.6)	9.9 (0.11)
Malta	37 (0.4)	489 (2.4)	52 (0.4)	479 (1.8)	11 (0.3)	459 (2.9)	9.4 (0.02)
Hong Kong SAR	36 (3.9)	535 (9.2)	59 (4.2)	551 (4.5)	5 (2.0)	546 (12.3)	9.5 (0.13)
Hungary	35 (2.1)	520 (5.1)	55 (2.3)	525 (4.3)	10 (1.6)	550 (6.7)	9.4 (0.11)
Thailand	35 (3.7)	463 (7.9)	60 (4.0)	450 (5.3)	5 (1.7)	469 (17.8)	9.7 (0.16)
Canada	35 (3.6)	531 (3.7)	61 (3.5)	526 (3.5)	4 (1.3)	515 (11.5)	9.7 (0.16)
Norway (9)	33 (4.2)	506 (5.5)	58 (4.4)	511 (3.3)	9 (2.4)	515 (8.6)	9.6 (0.18)
Malaysia	32 (3.6)	470 (8.7)	66 (3.8)	466 (5.4)	2 (1.0)	~ ~	9.6 (0.10)
South Africa (9)	32 (3.4)	386 (9.9)	55 (3.2)	348 (6.8)	13 (2.7)	331 (20.9)	9.5 (0.19)
Sweden	32 (4.0)	521 (6.0)	63 (4.3)	522 (4.3)	5 (1.7)	537 (12.1)	9.5 (0.13)
Australia	31 (2.5)	519 (5.3)	57 (3.2)	512 (3.7)	12 (2.4)	521 (8.0)	9.4 (0.11)
Slovenia	30 (2.0)	551 (3.4)	65 (1.8)	552 (2.6)	5 (1.1)	548 (7.0)	9.4 (0.08)
Chile	19 (3.2)	475 (9.0)	65 (4.1)	449 (4.6)	16 (3.2)	463 (10.4)	8.7 (0.15)
England r	18 (2.5)	559 (9.5)	61 (2.4)	534 (5.2)	22 (2.1)	534 (6.4)	8.5 (0.14)
Korea, Rep. of	17 (2.4)	549 (5.1)	60 (3.4)	556 (2.5)	23 (3.4)	560 (5.4)	8.5 (0.13)
Botswana (9)	12 (2.4)	416 (10.5)	80 (3.3)	390 (3.0)	8 (2.3)	395 (11.0)	8.9 (0.10)
Singapore	- -	- -	- -	- -	- -	- -	- -
International Avg.	45 (0.5)	487 (1.0)	49 (0.5)	481 (0.9)	6 (0.3)	473 (2.7)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

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

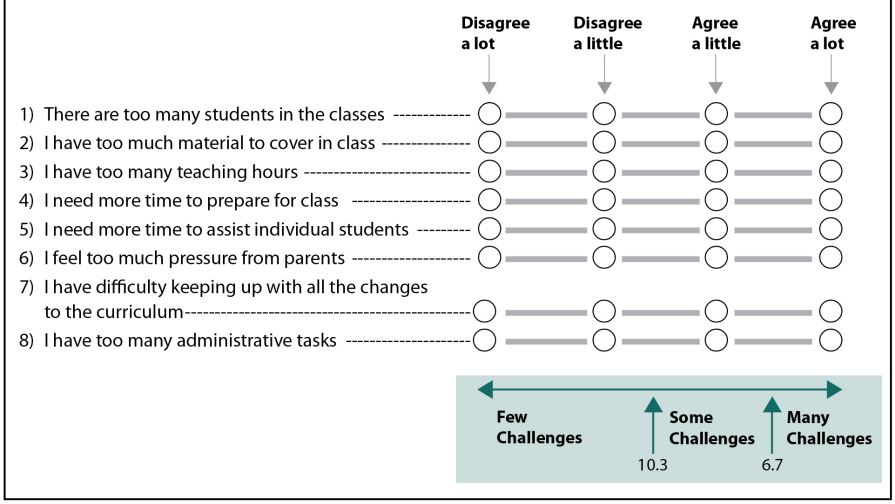
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 6.9: Challenges Facing Teachers (Continued)

Country		Few Challenges		Some Challenges		Many Challenges		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Benchmarking Participants								
Abu Dhabi, UAE		54 (4.2)	461 (8.5)	42 (4.3)	440 (8.3)	4 (1.8)	423 (15.6)	10.3 (0.16)
Dubai, UAE	r	50 (2.1)	532 (3.6)	48 (2.6)	512 (3.9)	3 (1.1)	534 (13.9)	10.8 (0.09)
Florida, US	s	42 (7.1)	511 (12.8)	52 (7.0)	526 (9.4)	6 (2.2)	502 (23.6)	10.0 (0.33)
Norway (8)		34 (3.3)	481 (4.1)	56 (3.5)	494 (3.0)	10 (2.3)	506 (6.6)	9.3 (0.17)
Ontario, Canada	r	34 (4.7)	526 (4.8)	63 (4.6)	527 (3.8)	4 (1.8)	522 (19.3)	9.5 (0.16)
Quebec, Canada		32 (4.9)	536 (6.7)	62 (5.1)	528 (6.9)	5 (2.1)	504 (15.2)	9.6 (0.15)
Buenos Aires, Argentina		x x	x x	x x	x x	x x	x x	x x

Indicate the extent to which you agree or disagree with each of the following statements.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 6.11: Students' Sense of School Belonging

Reported by Students

Students were scored according to their agreement to seven statements about their *Sense of School Belonging*. Students with a **High Sense of School Belonging** had a score on the scale of at least 10.3, which corresponds to their "agreeing a lot" to four of the seven statements and "agreeing a little" to each of the other three statements, on average. Students with **Little Sense of School Belonging** had a score no higher than 7.5, which corresponds to their "disagreeing a little" to four of the seven statements and "agreeing a little" to each of the other three statements, on average. All other students had a **Sense of School Belonging**.

Country	High Sense of School Belonging		Sense of School Belonging		Little Sense of School Belonging		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Morocco	73 (0.9)	396 (2.3)	24 (0.8)	390 (3.8)	3 (0.3)	379 (7.7)	11.3 (0.05)
Jordan	66 (1.1)	431 (3.5)	28 (0.8)	429 (4.5)	6 (0.5)	410 (9.8)	11.0 (0.06)
Kazakhstan	66 (1.4)	537 (4.8)	33 (1.3)	525 (5.4)	1 (0.2)	~ ~	11.1 (0.06)
Egypt	63 (1.3)	380 (4.4)	30 (1.1)	363 (5.8)	7 (0.5)	363 (8.2)	10.9 (0.07)
Oman	62 (0.9)	464 (2.7)	33 (0.8)	447 (3.3)	5 (0.5)	427 (8.8)	10.8 (0.04)
South Africa (9)	60 (1.1)	362 (5.7)	36 (0.9)	355 (7.4)	4 (0.3)	369 (12.0)	10.7 (0.05)
Turkey	59 (1.1)	494 (4.2)	35 (0.9)	493 (4.8)	6 (0.4)	496 (7.5)	10.6 (0.05)
Thailand	58 (1.2)	456 (4.2)	40 (1.2)	458 (5.1)	2 (0.2)	~ ~	10.6 (0.05)
Kuwait	53 (1.5)	417 (5.8)	39 (1.2)	410 (6.9)	8 (0.6)	382 (9.6)	10.3 (0.07)
Botswana (9)	53 (0.8)	414 (2.5)	42 (0.8)	378 (4.0)	5 (0.4)	366 (10.8)	10.4 (0.03)
Lebanon	53 (1.3)	407 (5.6)	40 (1.2)	395 (5.8)	8 (0.5)	377 (9.1)	10.4 (0.06)
Norway (9)	52 (1.5)	520 (3.0)	41 (1.2)	503 (3.2)	7 (0.5)	467 (6.4)	10.4 (0.06)
Chile	50 (1.6)	461 (4.0)	39 (1.1)	452 (3.4)	11 (0.7)	434 (4.5)	10.2 (0.08)
Saudi Arabia	49 (1.5)	405 (5.1)	41 (1.2)	399 (5.2)	10 (0.8)	364 (8.3)	10.2 (0.06)
Israel	49 (1.4)	512 (4.3)	41 (1.0)	510 (4.1)	10 (0.7)	478 (7.1)	10.2 (0.07)
Malaysia	46 (1.3)	482 (4.3)	50 (1.1)	468 (4.5)	4 (0.5)	384 (12.1)	10.1 (0.05)
Iran, Islamic Rep. of	45 (1.3)	456 (5.4)	47 (1.1)	458 (3.6)	7 (0.5)	449 (6.2)	10.0 (0.05)
Canada	45 (1.1)	538 (2.2)	48 (0.9)	523 (2.3)	7 (0.5)	499 (3.5)	10.1 (0.05)
Georgia	44 (1.0)	453 (3.8)	51 (1.0)	440 (3.8)	5 (0.5)	424 (8.1)	10.1 (0.05)
New Zealand	43 (1.2)	528 (3.9)	49 (1.0)	509 (3.4)	8 (0.5)	474 (5.5)	10.0 (0.04)
Ireland	42 (1.3)	545 (2.8)	48 (1.0)	525 (3.1)	10 (0.7)	492 (6.8)	9.9 (0.06)
Bahrain	41 (0.8)	483 (3.0)	46 (0.9)	466 (3.2)	13 (1.0)	433 (6.3)	9.8 (0.05)
Australia	41 (1.1)	535 (2.9)	48 (0.9)	506 (2.3)	11 (0.5)	465 (5.1)	9.8 (0.05)
Qatar	39 (1.3)	483 (3.3)	46 (1.2)	454 (3.7)	15 (0.6)	409 (4.5)	9.7 (0.05)
Lithuania	38 (1.4)	521 (4.2)	54 (1.2)	520 (2.9)	8 (0.7)	505 (6.7)	9.8 (0.05)
United States	37 (0.9)	548 (3.3)	49 (0.7)	526 (2.8)	14 (0.6)	501 (3.6)	9.6 (0.05)
Singapore	37 (0.7)	614 (3.2)	55 (0.7)	591 (3.5)	9 (0.4)	564 (6.4)	9.8 (0.03)
Russian Federation	36 (1.2)	547 (5.6)	55 (1.1)	544 (4.2)	9 (0.6)	536 (5.5)	9.7 (0.05)
England	35 (1.3)	560 (4.1)	54 (1.0)	532 (3.9)	11 (0.6)	497 (6.3)	9.6 (0.05)
Sweden	35 (1.4)	539 (4.5)	56 (1.3)	519 (3.4)	9 (0.6)	489 (6.5)	9.7 (0.06)
Malta	33 (0.8)	510 (2.9)	51 (0.8)	480 (2.2)	16 (0.6)	437 (5.1)	9.5 (0.03)
Hong Kong SAR	31 (1.6)	562 (4.4)	55 (1.3)	542 (3.8)	14 (0.8)	525 (6.4)	9.4 (0.07)
Hungary	30 (1.2)	541 (5.2)	57 (1.0)	524 (3.6)	13 (0.7)	511 (4.3)	9.4 (0.06)
United Arab Emirates	29 (0.8)	520 (3.8)	44 (0.7)	472 (2.3)	27 (0.7)	441 (3.3)	9.1 (0.04)
Japan	27 (1.1)	579 (2.9)	60 (0.9)	570 (1.8)	13 (0.7)	558 (4.3)	9.4 (0.05)
Italy	27 (0.9)	502 (3.8)	61 (0.8)	500 (2.6)	12 (0.8)	486 (4.3)	9.3 (0.04)
Chinese Taipei	27 (0.9)	584 (3.0)	63 (0.7)	567 (2.0)	10 (0.5)	545 (5.1)	9.4 (0.04)
Korea, Rep. of	24 (0.9)	565 (3.6)	69 (0.8)	555 (2.1)	7 (0.5)	526 (5.3)	9.4 (0.04)
Slovenia	12 (0.7)	564 (4.9)	66 (0.9)	555 (2.6)	22 (1.0)	533 (3.1)	8.5 (0.04)
International Avg.	44 (0.2)	498 (0.6)	47 (0.2)	483 (0.6)	9 (0.1)	459 (1.1)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

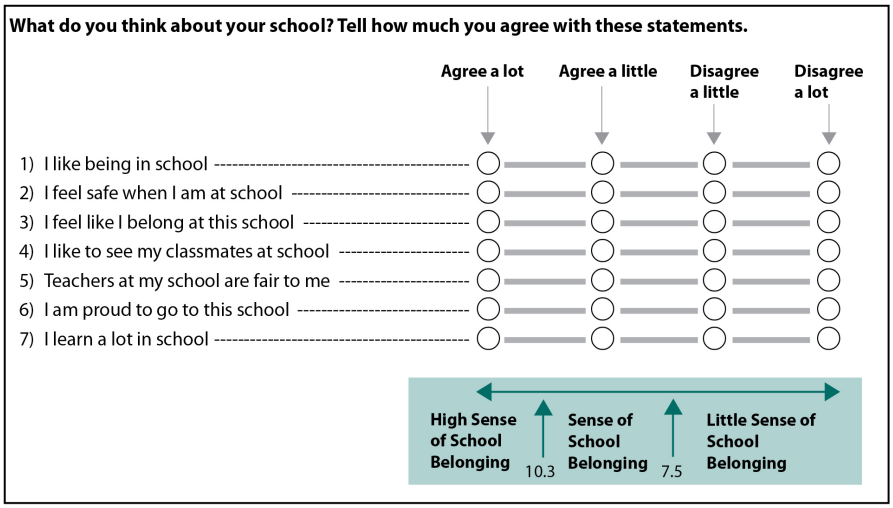
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 6.11: Students' Sense of School Belonging (Continued)

Country	High Sense of School Belonging		Sense of School Belonging		Little Sense of School Belonging		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Benchmarking Participants							
Norway (8)	61 (1.4)	496 (2.5)	33 (1.2)	485 (3.2)	5 (0.5)	442 (6.6)	10.8 (0.06)
Buenos Aires, Argentina	52 (1.4)	395 (5.5)	40 (1.1)	381 (5.5)	8 (0.7)	365 (8.7)	10.3 (0.06)
Ontario, Canada	48 (1.6)	535 (2.6)	44 (1.3)	521 (2.7)	8 (0.8)	494 (4.5)	10.2 (0.07)
Dubai, UAE	44 (0.7)	550 (3.1)	43 (0.7)	518 (2.3)	13 (0.3)	465 (4.6)	10.0 (0.03)
Quebec, Canada	38 (1.4)	546 (4.3)	58 (1.3)	525 (4.3)	5 (0.4)	506 (6.9)	9.8 (0.05)
Florida, US	27 (2.0)	526 (7.8)	52 (1.3)	513 (5.6)	21 (1.6)	479 (7.6)	9.1 (0.09)
Abu Dhabi, UAE	21 (2.0)	495 (12.4)	42 (1.3)	455 (5.7)	36 (1.6)	433 (4.7)	8.7 (0.10)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

TIMSS 2015

CHAPTER 7: SCHOOL SAFETY

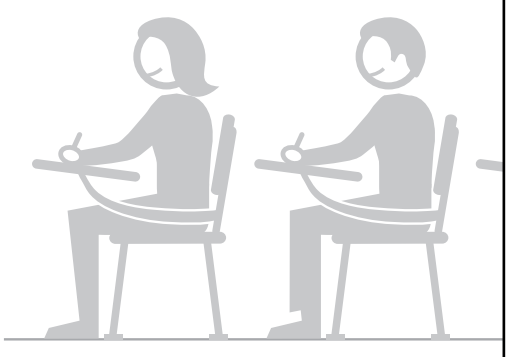
TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

IEA
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

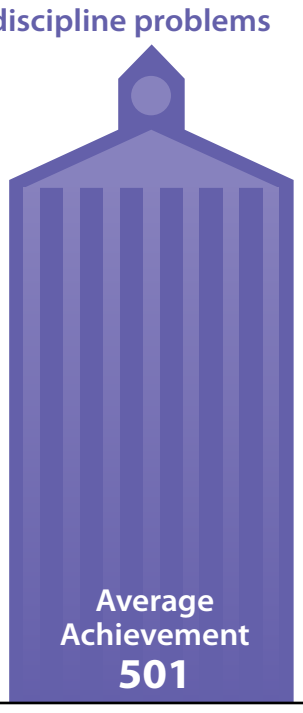
Students Are in Safe Schools

Internationally, the majority of eighth grade students were in safe school environments according to their principals and teachers. However, students that attended schools with disorderly environments had much lower achievement than their counterparts in safe and orderly schools.

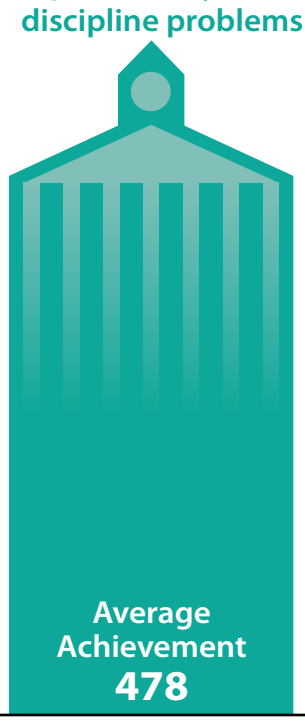
Principals' Reports



43% of students were in schools where principals reported HARDLY ANY discipline problems



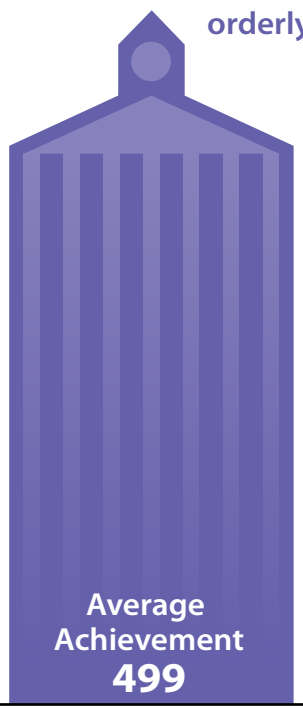
45% of students were in schools where principals reported only MINOR discipline problems



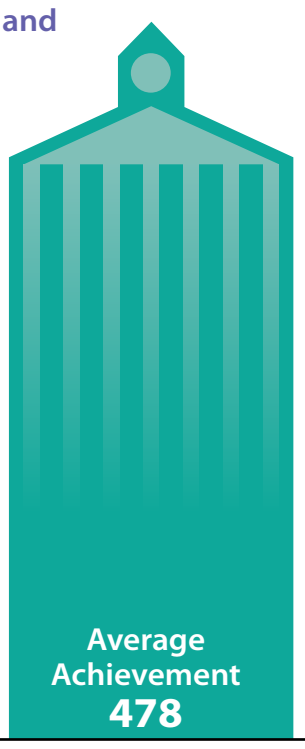
11% of students were in schools where principals reported MODERATE TO SEVERE discipline problems

Teachers' Reports

45% of students were in schools teachers found VERY safe and orderly

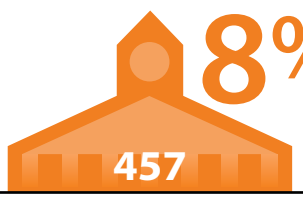


47% of students were in schools teachers found safe and orderly



Teachers in 10 countries reported schools were more safe and orderly in 2015 than in 2011, and that schools were less so in only 1 country. Principals reported a decrease in discipline problems in 9 countries, and an increase in only 2.

8% of students were in schools teachers found LESS THAN safe and orderly

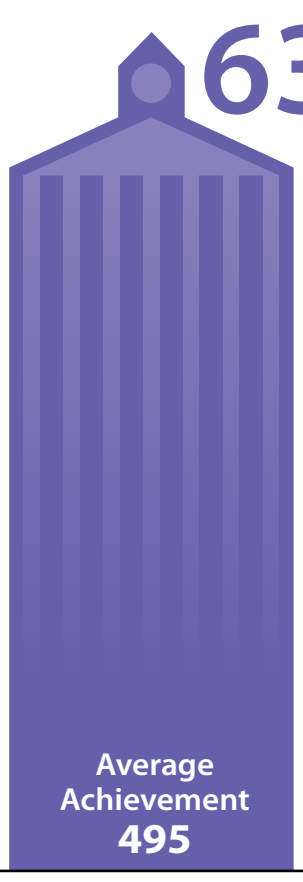


Student Bullying

With the emergence of cyber-bullying, there is growing evidence that school-related bullying is on the rise and does have a negative impact on student achievement.

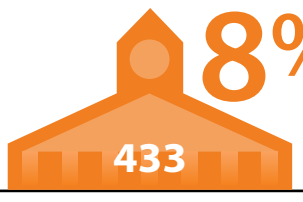
Students' Reports

63% of students said they were ALMOST NEVER bullied



29% of students said they were bullied about MONTHLY

8% of students said they were bullied about WEEKLY



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.

http://timss2015.org/download-center/

IEA TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 7.2: School Discipline Problems – Principals' Reports

Reported by Principals

Students were scored according to their principals' responses concerning eleven potential school problems on the *School Discipline Problems* scale. Students in schools with **Hardly Any Problems** had a score on the scale of at least 10.8, which corresponds to their principals reporting "not a problem" for six of the eleven issues and "minor problem" for the other five, on average. Students in schools with **Moderate to Severe Problems** had a score no higher than 8.0, which corresponds to their principals reporting "moderate problem" for six of the eleven issues and "minor problem" for the other five, on average. All other students attended schools with **Minor Problems**.

Country	Hardly Any Problems		Minor Problems		Moderate to Severe Problems		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Singapore	74 (0.0)	606 (3.5)	26 (0.0)	571 (6.9)	0 (0.0)	~ ~	11.7 (0.00)	0.7 (0.00) ▲
England r	73 (4.5)	552 (6.0)	27 (4.5)	522 (10.3)	0 (0.0)	~ ~	11.6 (0.13)	r 1.0 (0.20) ▲
Norway (9)	67 (4.5)	511 (3.3)	33 (4.5)	506 (6.0)	0 (0.0)	~ ~	11.2 (0.13)	◊ ◊
Hong Kong SAR	66 (4.5)	552 (5.9)	33 (4.6)	530 (6.9)	1 (1.1)	~ ~	11.4 (0.15)	0.4 (0.21)
Kazakhstan	65 (4.2)	542 (6.6)	18 (3.3)	514 (11.8)	17 (3.2)	516 (11.4)	10.8 (0.23)	-0.9 (0.26) ▼
Ireland	64 (3.9)	537 (3.2)	34 (4.0)	519 (6.4)	2 (1.2)	~ ~	10.9 (0.13)	◊ ◊
Georgia	57 (3.8)	441 (4.8)	40 (3.8)	446 (4.6)	3 (1.0)	459 (16.4)	10.8 (0.12)	0.0 (0.16)
Chinese Taipei	57 (3.8)	578 (3.2)	42 (3.7)	558 (3.7)	1 (0.8)	~ ~	11.1 (0.13)	-0.3 (0.20)
Russian Federation	56 (3.7)	552 (6.1)	43 (3.5)	535 (5.0)	1 (0.8)	~ ~	10.8 (0.08)	0.2 (0.11)
Iran, Islamic Rep. of	55 (3.4)	465 (5.5)	41 (3.4)	444 (5.0)	4 (1.1)	460 (15.0)	11.0 (0.13)	-0.4 (0.17)
Korea, Rep. of	55 (4.7)	557 (3.2)	38 (4.6)	555 (3.0)	7 (2.3)	549 (6.1)	11.0 (0.17)	0.9 (0.25) ▲
United Arab Emirates	54 (2.3)	497 (3.5)	40 (2.2)	455 (4.3)	6 (0.9)	410 (7.6)	11.0 (0.08)	0.8 (0.11) ▲
Japan	54 (3.9)	577 (2.4)	37 (4.2)	566 (3.4)	9 (2.3)	557 (8.2)	10.5 (0.13)	0.5 (0.22)
Bahrain	51 (0.2)	486 (2.8)	36 (0.2)	440 (3.5)	13 (0.2)	460 (8.6)	10.4 (0.02)	0.5 (0.02) ▲
Lebanon	51 (4.6)	405 (7.7)	29 (4.3)	388 (10.6)	20 (3.5)	396 (14.0)	10.2 (0.23)	0.0 (0.30)
Qatar	51 (0.7)	459 (4.9)	34 (0.7)	452 (4.1)	15 (0.3)	458 (4.2)	10.2 (0.02)	-0.4 (0.05) ▼
Oman	50 (3.9)	462 (4.1)	27 (3.6)	450 (6.7)	23 (3.1)	443 (7.6)	10.2 (0.19)	0.4 (0.27)
Malta	50 (0.1)	515 (2.3)	45 (0.1)	446 (2.3)	5 (0.1)	443 (7.2)	10.6 (0.00)	◊ ◊
Malaysia	50 (4.6)	484 (5.9)	48 (4.4)	456 (6.6)	3 (2.1)	476 (12.4)	10.8 (0.15)	0.9 (0.18) ▲
Saudi Arabia	49 (4.3)	417 (6.8)	31 (3.9)	378 (8.0)	20 (3.5)	380 (11.7)	10.2 (0.24)	0.5 (0.32)
Australia	48 (3.2)	531 (4.4)	51 (3.2)	497 (3.9)	1 (0.6)	~ ~	10.6 (0.09)	0.5 (0.13) ▲
Canada	45 (4.1)	534 (2.6)	54 (4.1)	522 (2.9)	1 (0.7)	~ ~	10.6 (0.12)	◊ ◊
Thailand	42 (4.0)	473 (6.0)	53 (4.0)	444 (6.0)	5 (1.7)	433 (13.7)	10.4 (0.14)	0.4 (0.19)
Lithuania	40 (4.2)	531 (4.8)	57 (4.2)	511 (4.5)	2 (1.1)	~ ~	10.3 (0.10)	0.2 (0.15)
United States	34 (3.0)	549 (5.1)	64 (3.4)	523 (3.7)	2 (1.0)	~ ~	10.2 (0.09)	0.2 (0.12)
Jordan	34 (3.5)	442 (5.4)	43 (3.9)	416 (5.7)	23 (3.3)	422 (8.2)	9.6 (0.18)	0.6 (0.23)
Slovenia	32 (3.6)	556 (4.7)	63 (3.7)	550 (3.1)	5 (1.8)	545 (9.6)	10.0 (0.12)	0.1 (0.17)
New Zealand	31 (4.6)	529 (4.1)	66 (4.6)	505 (4.6)	3 (1.5)	457 (18.1)	10.2 (0.13)	0.5 (0.16) ▲
Chile	29 (3.8)	482 (6.3)	58 (3.9)	448 (5.0)	13 (3.0)	424 (5.7)	9.8 (0.12)	0.1 (0.20)
Hungary	29 (3.9)	550 (7.4)	63 (4.1)	525 (4.6)	8 (2.1)	453 (12.3)	10.1 (0.12)	0.5 (0.16) ▲
Italy	27 (4.2)	505 (6.2)	61 (4.5)	496 (3.7)	12 (2.6)	493 (11.5)	9.7 (0.12)	0.2 (0.18)
Kuwait	27 (3.3)	449 (11.8)	50 (4.0)	406 (6.0)	23 (3.5)	375 (12.2)	9.4 (0.15)	◊ ◊
Israel	26 (3.6)	529 (9.2)	61 (3.6)	508 (6.2)	13 (2.3)	458 (11.8)	9.6 (0.14)	0.2 (0.21)
Sweden	26 (4.3)	541 (5.1)	70 (4.6)	517 (4.3)	4 (1.8)	489 (29.9)	9.8 (0.13)	r 0.3 (0.16)
Turkey	19 (2.6)	529 (10.8)	49 (3.8)	494 (4.3)	32 (3.4)	473 (6.7)	8.8 (0.14)	-0.4 (0.20)
Egypt	19 (3.4)	375 (11.4)	42 (3.6)	374 (7.0)	40 (3.6)	367 (7.7)	8.4 (0.18)	◊ ◊
Morocco	13 (2.1)	411 (8.4)	34 (3.4)	392 (4.3)	53 (3.2)	391 (3.3)	8.1 (0.12)	-0.1 (0.18)
Botswana (9)	11 (2.8)	418 (12.4)	68 (3.8)	396 (3.6)	22 (3.5)	367 (7.1)	9.0 (0.11)	0.1 (0.14)
South Africa (9)	10 (2.1)	400 (24.8)	56 (3.7)	371 (8.4)	34 (3.8)	325 (6.1)	8.8 (0.12)	0.0 (0.15)
International Avg.	43 (0.6)	501 (1.2)	45 (0.6)	478 (0.9)	11 (0.4)	446 (2.2)		

▲ Significantly higher than 2011
▼ Significantly lower than 2011

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

A diamond (◊) indicates the country did not participate in the 2011 assessment.

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

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 7.2: School Discipline Problems – Principals' Reports (Continued)

Country	Hardly Any Problems		Minor Problems		Moderate to Severe Problems		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Benchmarking Participants								
Dubai, UAE	76 (0.3)	543 (2.4)	22 (0.3)	471 (4.0)	2 (0.1)	~ ~	12.1 (0.01)	1.1 (0.02) ▲
Norway (8)	73 (4.1)	495 (2.6)	27 (4.1)	481 (5.5)	0 (0.0)	~ ~	11.6 (0.13)	1.5 (0.18) ▲
Quebec, Canada	56 (6.1)	541 (4.7)	44 (6.1)	529 (6.3)	1 (0.6)	~ ~	10.9 (0.19)	0.9 (0.22) ▲
Abu Dhabi, UAE	41 (4.2)	459 (9.0)	53 (4.1)	451 (7.5)	7 (1.7)	401 (14.4)	10.5 (0.14)	0.3 (0.22)
Ontario, Canada	39 (5.3)	528 (3.5)	59 (5.2)	520 (3.7)	2 (1.1)	~ ~	10.4 (0.16)	0.2 (0.22)
Florida, US s	29 (8.2)	503 (14.5)	71 (8.2)	519 (11.4)	0 (0.0)	~ ~	10.2 (0.33)	s 0.4 (0.40)
Buenos Aires, Argentina s	21 (4.2)	450 (7.7)	61 (5.7)	374 (7.4)	18 (4.4)	356 (12.7)	9.5 (0.15)	◊ ◊

▲ Significantly higher than 2011
▼ Significantly lower than 2011

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

To what degree is each of the following a problem among eighth grade students in your school?

	Not a problem	Minor problem	Moderate problem	Serious problem
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, emailing, etc.)	○	○	○	○
9) Physical injury to other students	○	○	○	○
10) Intimidation or verbal abuse of teachers or staff (including texting, emailing, etc.)	○	○	○	○
11) Physical injury to teachers or staff	○	○	○	○

Hardly Any Problems | Minor Problems | Moderate to Severe Problems
10.8 8.0

Exhibit 7.4: Safe and Orderly School – Teachers' Reports

Reported by Teachers

Students were scored according to their teachers' degree of agreement with eight statements on the *Safe and Orderly School* scale. Students in **Very Safe and Orderly** schools had a score on the scale of at least 10.6, which corresponds to their teachers "agreeing a lot" with four of the eight qualities of a safe and orderly school and "agreeing a little" with the other four, on average. Students in **Less than Safe and Orderly** schools had a score no higher than 7.2, which corresponds to their teachers "disagreeing a little" with four of the eight qualities and "agreeing a little" with the other four, on average. All other students attended **Safe and Orderly** schools.

Country	Very Safe and Orderly		Safe and Orderly		Less than Safe and Orderly		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Norway (9)	71 (3.3)	513 (3.1)	29 (3.3)	504 (5.0)	0 (0.4)	~ ~	11.3 (0.12)	◊ ◊
Lebanon	66 (4.0)	401 (7.1)	28 (3.7)	401 (9.3)	6 (1.9)	350 (19.3)	11.2 (0.20)	1.1 (0.24) ▲
Kazakhstan	66 (2.9)	536 (4.7)	34 (3.0)	527 (7.6)	1 (0.3)	~ ~	11.5 (0.14)	0.5 (0.17) ▲
United Arab Emirates r	64 (2.3)	497 (3.1)	33 (2.3)	440 (5.4)	3 (1.2)	426 (12.0)	11.3 (0.10)	r 0.6 (0.14) ▲
Ireland	64 (3.1)	544 (2.9)	32 (2.9)	514 (4.9)	4 (1.2)	475 (14.5)	11.3 (0.14)	◊ ◊
Singapore	64 (2.2)	606 (4.2)	33 (2.1)	582 (7.9)	3 (0.8)	571 (15.0)	11.3 (0.09)	0.7 (0.14) ▲
Qatar	64 (2.2)	468 (4.9)	35 (2.3)	434 (4.1)	1 (0.3)	~ ~	11.2 (0.10)	0.2 (0.16)
Iran, Islamic Rep. of	61 (3.1)	465 (5.7)	35 (3.2)	445 (5.3)	4 (1.3)	427 (10.5)	10.8 (0.12)	0.3 (0.16)
Hong Kong SAR	58 (4.5)	549 (4.5)	39 (4.4)	542 (8.4)	2 (1.2)	~ ~	10.7 (0.16)	0.4 (0.23)
Australia	56 (3.2)	529 (3.3)	38 (3.3)	501 (4.2)	6 (1.5)	482 (13.1)	10.8 (0.14)	s 0.4 (0.25)
Israel	55 (3.1)	514 (6.2)	39 (3.1)	507 (6.9)	6 (1.7)	470 (21.1)	10.7 (0.12)	0.5 (0.20)
New Zealand	53 (3.6)	536 (4.0)	40 (3.4)	498 (6.0)	7 (1.9)	455 (14.9)	10.6 (0.16)	0.2 (0.20)
Oman	52 (3.3)	462 (3.4)	42 (3.4)	449 (5.0)	6 (1.9)	438 (20.9)	10.6 (0.13)	0.7 (0.17) ▲
Kuwait	52 (4.0)	426 (7.6)	39 (3.8)	395 (10.4)	9 (2.7)	372 (25.9)	10.5 (0.18)	◊ ◊
Georgia	52 (2.5)	446 (3.8)	47 (2.5)	441 (3.9)	1 (0.5)	~ ~	10.5 (0.08)	-0.6 (0.13) ▼
England r	51 (3.0)	551 (6.2)	43 (3.0)	527 (6.6)	5 (1.1)	498 (15.4)	10.7 (0.13)	r 0.4 (0.19)
Egypt	50 (3.9)	389 (6.1)	42 (3.7)	354 (6.7)	8 (1.9)	342 (17.3)	10.4 (0.15)	◊ ◊
Chile r	48 (4.4)	475 (5.9)	46 (4.7)	443 (5.8)	6 (2.1)	410 (11.7)	10.3 (0.19)	r 1.1 (0.27) ▲
Russian Federation	47 (2.6)	550 (4.9)	50 (2.6)	538 (5.2)	2 (0.5)	~ ~	10.3 (0.08)	0.2 (0.12)
Canada	47 (2.6)	536 (2.9)	47 (2.5)	519 (4.0)	6 (1.0)	528 (10.5)	10.5 (0.12)	◊ ◊
United States r	45 (2.9)	549 (4.5)	42 (2.6)	526 (4.4)	12 (1.9)	490 (9.1)	10.3 (0.14)	r 0.1 (0.17)
Bahrain	45 (2.5)	475 (4.4)	47 (3.1)	458 (3.2)	8 (1.9)	452 (12.0)	10.2 (0.11)	0.2 (0.14)
Lithuania	44 (2.9)	519 (4.0)	51 (2.7)	518 (3.5)	5 (1.1)	528 (8.9)	10.1 (0.10)	0.4 (0.12) ▲
Jordan	44 (3.5)	444 (4.6)	42 (4.0)	418 (5.3)	14 (2.9)	397 (9.7)	10.0 (0.16)	0.6 (0.22)
Thailand	42 (3.8)	461 (7.0)	52 (3.9)	451 (6.1)	6 (1.7)	463 (21.4)	10.1 (0.15)	-0.4 (0.21)
Saudi Arabia	42 (4.2)	411 (6.9)	52 (4.1)	390 (6.1)	6 (2.0)	349 (19.8)	10.2 (0.20)	0.1 (0.24)
Hungary	41 (2.3)	542 (3.6)	53 (2.3)	516 (4.6)	6 (1.5)	500 (8.5)	10.1 (0.09)	0.2 (0.13)
Chinese Taipei	41 (3.6)	576 (4.1)	52 (3.9)	565 (3.5)	8 (2.1)	567 (12.8)	10.1 (0.14)	0.9 (0.19) ▲
Malta	38 (0.4)	503 (2.5)	51 (0.4)	471 (1.9)	10 (0.2)	442 (4.3)	10.1 (0.02)	◊ ◊
Malaysia	32 (3.8)	478 (7.2)	62 (4.3)	464 (6.4)	6 (1.9)	459 (23.6)	9.8 (0.13)	-0.1 (0.20)
Sweden	31 (3.2)	544 (4.5)	61 (3.7)	515 (4.4)	8 (2.1)	496 (11.9)	9.8 (0.14)	r 0.3 (0.19)
Morocco	30 (2.0)	406 (4.9)	52 (2.1)	391 (2.4)	18 (1.9)	380 (3.9)	9.3 (0.11)	0.1 (0.16)
Korea, Rep. of	30 (3.7)	560 (2.8)	65 (4.0)	555 (2.8)	5 (1.7)	544 (4.8)	9.8 (0.15)	1.3 (0.20) ▲
South Africa (9)	30 (3.5)	391 (13.4)	49 (3.3)	351 (6.9)	22 (2.8)	326 (6.3)	9.2 (0.18)	0.6 (0.25)
Turkey	28 (3.5)	515 (7.5)	54 (3.7)	489 (5.2)	18 (2.8)	472 (9.5)	9.2 (0.14)	-0.2 (0.20)
Slovenia	20 (2.0)	557 (4.7)	71 (2.2)	551 (2.4)	9 (1.5)	542 (5.2)	9.3 (0.08)	0.3 (0.11)
Italy	18 (3.2)	515 (6.4)	75 (3.3)	497 (3.3)	8 (1.7)	469 (10.3)	9.2 (0.13)	0.3 (0.18)
Botswana (9)	14 (3.2)	426 (10.3)	56 (4.5)	387 (4.0)	30 (4.5)	394 (6.3)	8.3 (0.17)	0.4 (0.23)
Japan	11 (2.3)	590 (7.2)	77 (3.2)	570 (2.4)	12 (2.3)	558 (4.1)	8.9 (0.12)	0.6 (0.17) ▲
International Avg.	45 (0.5)	499 (0.9)	47 (0.5)	478 (0.9)	8 (0.3)	457 (2.4)		

Significantly higher than 2011 ▲
Significantly lower than 2011 ▼

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

A diamond (◊) indicates the country did not participate in the 2011 assessment.

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

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 7.4: Safe and Orderly School – Teachers' Reports (Continued)

Country		Very Safe and Orderly		Safe and Orderly		Less than Safe and Orderly		Average Scale Score		Difference in Average Scale Score from 2011	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement				
Benchmarking Participants											
Dubai, UAE	r	78 (1.6)	535 (2.5)	21 (1.8)	485 (9.3)	2 (0.6)	~ ~	12.0 (0.07)	r	0.9 (0.11)	▲
Norway (8)		66 (3.6)	492 (2.8)	33 (3.5)	489 (4.8)	1 (0.7)	~ ~	11.3 (0.13)		0.2 (0.18)	
Ontario, Canada	r	56 (3.6)	531 (3.4)	37 (3.4)	519 (4.6)	8 (1.6)	523 (12.2)	10.9 (0.18)	r	0.3 (0.26)	
Abu Dhabi, UAE		50 (4.5)	475 (8.9)	45 (4.7)	425 (8.2)	5 (2.1)	437 (13.7)	10.8 (0.19)		0.3 (0.25)	
Florida, US	s	48 (6.4)	533 (13.5)	41 (5.7)	503 (12.5)	11 (3.7)	512 (17.9)	10.1 (0.41)		x x	
Quebec, Canada		31 (3.5)	555 (5.4)	66 (3.6)	517 (6.6)	2 (1.2)	~ ~	9.8 (0.15)		-0.2 (0.19)	
Buenos Aires, Argentina		x x	x x	x x	x x	x x	x x	x x		x x	

▲ Significantly higher than 2011
▼ Significantly lower than 2011

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Thinking about your current school, indicate the extent to which you agree or disagree with each of the following statements.

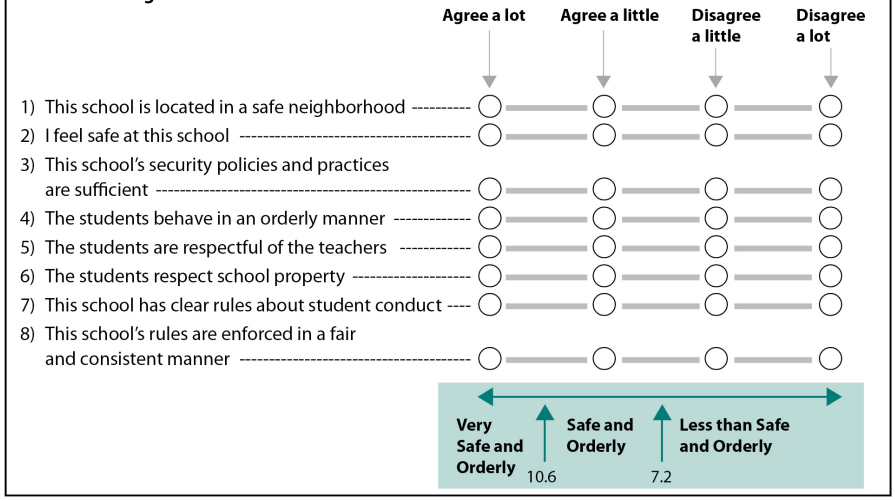


Exhibit 7.6: Student Bullying

Reported by Students

Students were scored according to their responses to how often they experienced nine bullying behaviors on the *Student Bullying* scale. Students bullied **Almost Never** had a score on the scale of at least 9.3, which corresponds to "never" experiencing five of the nine bullying behaviors and experiencing each of the other four behaviors "a few times a year," on average. Students bullied **About Weekly** had a score no higher than 7.3, which corresponds to their experiencing each of five of the nine behaviors "once or twice a month" and each of the other four "a few times a year," on average. All other students were bullied **About Monthly**.

Country	Almost Never		About Monthly		About Weekly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Chinese Taipei	86 (0.7)	570 (2.0)	13 (0.6)	568 (4.7)	1 (0.2)	~ ~	11.3 (0.04)
Kazakhstan	86 (0.8)	535 (4.5)	13 (0.7)	523 (6.3)	2 (0.2)	~ ~	11.3 (0.05)
Korea, Rep. of	84 (0.6)	556 (2.4)	15 (0.6)	554 (3.3)	1 (0.2)	~ ~	11.1 (0.03)
Georgia	82 (1.0)	450 (2.9)	16 (0.9)	432 (6.7)	2 (0.3)	~ ~	11.0 (0.05)
Japan	80 (0.8)	570 (2.0)	18 (0.7)	576 (2.8)	2 (0.2)	~ ~	10.9 (0.05)
Chile	78 (0.8)	458 (3.3)	18 (0.7)	447 (4.2)	3 (0.4)	422 (8.3)	10.6 (0.04)
Norway (9)	75 (0.9)	513 (2.7)	22 (0.8)	505 (4.3)	3 (0.3)	464 (13.6)	10.6 (0.04)
Ireland	75 (0.9)	533 (2.7)	22 (0.9)	526 (3.8)	4 (0.3)	493 (7.4)	10.5 (0.04)
Sweden	74 (0.9)	527 (3.4)	23 (0.8)	520 (5.1)	3 (0.3)	466 (11.7)	10.5 (0.04)
Italy	73 (0.9)	502 (2.8)	25 (0.8)	494 (2.6)	2 (0.3)	~ ~	10.3 (0.04)
Hungary	73 (1.0)	532 (3.5)	25 (0.9)	520 (4.8)	2 (0.3)	~ ~	10.3 (0.04)
Slovenia	72 (1.1)	553 (2.6)	24 (1.0)	552 (2.7)	4 (0.3)	517 (11.9)	10.3 (0.04)
Lithuania	72 (1.3)	522 (2.9)	24 (1.1)	516 (4.1)	4 (0.4)	488 (8.1)	10.3 (0.06)
Turkey	69 (1.1)	503 (4.3)	26 (0.9)	485 (4.3)	6 (0.3)	429 (7.5)	10.3 (0.05)
Russian Federation	66 (1.0)	547 (4.6)	30 (0.9)	542 (4.1)	4 (0.3)	521 (8.4)	10.1 (0.04)
Canada	65 (0.8)	532 (2.3)	30 (0.7)	525 (2.2)	5 (0.3)	502 (5.3)	10.0 (0.03)
United States	64 (0.6)	534 (2.9)	29 (0.5)	529 (3.2)	7 (0.4)	504 (4.9)	10.0 (0.03)
Saudi Arabia	64 (1.2)	411 (4.3)	27 (1.0)	394 (6.4)	9 (0.6)	325 (8.0)	10.1 (0.06)
Malta	64 (0.9)	489 (2.1)	29 (0.8)	489 (3.0)	7 (0.5)	426 (8.9)	10.0 (0.03)
Jordan	64 (1.1)	448 (3.3)	26 (0.9)	415 (4.1)	11 (0.5)	356 (6.1)	10.1 (0.05)
England	62 (1.2)	540 (3.9)	32 (1.0)	538 (4.5)	6 (0.5)	516 (7.8)	9.9 (0.05)
Qatar	61 (1.0)	472 (2.5)	27 (0.7)	461 (4.2)	12 (0.8)	389 (8.4)	9.8 (0.05)
Iran, Islamic Rep. of	60 (0.8)	465 (4.2)	32 (0.8)	453 (4.5)	8 (0.5)	410 (5.8)	9.9 (0.04)
Kuwait	60 (1.1)	419 (5.3)	32 (1.0)	407 (6.8)	8 (0.6)	368 (9.0)	9.8 (0.05)
United Arab Emirates	58 (0.8)	492 (2.2)	32 (0.6)	473 (2.6)	10 (0.5)	410 (5.4)	9.7 (0.04)
Singapore	58 (0.8)	603 (3.0)	36 (0.7)	592 (3.8)	6 (0.4)	563 (7.4)	9.7 (0.03)
Australia	57 (1.0)	521 (2.9)	34 (0.8)	507 (2.9)	9 (0.4)	483 (4.4)	9.7 (0.04)
Hong Kong SAR	56 (1.1)	541 (3.7)	37 (1.0)	553 (4.8)	7 (0.6)	545 (7.6)	9.6 (0.04)
New Zealand	55 (1.0)	521 (3.6)	35 (0.8)	512 (3.5)	10 (0.5)	485 (5.4)	9.5 (0.04)
Egypt	55 (1.5)	402 (4.1)	29 (1.0)	360 (5.1)	16 (1.0)	301 (6.7)	9.7 (0.07)
Lebanon	52 (2.0)	421 (6.0)	28 (1.3)	402 (6.0)	19 (1.8)	342 (9.6)	9.5 (0.10)
Morocco	51 (0.8)	402 (2.7)	38 (0.7)	392 (2.8)	11 (0.5)	371 (4.7)	9.4 (0.04)
Bahrain	49 (0.8)	484 (2.7)	36 (0.7)	472 (3.6)	15 (0.6)	414 (5.6)	9.3 (0.04)
Malaysia	48 (1.1)	489 (3.6)	42 (0.7)	467 (4.2)	11 (0.8)	410 (8.7)	9.3 (0.05)
Oman	44 (0.9)	471 (2.7)	41 (0.8)	453 (3.2)	14 (0.7)	416 (5.5)	9.2 (0.04)
South Africa (9)	36 (1.2)	393 (7.0)	47 (0.9)	357 (5.0)	17 (0.9)	296 (6.3)	8.9 (0.04)
Thailand	33 (1.1)	458 (4.9)	50 (0.9)	460 (4.5)	17 (0.8)	438 (4.9)	8.8 (0.04)
Botswana (9)	26 (0.8)	417 (3.7)	51 (0.7)	406 (2.7)	23 (0.6)	353 (5.0)	8.4 (0.03)
Israel	- -	- -	- -	- -	- -	- -	- -
International Avg.	63 (0.2)	495 (0.6)	29 (0.1)	484 (0.7)	8 (0.1)	433 (1.4)	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

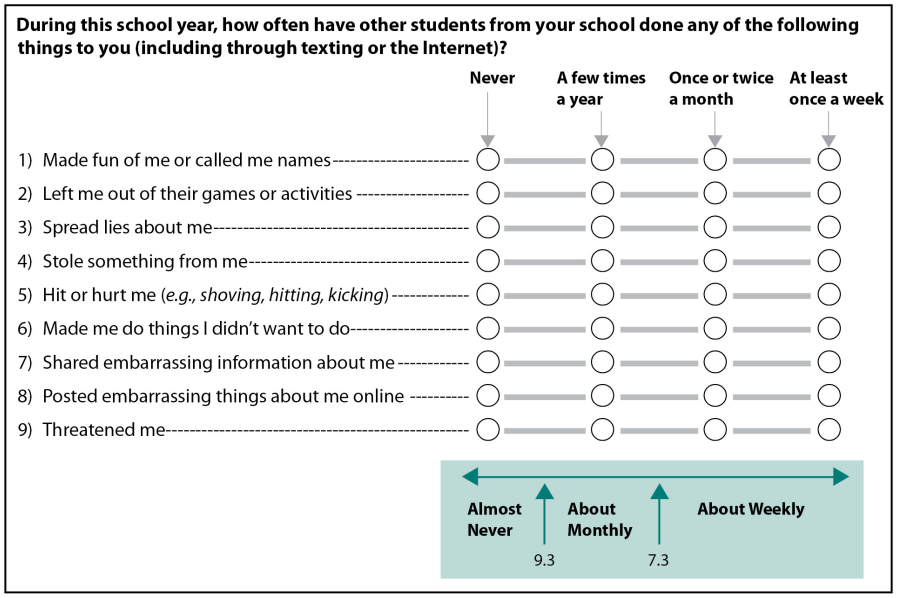
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

Exhibit 7.6: Student Bullying (Continued)

Country	Almost Never		About Monthly		About Weekly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Benchmarking Participants							
Norway (8)	81 (0.8)	493 (2.4)	17 (0.7)	481 (3.9)	2 (0.3)	~ ~	10.9 (0.04)
Buenos Aires, Argentina	75 (1.2)	391 (4.8)	22 (1.1)	377 (6.4)	3 (0.4)	356 (13.5)	10.5 (0.05)
Quebec, Canada	74 (0.9)	534 (3.8)	24 (0.9)	529 (4.6)	3 (0.3)	516 (7.5)	10.4 (0.04)
Florida, US	68 (1.2)	512 (6.1)	26 (1.0)	512 (7.2)	6 (0.6)	472 (13.1)	10.2 (0.06)
Dubai, UAE	62 (1.1)	532 (2.4)	30 (0.9)	522 (2.8)	8 (0.7)	476 (7.4)	9.9 (0.05)
Ontario, Canada	61 (1.0)	529 (2.7)	32 (0.9)	523 (2.5)	7 (0.4)	499 (6.1)	9.9 (0.04)
Abu Dhabi, UAE	56 (1.5)	473 (5.2)	31 (1.0)	451 (5.8)	13 (1.0)	383 (9.1)	9.7 (0.07)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



TIMSS 2015

CHAPTER 8: TEACHERS' AND PRINCIPALS' PREPARATION

TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

IEA
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Students Have Well Qualified Teachers and Principals

Science Teachers' Preparation and Experience

Internationally, teachers of eighth grade students reported high levels of education and considerable experience.

92%

of students were taught by teachers with at least a Bachelor's degree

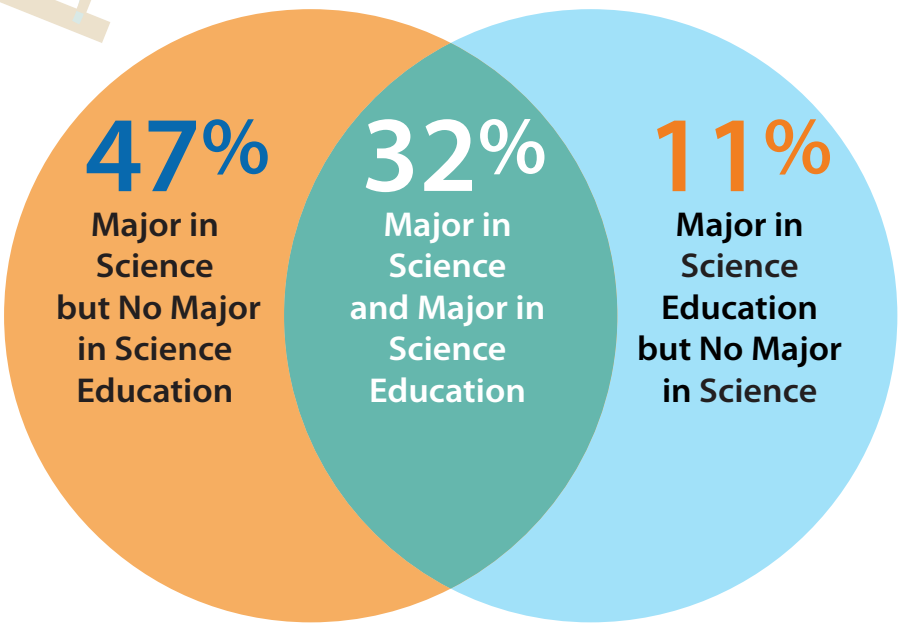
28%

of students were taught by teachers with an advanced degree

32%

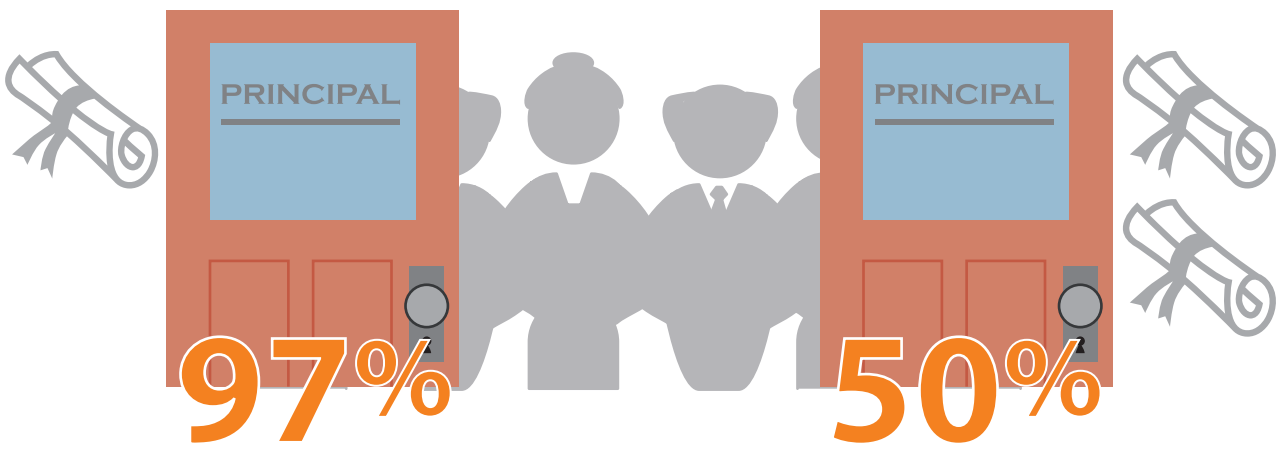
of students were taught by teachers with at least 20 years of experience (on average, students' teachers had 15 years of experience).

Most students (79%) had teachers that majored in science and 43% had teachers that majored in science education.



Principals' Preparation and Experience

Internationally, principals of eighth grade students reported high levels of education and considerable experience.



97%

of students had principals with at least a Bachelor's degree

50%

of students had principals with an advanced degree

On average, principals had 9 years of experience. They were required to have teaching experience in 31 countries, but completion of a specialized leadership program was less common (22 countries).

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.

http://timss2015.org/download-center/

IEA TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 8.2: Teachers' Formal Education*

Reported by Teachers

Country		Percent of Students by Teacher Educational Level			
		Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Completed Post-Secondary Education but Not a Bachelor's Degree	No Further than Upper-Secondary Education
Australia		19 (2.2)	81 (2.2)	1 (0.3)	0 (0.0)
Bahrain	r	19 (3.9)	80 (3.9)	0 (0.0)	1 (0.6)
Botswana (9)	s	1 (0.4)	37 (5.8)	59 (6.1)	3 (2.0)
Canada	r	20 (2.3)	80 (2.3)	0 (0.0)	0 (0.1)
Chile	r	7 (2.4)	88 (3.1)	4 (1.9)	1 (0.7)
Chinese Taipei		50 (3.5)	49 (3.4)	1 (0.7)	0 (0.0)
Egypt	r	4 (1.7)	84 (3.0)	7 (2.3)	4 (1.6)
England	r	26 (2.2)	74 (2.3)	0 (0.2)	0 (0.0)
Georgia		89 (1.7)	9 (1.6)	0 (0.0)	2 (0.6)
Hong Kong SAR		52 (4.5)	45 (4.5)	3 (1.5)	0 (0.0)
Hungary		33 (2.5)	67 (2.5)	0 (0.2)	0 (0.0)
Iran, Islamic Rep. of		6 (1.5)	78 (2.8)	15 (2.2)	0 (0.0)
Ireland		31 (2.8)	66 (2.8)	2 (0.9)	1 (0.6)
Israel		44 (3.6)	51 (3.6)	4 (1.4)	1 (0.5)
Italy		12 (3.0)	71 (4.0)	17 (3.1)	0 (0.0)
Japan		17 (2.9)	83 (2.9)	0 (0.0)	0 (0.0)
Jordan	r	6 (1.8)	83 (2.7)	2 (1.4)	8 (2.4)
Kazakhstan		3 (0.8)	95 (0.9)	1 (0.3)	1 (0.4)
Korea, Rep. of		37 (3.7)	63 (3.7)	0 (0.0)	0 (0.0)
Kuwait	r	13 (2.1)	87 (2.2)	0 (0.0)	1 (0.6)
Lebanon		40 (4.4)	27 (3.5)	19 (3.6)	15 (3.5)
Lithuania		41 (2.4)	58 (2.4)	1 (0.3)	0 (0.2)
Malaysia		4 (1.9)	90 (2.5)	6 (1.7)	0 (0.0)
Malta		22 (0.3)	76 (0.3)	1 (0.1)	1 (0.1)
Morocco		8 (1.4)	49 (2.6)	23 (1.9)	20 (2.1)
New Zealand		68 (3.6)	31 (3.6)	2 (0.7)	0 (0.0)
Norway (9)		25 (3.5)	69 (3.5)	6 (1.9)	0 (0.0)
Oman		15 (1.9)	82 (2.3)	1 (0.5)	2 (1.0)
Qatar		33 (2.3)	63 (2.4)	3 (0.7)	2 (0.3)
Russian Federation		74 (2.3)	25 (2.4)	1 (0.5)	0 (0.0)
Saudi Arabia	r	7 (2.5)	87 (3.4)	2 (1.5)	4 (1.9)
Singapore		18 (2.0)	81 (2.0)	1 (0.6)	0 (0.0)
Slovenia		60 (2.5)	0 (0.3)	39 (2.5)	0 (0.0)
South Africa (9)		3 (1.2)	58 (3.3)	29 (3.2)	10 (2.2)
Sweden		38 (3.6)	54 (3.5)	4 (1.5)	5 (1.4)
Thailand		28 (3.2)	72 (3.3)	1 (0.7)	0 (0.0)
Turkey		7 (2.1)	92 (2.1)	0 (0.4)	0 (0.0)
United Arab Emirates	s	39 (2.0)	57 (2.1)	1 (0.4)	2 (0.6)
United States	r	56 (2.6)	44 (2.5)	0 (0.0)	0 (0.4)
International Avg.		28 (0.4)	64 (0.5)	7 (0.3)	2 (0.2)
Benchmarking Participants					
Buenos Aires, Argentina		x x	x x	x x	x x
Ontario, Canada	r	24 (3.4)	76 (3.4)	0 (0.0)	0 (0.0)
Quebec, Canada	r	12 (3.1)	88 (3.0)	0 (0.0)	0 (0.3)
Norway (8)		26 (3.6)	71 (3.9)	3 (1.5)	0 (0.0)
Abu Dhabi, UAE	r	23 (3.8)	74 (3.8)	0 (0.3)	2 (1.5)
Dubai, UAE	r	60 (2.1)	38 (2.0)	1 (0.0)	2 (0.4)
Florida, US	s	34 (7.0)	66 (7.0)	0 (0.0)	0 (0.0)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011).

** For example, doctorate, master's, or other postgraduate degree.

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

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

Exhibit 8.4: Teachers Majored in Education and Science

Reported by Teachers

Country	Major in Science and Science Education		Major in Science but No Major in Science Education		Major in Science Education but No Major in Science		All Other Majors		No Formal Education Beyond Upper-Secondary*	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia	63 (2.2)	516 (3.9)	21 (2.3)	519 (4.9)	8 (1.5)	513 (8.7)	8 (1.4)	502 (8.1)	0 (0.0)	~ ~
Bahrain	46 (3.9)	467 (4.8)	48 (3.8)	461 (3.9)	4 (0.8)	479 (10.6)	1 (0.2)	~ ~	1 (0.5)	~ ~
Botswana (9)	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x
Canada	26 (2.7)	529 (5.2)	21 (2.7)	535 (5.5)	13 (2.7)	519 (6.7)	41 (3.0)	526 (3.6)	0 (0.1)	~ ~
Chile r	36 (4.6)	477 (7.0)	25 (4.2)	468 (8.9)	10 (3.0)	450 (9.8)	28 (4.5)	422 (6.9)	1 (0.6)	~ ~
Chinese Taipei	17 (2.7)	564 (5.8)	75 (3.2)	572 (2.8)	1 (0.5)	~ ~	6 (1.8)	560 (7.7)	0 (0.0)	~ ~
Egypt	42 (3.6)	377 (7.3)	31 (3.3)	353 (7.6)	19 (3.1)	381 (11.3)	4 (1.7)	389 (27.2)	3 (1.4)	349 (9.5)
England r	47 (3.0)	536 (5.5)	49 (3.1)	541 (6.5)	1 (0.4)	~ ~	3 (1.0)	526 (22.8)	0 (0.0)	~ ~
Georgia	33 (2.4)	446 (4.1)	63 (2.4)	443 (3.5)	1 (0.3)	~ ~	1 (0.5)	~ ~	2 (0.6)	~ ~
Hong Kong SAR	42 (4.7)	550 (7.7)	37 (3.9)	547 (6.1)	12 (3.2)	556 (10.3)	10 (2.4)	510 (16.2)	0 (0.0)	~ ~
Hungary	15 (1.6)	526 (6.0)	12 (1.5)	526 (6.6)	69 (2.3)	530 (3.6)	4 (0.7)	445 (15.2)	0 (0.0)	~ ~
Iran, Islamic Rep. of	19 (2.4)	456 (11.8)	11 (2.0)	464 (12.1)	64 (3.0)	458 (4.6)	6 (1.8)	432 (15.3)	0 (0.0)	~ ~
Ireland	44 (3.4)	535 (4.2)	49 (3.5)	532 (3.7)	2 (1.2)	~ ~	4 (1.0)	485 (15.7)	1 (0.6)	~ ~
Israel	64 (3.1)	518 (5.4)	28 (3.0)	489 (8.3)	3 (1.4)	478 (17.1)	4 (1.0)	522 (17.5)	1 (0.5)	~ ~
Italy	37 (4.1)	497 (4.9)	58 (4.3)	496 (3.8)	1 (0.9)	~ ~	4 (1.5)	508 (10.1)	0 (0.0)	~ ~
Japan	25 (3.5)	567 (4.0)	62 (4.2)	572 (2.5)	8 (2.3)	573 (8.8)	6 (2.0)	580 (5.5)	0 (0.0)	~ ~
Jordan	7 (1.9)	429 (9.9)	69 (3.3)	423 (4.4)	13 (2.6)	436 (8.7)	4 (1.4)	453 (31.6)	7 (1.9)	419 (11.4)
Kazakhstan	21 (2.9)	541 (8.0)	77 (2.9)	531 (5.2)	0 (0.3)	~ ~	0 (0.2)	~ ~	1 (0.4)	~ ~
Korea, Rep. of	42 (3.4)	556 (3.5)	51 (3.6)	555 (2.5)	7 (2.1)	557 (7.3)	0 (0.0)	~ ~	0 (0.0)	~ ~
Kuwait	29 (3.6)	434 (11.8)	60 (3.9)	394 (7.7)	9 (2.2)	429 (9.3)	2 (1.0)	~ ~	1 (0.5)	~ ~
Lebanon	22 (3.5)	408 (11.4)	56 (4.9)	405 (7.7)	0 (0.0)	~ ~	7 (2.1)	382 (14.2)	15 (3.5)	364 (18.7)
Lithuania	28 (2.1)	522 (4.5)	68 (2.1)	519 (2.9)	1 (0.3)	~ ~	3 (0.8)	494 (14.3)	0 (0.2)	~ ~
Malaysia	35 (3.6)	464 (8.1)	38 (3.0)	476 (8.1)	17 (2.8)	469 (12.4)	10 (2.4)	438 (20.8)	0 (0.0)	~ ~
Malta	38 (0.5)	490 (1.9)	56 (0.4)	474 (1.9)	1 (0.1)	~ ~	4 (0.2)	482 (5.9)	1 (0.1)	~ ~
Morocco	7 (1.2)	391 (4.7)	74 (2.1)	392 (3.1)	0 (0.0)	~ ~	0 (0.2)	~ ~	19 (1.9)	402 (3.9)
New Zealand	47 (4.0)	521 (3.8)	45 (3.5)	510 (6.6)	1 (0.4)	~ ~	7 (1.7)	499 (16.7)	0 (0.0)	~ ~
Norway (9)	15 (2.8)	515 (9.1)	27 (3.5)	515 (5.2)	12 (2.2)	512 (6.0)	46 (4.0)	506 (3.7)	0 (0.0)	~ ~
Oman	36 (2.9)	468 (3.7)	58 (2.9)	447 (3.9)	3 (1.3)	471 (13.1)	0 (0.3)	~ ~	2 (0.9)	~ ~
Qatar	29 (3.2)	475 (7.2)	61 (3.7)	446 (5.4)	4 (1.1)	445 (19.0)	4 (1.2)	471 (18.1)	2 (0.3)	~ ~
Russian Federation	50 (2.2)	549 (4.2)	48 (2.2)	540 (4.7)	1 (0.2)	~ ~	1 (0.3)	~ ~	0 (0.0)	~ ~
Saudi Arabia	17 (3.4)	376 (11.3)	63 (4.4)	391 (5.3)	15 (3.1)	433 (15.5)	2 (1.1)	~ ~	3 (1.4)	430 (9.6)
Singapore	54 (2.8)	596 (4.8)	41 (2.8)	599 (5.9)	2 (0.8)	~ ~	3 (1.0)	599 (23.3)	0 (0.0)	~ ~
Slovenia	18 (1.7)	550 (3.5)	77 (1.7)	551 (2.4)	2 (0.6)	~ ~	3 (0.7)	547 (8.5)	0 (0.0)	~ ~
South Africa (9)	23 (3.1)	379 (11.8)	50 (3.8)	350 (8.6)	9 (2.2)	360 (24.3)	8 (1.7)	352 (12.5)	10 (2.1)	351 (22.6)
Sweden	48 (4.3)	519 (4.5)	25 (3.2)	526 (7.3)	16 (3.7)	531 (6.0)	5 (1.7)	523 (7.9)	5 (1.4)	510 (18.0)
Thailand	20 (3.0)	457 (10.3)	41 (3.2)	453 (6.2)	24 (3.2)	463 (9.6)	16 (3.0)	463 (14.3)	0 (0.0)	~ ~
Turkey	30 (3.5)	486 (7.6)	27 (3.3)	508 (6.9)	42 (3.2)	490 (7.4)	0 (0.3)	~ ~	0 (0.0)	~ ~
United Arab Emirates r	26 (2.2)	503 (6.1)	55 (2.4)	474 (4.4)	13 (1.4)	452 (8.1)	3 (0.9)	451 (15.1)	2 (0.5)	~ ~
United States r	35 (3.0)	536 (5.1)	26 (2.6)	537 (6.4)	18 (2.4)	528 (5.6)	21 (2.1)	522 (6.8)	0 (0.4)	~ ~
International Avg.	32 (0.5)	493 (1.1)	47 (0.5)	488 (1.0)	11 (0.3)	480 (2.3)	7 (0.3)	485 (2.9)	2 (0.2)	404 (5.6)
Benchmarking Participants										
Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x
Ontario, Canada r	15 (3.1)	528 (5.3)	16 (3.3)	541 (6.0)	8 (2.7)	517 (8.8)	60 (4.2)	523 (3.9)	0 (0.0)	~ ~
Quebec, Canada	38 (4.7)	530 (8.8)	29 (4.7)	533 (9.6)	20 (5.6)	520 (11.6)	13 (2.6)	533 (8.2)	0 (0.2)	~ ~
Norway (8)	17 (3.2)	497 (5.4)	32 (3.8)	491 (3.9)	8 (1.6)	495 (7.9)	42 (4.2)	487 (4.1)	0 (0.0)	~ ~
Abu Dhabi, UAE r	27 (3.7)	483 (13.3)	53 (3.9)	445 (7.3)	16 (2.9)	428 (14.9)	2 (1.3)	~ ~	2 (1.2)	~ ~
Dubai, UAE r	33 (2.9)	537 (5.0)	53 (3.3)	524 (3.6)	11 (1.1)	494 (12.5)	1 (0.3)	~ ~	1 (0.3)	~ ~
Florida, US s	28 (5.7)	528 (16.6)	30 (7.7)	541 (10.4)	16 (3.9)	507 (26.3)	26 (6.7)	493 (16.7)	0 (0.0)	~ ~

* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

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

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

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 8.6: Teachers' Years of Experience

Reported by Teachers

Country		20 Years or More		At Least 10 but Less than 20 Years		At Least 5 but Less than 10 Years		Less than 5 Years		Average Years of Experience
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Australia		26 (2.5)	519 (4.4)	29 (2.8)	512 (6.1)	25 (2.8)	521 (4.9)	20 (2.1)	508 (6.4)	13 (0.5)
Bahrain		17 (2.2)	455 (7.2)	41 (3.1)	459 (5.0)	22 (2.4)	480 (6.9)	19 (2.9)	476 (5.9)	12 (0.5)
Botswana (9)		6 (2.2)	403 (15.3)	40 (3.5)	393 (4.8)	20 (3.2)	415 (7.8)	33 (3.9)	381 (5.4)	9 (0.5)
Canada		24 (2.8)	529 (5.1)	50 (3.3)	526 (2.8)	15 (2.2)	536 (5.8)	11 (2.2)	519 (8.5)	14 (0.5)
Chile	r	29 (4.3)	459 (8.5)	19 (3.7)	457 (9.7)	23 (3.9)	449 (7.5)	29 (4.2)	455 (8.2)	14 (1.1)
Chinese Taipei		30 (3.1)	582 (5.3)	32 (3.2)	561 (4.5)	17 (2.8)	571 (5.1)	21 (2.8)	563 (5.9)	14 (0.7)
Egypt		44 (3.5)	387 (5.2)	24 (3.0)	371 (8.2)	21 (2.5)	351 (11.7)	10 (2.2)	361 (15.6)	16 (0.5)
England	r	17 (2.5)	555 (12.1)	28 (2.4)	534 (6.5)	25 (2.6)	531 (8.2)	29 (2.7)	537 (7.7)	11 (0.7)
Georgia		64 (2.2)	440 (3.5)	20 (1.6)	448 (4.6)	11 (1.5)	455 (6.0)	5 (1.0)	454 (6.7)	23 (0.6)
Hong Kong SAR		31 (4.1)	540 (7.8)	38 (4.6)	544 (6.0)	18 (3.8)	542 (10.5)	13 (3.3)	567 (10.4)	15 (0.7)
Hungary		64 (2.5)	526 (4.1)	22 (1.9)	530 (5.9)	10 (1.4)	513 (8.3)	4 (0.7)	534 (9.6)	23 (0.5)
Iran, Islamic Rep. of		61 (2.9)	463 (5.2)	30 (3.2)	454 (7.4)	8 (1.9)	436 (13.7)	1 (0.6)	~ ~	19 (0.3)
Ireland		34 (3.2)	534 (4.3)	31 (3.1)	521 (5.3)	20 (2.6)	540 (5.5)	15 (2.6)	538 (8.4)	15 (0.7)
Israel		35 (3.8)	518 (7.3)	26 (2.9)	513 (9.2)	18 (2.8)	485 (10.2)	21 (2.7)	508 (9.6)	15 (0.8)
Italy		63 (4.1)	500 (3.7)	19 (3.2)	486 (6.5)	13 (2.7)	505 (6.7)	5 (1.7)	492 (19.7)	23 (1.0)
Japan		45 (3.9)	569 (3.2)	21 (3.1)	578 (6.0)	13 (2.7)	577 (4.7)	21 (3.5)	568 (4.6)	18 (0.9)
Jordan		11 (2.2)	417 (8.5)	27 (3.1)	437 (6.7)	28 (2.5)	416 (5.8)	34 (3.2)	428 (7.0)	9 (0.5)
Kazakhstan		53 (2.6)	533 (5.9)	23 (1.8)	532 (6.2)	12 (1.4)	532 (8.1)	12 (1.5)	533 (8.2)	20 (0.6)
Korea, Rep. of		36 (4.2)	554 (3.0)	28 (3.6)	558 (2.9)	15 (3.2)	557 (6.9)	21 (3.2)	554 (4.9)	15 (0.9)
Kuwait		24 (3.8)	415 (19.4)	24 (4.0)	422 (13.7)	36 (4.3)	396 (6.4)	15 (3.2)	408 (13.9)	12 (0.8)
Lebanon		16 (3.4)	392 (22.5)	29 (3.5)	392 (10.7)	28 (3.3)	410 (8.8)	27 (3.9)	394 (10.2)	10 (0.8)
Lithuania		71 (2.1)	516 (2.6)	18 (2.1)	525 (6.1)	5 (0.9)	528 (10.6)	6 (1.0)	533 (6.8)	24 (0.5)
Malaysia		16 (3.3)	459 (14.7)	34 (3.8)	476 (8.5)	35 (3.7)	462 (9.1)	15 (2.9)	477 (11.4)	12 (0.7)
Malta		16 (0.3)	483 (3.2)	31 (0.5)	481 (2.2)	25 (0.4)	463 (2.7)	28 (0.5)	494 (2.4)	11 (0.1)
Morocco		45 (2.7)	399 (2.9)	26 (2.0)	395 (4.2)	10 (1.6)	388 (4.5)	20 (1.7)	381 (4.7)	18 (0.6)
New Zealand		31 (3.5)	523 (6.2)	27 (2.7)	506 (8.4)	23 (3.2)	512 (8.7)	19 (2.7)	520 (8.0)	15 (0.9)
Norway (9)		21 (3.3)	511 (4.8)	36 (4.1)	509 (5.2)	22 (2.9)	515 (5.5)	21 (2.8)	506 (6.2)	13 (0.8)
Oman		11 (2.4)	448 (10.0)	38 (3.4)	456 (4.3)	41 (3.9)	457 (5.1)	11 (2.0)	459 (5.3)	11 (0.5)
Qatar		16 (1.8)	421 (9.5)	35 (2.9)	464 (6.7)	33 (2.9)	470 (7.6)	16 (1.8)	450 (7.9)	11 (0.4)
Russian Federation		66 (1.9)	544 (4.0)	19 (1.4)	540 (5.9)	7 (1.4)	546 (11.9)	8 (1.0)	546 (8.4)	23 (0.5)
Saudi Arabia		19 (3.7)	405 (13.7)	39 (4.7)	411 (8.1)	24 (3.7)	396 (7.0)	18 (3.6)	375 (10.3)	12 (0.7)
Singapore		10 (1.4)	586 (11.6)	20 (2.1)	611 (7.7)	32 (2.6)	598 (7.6)	39 (2.7)	591 (5.0)	8 (0.4)
Slovenia		59 (2.4)	550 (2.8)	26 (2.1)	552 (2.5)	10 (1.4)	558 (4.8)	5 (1.1)	549 (6.2)	22 (0.5)
South Africa (9)		31 (3.8)	371 (11.9)	31 (3.4)	351 (11.2)	20 (3.2)	339 (13.2)	18 (2.8)	372 (13.3)	15 (0.8)
Sweden		15 (2.4)	528 (7.0)	45 (4.0)	523 (4.9)	20 (4.0)	527 (7.2)	19 (3.2)	509 (7.0)	13 (0.6)
Thailand		30 (3.3)	463 (7.8)	22 (3.5)	455 (9.3)	28 (3.7)	448 (8.2)	19 (2.7)	461 (12.1)	14 (0.8)
Turkey		19 (3.0)	519 (7.6)	33 (3.3)	510 (7.8)	22 (3.2)	492 (7.4)	26 (3.3)	454 (7.2)	12 (0.6)
United Arab Emirates	r	20 (1.7)	458 (7.2)	35 (2.5)	459 (5.3)	28 (2.2)	495 (5.4)	18 (2.4)	501 (9.1)	12 (0.4)
United States	r	22 (2.3)	532 (6.4)	38 (2.8)	532 (4.7)	15 (2.1)	541 (8.4)	24 (2.8)	526 (5.8)	13 (0.5)
International Avg.		32 (0.5)	487 (1.4)	30 (0.5)	487 (1.1)	20 (0.4)	486 (1.3)	18 (0.4)	486 (1.4)	15 (0.1)
Benchmarking Participants										
Buenos Aires, Argentina		x x	x x	x x	x x	x x	x x	x x	x x	x x
Ontario, Canada	r	20 (3.7)	520 (5.1)	51 (4.4)	526 (4.1)	19 (3.3)	533 (6.5)	10 (2.8)	523 (9.9)	14 (0.7)
Quebec, Canada		30 (4.9)	538 (9.6)	54 (5.3)	525 (5.2)	9 (2.8)	553 (9.1)	7 (3.0)	490 (23.8)	16 (0.9)
Norway (8)		16 (2.7)	489 (5.9)	37 (3.7)	492 (3.6)	18 (2.5)	494 (5.4)	29 (3.4)	487 (4.0)	12 (0.7)
Abu Dhabi, UAE	r	20 (3.4)	431 (15.5)	41 (4.0)	431 (7.5)	23 (4.1)	472 (13.5)	16 (4.8)	494 (23.5)	13 (0.9)
Dubai, UAE	r	18 (1.8)	518 (5.3)	32 (2.6)	516 (7.1)	31 (3.8)	531 (5.7)	19 (3.3)	527 (7.8)	12 (0.4)
Florida, US	s	19 (5.1)	505 (15.2)	31 (5.8)	521 (12.5)	39 (6.4)	521 (15.8)	11 (4.1)	532 (14.7)	13 (1.4)

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

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

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 8.8: Teacher Participation in Professional Development in Science in the Past Two Years

Reported by Teachers

Teachers could indicate participating in more than one area of professional development.

Country	Percent of Students by Teachers' Area of Professional Development						
	Science Content	Science Pedagogy/ Instruction	Science Curriculum	Integrating Information Technology into Science	Improving Students' Critical Thinking or Inquiry Skills	Science Assessment	Addressing Individual Students' Needs
Australia	61 (2.7)	57 (3.3)	68 (2.7)	53 (2.8)	50 (2.7)	42 (2.8)	57 (2.6)
Bahrain	53 (2.5)	69 (2.5)	55 (2.6)	63 (2.3)	58 (2.8)	57 (3.3)	59 (3.1)
Botswana (9)	38 (5.1)	26 (4.2)	36 (4.7)	22 (3.8)	21 (3.8)	28 (3.9)	30 (4.5)
Canada	r 37 (3.5)	r 39 (3.2)	r 28 (3.3)	r 47 (3.9)	r 37 (2.9)	r 26 (3.4)	r 43 (3.6)
Chile	43 (5.0)	28 (3.8)	r 31 (4.1)	29 (4.1)	25 (4.3)	23 (4.0)	24 (3.5)
Chinese Taipei	70 (3.6)	67 (4.2)	62 (3.7)	51 (4.1)	38 (3.9)	48 (4.0)	37 (4.2)
Egypt	45 (3.9)	62 (4.0)	38 (3.6)	59 (3.7)	59 (3.9)	54 (3.9)	55 (4.1)
England	r 54 (2.9)	r 61 (3.0)	r 62 (2.9)	r 32 (3.1)	r 41 (3.2)	r 53 (2.9)	r 56 (2.8)
Georgia	44 (2.7)	47 (2.6)	43 (2.5)	58 (2.7)	46 (2.3)	43 (2.7)	42 (3.0)
Hong Kong SAR	69 (4.0)	70 (3.8)	63 (4.0)	53 (4.3)	48 (4.6)	40 (4.4)	49 (4.7)
Hungary	31 (2.2)	36 (2.3)	18 (2.1)	37 (2.5)	16 (2.1)	13 (1.7)	25 (2.0)
Iran, Islamic Rep. of	86 (2.4)	87 (1.9)	62 (3.0)	46 (3.3)	36 (3.0)	57 (3.3)	35 (2.8)
Ireland	42 (3.4)	38 (3.1)	28 (2.8)	36 (3.7)	34 (3.1)	26 (2.9)	24 (2.9)
Israel	65 (3.2)	63 (3.2)	57 (3.4)	60 (3.4)	61 (3.1)	35 (3.1)	47 (3.6)
Italy	25 (3.1)	27 (3.6)	22 (3.3)	37 (3.6)	18 (3.1)	16 (3.0)	41 (3.9)
Japan	76 (3.4)	77 (3.3)	35 (4.2)	36 (3.9)	23 (3.4)	31 (3.9)	30 (3.8)
Jordan	18 (2.3)	38 (3.1)	20 (2.5)	31 (3.2)	48 (3.9)	27 (3.2)	38 (3.9)
Kazakhstan	73 (2.0)	76 (1.9)	70 (2.4)	88 (1.8)	77 (2.5)	71 (2.5)	71 (2.4)
Korea, Rep. of	69 (3.9)	76 (3.2)	56 (4.1)	46 (4.2)	47 (4.4)	50 (3.8)	39 (3.9)
Kuwait	69 (4.2)	74 (4.0)	60 (4.5)	61 (3.7)	61 (4.2)	60 (4.2)	62 (3.7)
Lebanon	66 (4.1)	60 (4.0)	54 (4.3)	56 (4.4)	55 (4.4)	50 (4.2)	42 (4.5)
Lithuania	62 (1.8)	54 (2.6)	54 (2.3)	64 (2.5)	46 (2.0)	60 (2.1)	51 (2.0)
Malaysia	49 (4.4)	75 (3.9)	56 (4.0)	54 (4.0)	75 (3.5)	74 (3.8)	35 (4.0)
Malta	55 (0.5)	60 (0.5)	60 (0.5)	56 (0.5)	45 (0.5)	37 (0.5)	49 (0.4)
Morocco	34 (2.0)	43 (2.2)	30 (2.0)	43 (2.2)	14 (1.3)	35 (2.1)	12 (1.6)
New Zealand	63 (3.5)	57 (4.6)	60 (2.8)	58 (4.0)	48 (3.7)	41 (4.0)	42 (4.2)
Norway (9)	12 (2.5)	9 (2.5)	4 (1.7)	3 (1.3)	7 (2.0)	12 (2.9)	7 (2.3)
Oman	47 (3.2)	62 (3.4)	34 (2.9)	44 (3.6)	45 (3.5)	52 (3.5)	31 (3.3)
Qatar	59 (3.1)	67 (2.4)	56 (2.9)	68 (2.7)	69 (2.6)	60 (2.9)	60 (3.2)
Russian Federation	74 (1.8)	75 (2.6)	79 (1.7)	77 (1.8)	57 (2.4)	60 (2.3)	54 (2.5)
Saudi Arabia	57 (4.5)	71 (4.0)	59 (4.7)	50 (4.5)	66 (4.2)	52 (4.7)	47 (4.1)
Singapore	70 (2.6)	91 (1.5)	67 (2.5)	67 (2.6)	65 (2.0)	59 (2.2)	40 (2.7)
Slovenia	74 (1.9)	66 (2.0)	49 (2.4)	65 (2.2)	37 (1.9)	41 (2.3)	39 (2.6)
South Africa (9)	79 (3.1)	52 (3.9)	81 (2.6)	50 (3.5)	58 (3.9)	67 (3.7)	54 (3.7)
Sweden	35 (3.3)	32 (3.4)	36 (3.9)	28 (3.3)	23 (3.9)	32 (4.3)	28 (3.7)
Thailand	76 (3.0)	84 (2.9)	60 (3.9)	67 (3.3)	59 (4.0)	52 (4.3)	35 (4.2)
Turkey	24 (3.3)	22 (3.1)	18 (3.0)	22 (2.7)	16 (2.4)	28 (3.6)	12 (2.0)
United Arab Emirates	r 62 (2.2)	r 69 (2.5)	r 57 (2.3)	r 72 (2.4)	r 74 (1.9)	r 64 (2.1)	r 73 (1.9)
United States	r 75 (2.8)	r 64 (2.8)	r 76 (2.4)	r 63 (3.3)	r 68 (2.7)	r 47 (3.1)	r 66 (2.4)
International Avg.	55 (0.5)	57 (0.5)	49 (0.5)	50 (0.5)	45 (0.5)	44 (0.5)	42 (0.5)
Benchmarking Participants							
Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x
Ontario, Canada	r 25 (3.6)	r 29 (3.6)	r 23 (4.2)	r 38 (4.8)	r 51 (4.0)	r 16 (3.3)	r 46 (4.4)
Quebec, Canada	53 (5.0)	58 (5.5)	34 (5.2)	61 (6.4)	12 (3.5)	44 (6.4)	40 (5.6)
Norway (8)	19 (3.3)	15 (3.1)	11 (2.6)	8 (2.0)	9 (2.4)	11 (2.6)	8 (2.3)
Abu Dhabi, UAE	52 (4.7)	64 (5.0)	46 (4.8)	69 (3.9)	79 (3.6)	52 (4.5)	79 (3.4)
Dubai, UAE	r 63 (2.6)	r 64 (2.2)	r 53 (1.8)	r 81 (1.9)	r 72 (2.2)	r 75 (1.6)	r 68 (2.3)
Florida, US	s 94 (1.4)	s 64 (7.3)	s 85 (4.8)	s 66 (7.6)	s 80 (5.2)	s 59 (7.5)	s 75 (5.7)

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

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 8.10: Principals' Formal Education*

Principal Education Level Reported by Principals and Current Requirements Reported by National Research Coordinators

Country	Percent of Students by Principal Educational Level			Current Requirements	
	Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Did Not Complete Bachelor's Degree	Teaching Experience	Completion of Specialized School Leadership Training Program
Australia	56 (3.3)	43 (3.1)	1 (1.0)	●	○
Bahrain	36 (0.2)	64 (0.2)	0 (0.0)	●	●
Botswana (9)	12 (2.9)	76 (4.0)	12 (2.8)	●	○
Canada	56 (3.1)	44 (3.1)	0 (0.0)	●	●
Chile	64 (4.6)	36 (4.6)	0 (0.0)	●	●
Chinese Taipei	83 (3.0)	17 (3.0)	0 (0.0)	●	●
Egypt	6 (1.6)	87 (2.3)	7 (1.8)	–	–
England r	87 (3.4)	13 (3.4)	0 (0.0)	○	○
Georgia	98 (1.3)	2 (1.3)	0 (0.0)	○	○
Hong Kong SAR	89 (2.9)	11 (2.9)	0 (0.0)	●	●
Hungary	43 (4.6)	57 (4.6)	0 (0.0)	○	●
Iran, Islamic Rep. of	16 (2.9)	77 (3.1)	7 (1.7)	○	○
Ireland	65 (4.2)	34 (4.2)	1 (1.0)	●	○
Israel	89 (2.0)	10 (1.9)	0 (0.4)	●	●
Italy r	20 (3.6)	74 (4.2)	6 (2.2)	●	○
Japan	8 (2.4)	92 (2.4)	0 (0.0)	●	○
Jordan	50 (3.8)	48 (3.9)	2 (0.9)	○	○
Kazakhstan	14 (2.5)	86 (2.5)	0 (0.5)	●	●
Korea, Rep. of	79 (3.1)	21 (3.1)	0 (0.0)	●	●
Kuwait	17 (2.9)	72 (3.3)	11 (1.9)	●	●
Lebanon	58 (4.6)	28 (4.2)	15 (3.4)	●	●
Lithuania	54 (4.7)	46 (4.7)	0 (0.0)	●	○
Malaysia	35 (4.4)	65 (4.4)	0 (0.0)	●	●
Malta	58 (0.1)	42 (0.1)	0 (0.0)	●	●
Morocco	8 (1.7)	63 (3.1)	29 (2.6)	●	●
New Zealand	65 (4.6)	32 (4.2)	2 (2.2)	●	○
Norway (9)	41 (4.6)	58 (4.6)	1 (1.0)	○	○
Oman	27 (2.8)	68 (2.9)	5 (1.5)	●	●
Qatar	41 (0.5)	57 (0.5)	3 (0.0)	●	●
Russian Federation	84 (3.0)	16 (3.0)	0 (0.0)	●	○
Saudi Arabia	18 (3.3)	72 (3.6)	9 (2.3)	●	○
Singapore	61 (0.0)	39 (0.0)	0 (0.0)	●	●
Slovenia	99 (0.7)	1 (0.7)	0 (0.0)	●	●
South Africa (9)	12 (2.1)	80 (2.6)	8 (1.8)	●	○
Sweden	33 (4.1)	60 (4.6)	8 (2.5)	○	●
Thailand	94 (1.9)	6 (1.9)	0 (0.0)	●	●
Turkey	23 (3.0)	76 (3.1)	2 (0.8)	●	○
United Arab Emirates	50 (1.9)	48 (2.0)	2 (0.6)	●	●
United States	98 (0.7)	2 (0.7)	0 (0.0)	●	●
International Avg.	50 (0.5)	47 (0.5)	3 (0.2)		
Benchmarking Participants					
Buenos Aires, Argentina s	22 (5.1)	72 (5.6)	5 (2.5)	●	○
Ontario, Canada	51 (4.4)	49 (4.4)	0 (0.0)	●	●
Quebec, Canada	61 (5.7)	39 (5.7)	0 (0.0)	●	●
Norway (8)	42 (4.6)	57 (4.6)	1 (1.0)	○	○
Abu Dhabi, UAE	38 (4.7)	59 (4.9)	3 (1.5)	●	●
Dubai, UAE	67 (0.3)	32 (0.3)	1 (0.0)	●	○
Florida, US s	100 (0.0)	0 (0.0)	0 (0.0)	●	●

● Yes
○ No

* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011).
** For example, doctorate, master's, or other postgraduate degree.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available.
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 8.12: Principals' Years of Experience

Reported by Principals

Country	Percent of Students by Principals' Years of Experience as a Principal				Average Years of Experience as a Principal
	20 Years or More	At Least 10 but Less than 20 Years	At Least 5 but Less than 10 Years	Less than 5 Years	
Australia	12 (2.4)	32 (4.3)	32 (4.1)	23 (3.4)	10 (0.5)
Bahrain	4 (0.1)	13 (0.2)	32 (0.2)	52 (0.3)	6 (0.0)
Botswana (9)	6 (2.2)	19 (2.9)	41 (4.4)	33 (4.2)	8 (0.5)
Canada	0 (0.3)	32 (3.5)	35 (3.6)	32 (3.6)	8 (0.4)
Chile	17 (3.3)	21 (3.4)	24 (3.7)	38 (4.0)	10 (0.8)
Chinese Taipei	6 (2.0)	29 (3.7)	30 (3.6)	35 (3.8)	8 (0.5)
Egypt	3 (1.2)	20 (3.5)	27 (3.6)	50 (4.3)	6 (0.5)
England r	1 (1.0)	28 (4.7)	36 (4.5)	35 (4.8)	7 (0.5)
Georgia	16 (3.0)	15 (3.1)	38 (4.4)	31 (4.4)	9 (0.7)
Hong Kong SAR	12 (2.9)	31 (4.2)	33 (4.2)	24 (3.9)	11 (0.7)
Hungary	15 (3.5)	31 (4.4)	32 (3.9)	22 (3.5)	11 (0.7)
Iran, Islamic Rep. of	13 (2.1)	36 (3.1)	27 (2.5)	24 (3.0)	10 (0.5)
Ireland	7 (2.3)	24 (3.4)	38 (4.0)	31 (3.8)	8 (0.5)
Israel	10 (2.3)	26 (3.0)	32 (3.2)	33 (3.4)	9 (0.5)
Italy	18 (3.4)	23 (3.6)	28 (3.6)	30 (3.9)	10 (0.7)
Japan	0 (0.0)	8 (2.0)	38 (4.3)	54 (4.2)	5 (0.2)
Jordan	9 (2.1)	25 (2.9)	37 (3.6)	30 (3.6)	8 (0.5)
Kazakhstan	11 (2.2)	28 (3.7)	32 (4.1)	29 (3.9)	10 (0.7)
Korea, Rep. of	36 (4.4)	0 (0.0)	17 (2.9)	47 (4.5)	15 (1.5)
Kuwait	8 (2.6)	23 (3.4)	43 (4.3)	26 (3.3)	9 (0.7)
Lebanon	34 (4.9)	25 (3.9)	19 (3.7)	21 (4.0)	15 (1.1)
Lithuania	33 (4.1)	36 (3.9)	18 (3.5)	13 (3.0)	15 (0.9)
Malaysia	4 (1.5)	22 (3.0)	29 (4.1)	45 (4.7)	7 (0.5)
Malta	4 (0.0)	21 (0.1)	19 (0.1)	55 (0.1)	7 (0.0)
Morocco	1 (0.7)	20 (2.2)	38 (3.2)	40 (3.0)	7 (0.3)
New Zealand	12 (3.8)	36 (5.0)	33 (5.6)	19 (4.0)	11 (0.7)
Norway (9)	6 (2.1)	32 (4.3)	32 (4.7)	31 (4.4)	9 (0.6)
Oman	13 (2.3)	43 (4.1)	21 (2.9)	23 (2.9)	11 (0.5)
Qatar	12 (0.4)	27 (0.5)	40 (0.5)	21 (0.7)	10 (0.1)
Russian Federation	20 (3.7)	29 (3.9)	24 (3.3)	27 (3.7)	12 (0.8)
Saudi Arabia	9 (2.6)	33 (4.7)	17 (3.3)	40 (4.8)	9 (0.7)
Singapore	2 (0.0)	37 (0.0)	25 (0.0)	35 (0.0)	8 (0.0)
Slovenia	8 (2.1)	36 (4.1)	34 (4.4)	22 (3.7)	10 (0.5)
South Africa (9)	18 (2.6)	28 (2.8)	20 (2.9)	34 (3.5)	10 (0.7)
Sweden	7 (2.4)	34 (4.9)	28 (3.8)	31 (4.5)	9 (0.6)
Thailand	29 (3.3)	41 (3.6)	21 (2.9)	9 (1.8)	15 (0.7)
Turkey	8 (2.2)	23 (3.3)	21 (3.1)	48 (3.3)	7 (0.5)
United Arab Emirates	18 (1.5)	31 (1.6)	29 (2.0)	22 (2.1)	11 (0.3)
United States	7 (1.7)	19 (2.8)	31 (2.9)	44 (3.3)	7 (0.4)
International Avg.	12 (0.4)	27 (0.5)	29 (0.6)	32 (0.6)	9 (0.1)
Benchmarking Participants					
Buenos Aires, Argentina s	9 (3.2)	14 (4.7)	27 (5.2)	49 (5.6)	7 (0.8)
Ontario, Canada	0 (0.0)	29 (4.8)	41 (5.2)	30 (5.1)	7 (0.5)
Quebec, Canada	1 (0.9)	36 (7.0)	24 (5.3)	38 (6.1)	8 (0.7)
Norway (8)	7 (2.5)	30 (4.2)	31 (4.6)	31 (4.5)	9 (0.7)
Abu Dhabi, UAE	15 (3.1)	43 (3.7)	20 (4.4)	21 (3.6)	11 (0.6)
Dubai, UAE	14 (0.2)	20 (0.3)	41 (0.3)	26 (0.3)	9 (0.0)
Florida, US s	12 (6.1)	19 (7.0)	30 (8.2)	40 (6.2)	9 (1.7)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

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

TIMSS 2015

CHAPTER 9: CLASSROOM INSTRUCTION

TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

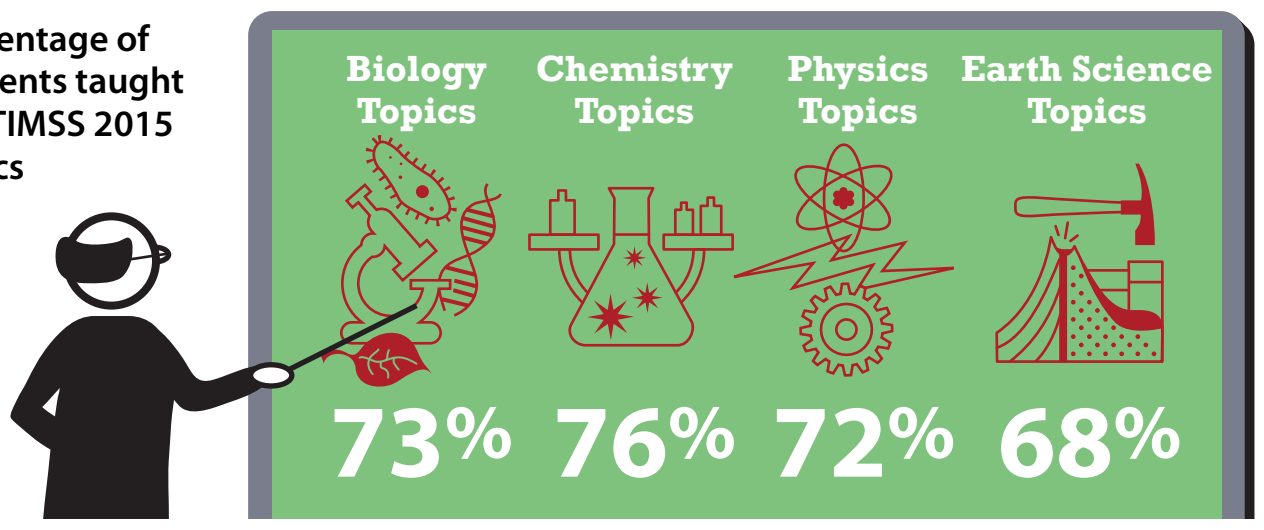
IEA
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Instruction in Science Classes

Curriculum Coverage

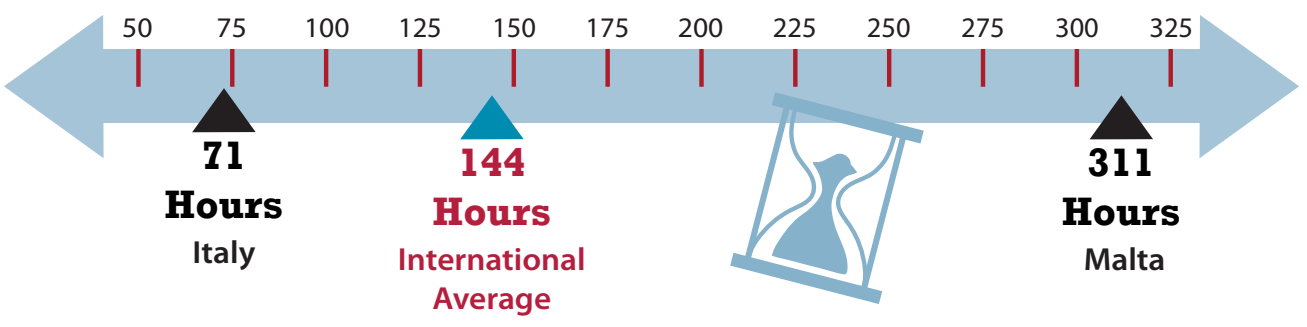
There was variation in topic coverage within content domains. However, according to their teachers many students had been taught the TIMSS topics.

Percentage of students taught the TIMSS 2015 topics



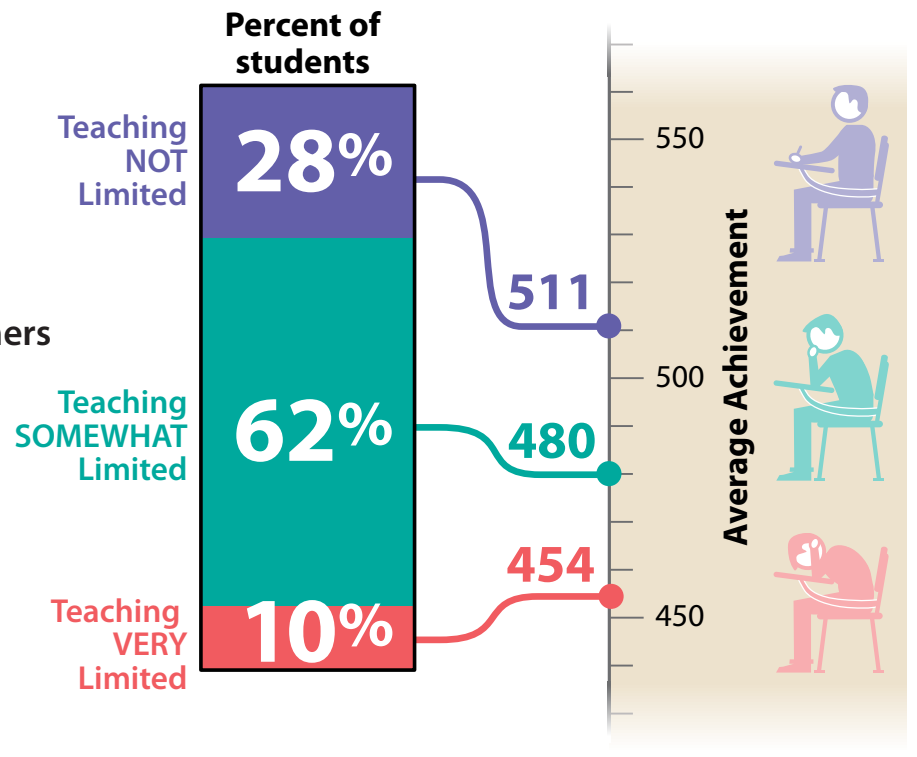
Instructional Time

Instructional time remains a crucial resource in considering students' opportunity to learn, even though there are many factors that influence the effectiveness of an educational system. There was a considerable range in the yearly number of instructional hours in science.



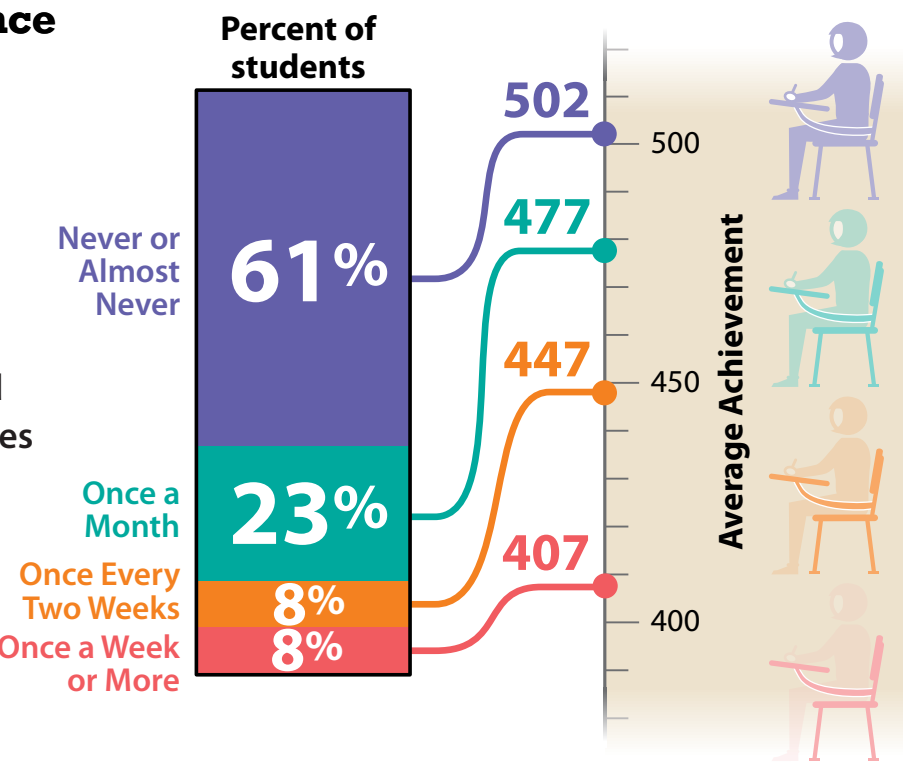
Teaching Limited by Student Needs

Extent to which teachers reported instruction being limited by students' needs



Student Attendance

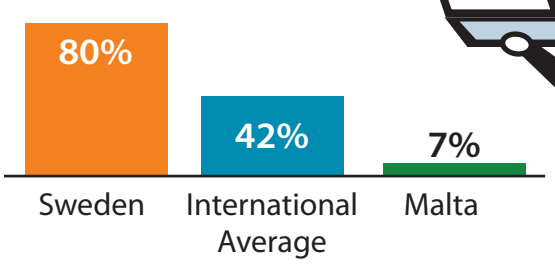
Frequency of student absences, as reported by students themselves



Computer Activities During Science Lessons

There is a continuing debate about the role of technology in education, including in science classes.

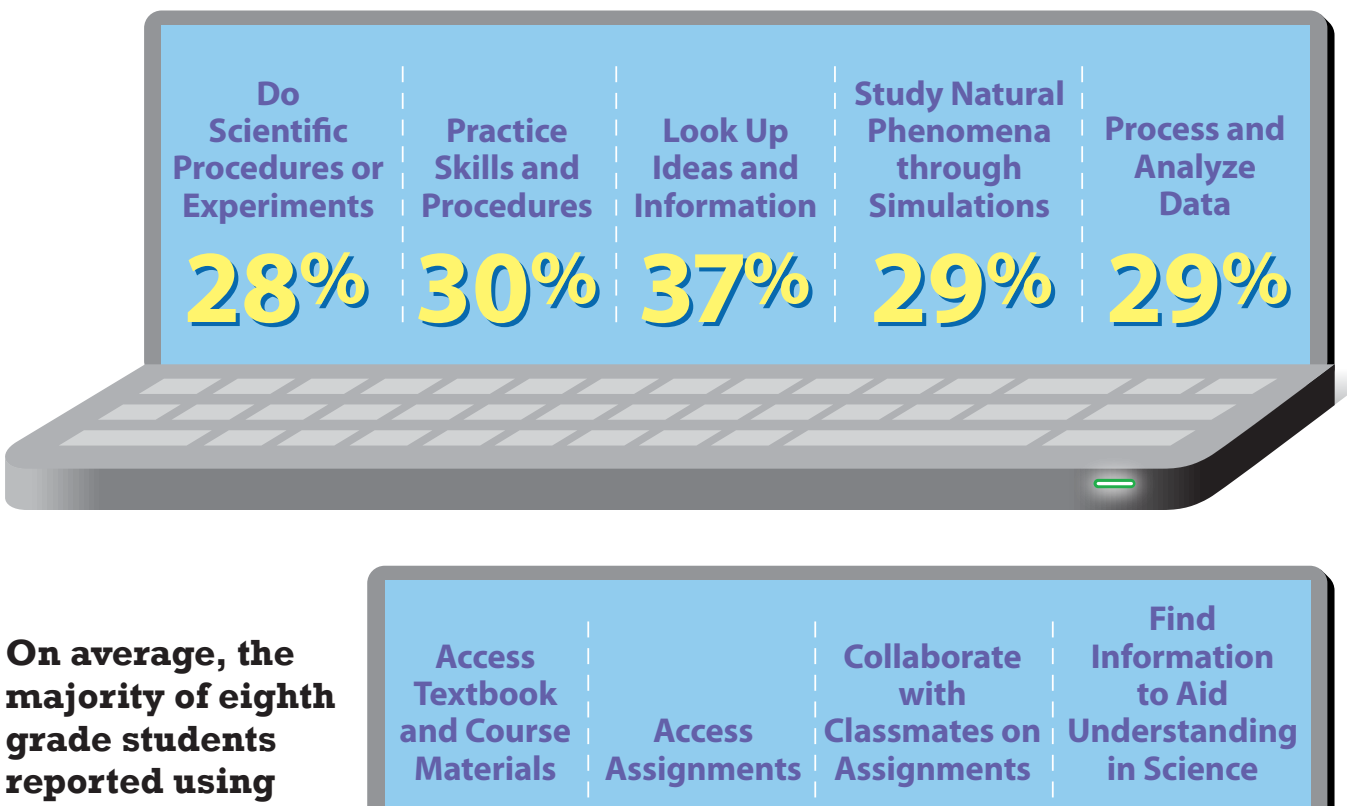
Teachers reported considerable variation in computer availability for use in science lessons.



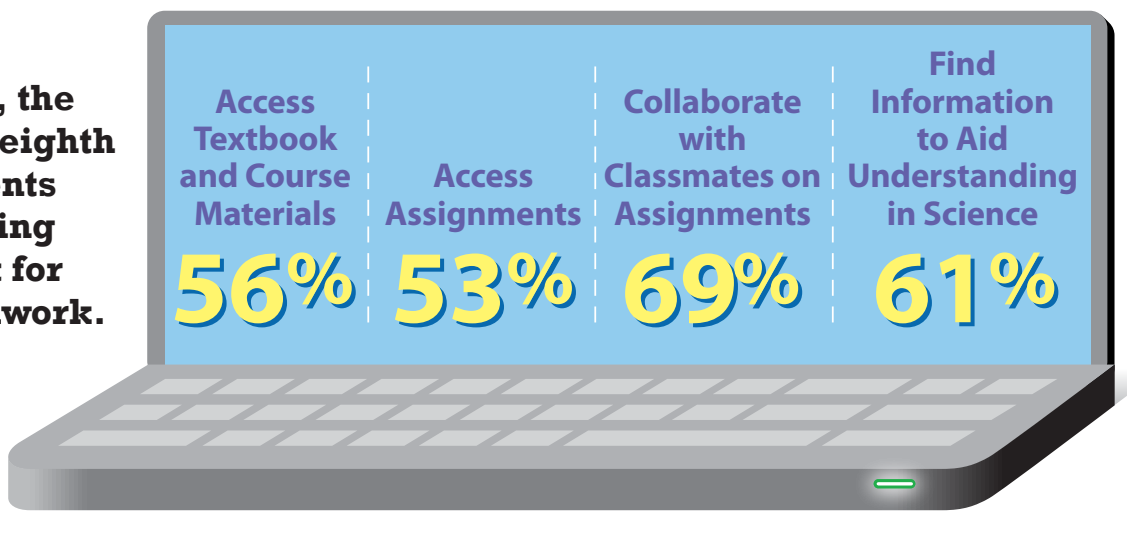
Average science achievement for students with computer availability compared to those without availability:

493 vs 483

28-37% of the eighth grade students were asked to use computers at least monthly for various activities.



On average, the majority of eighth grade students reported using the Internet for their schoolwork.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.

http://timss2015.org/download-center/

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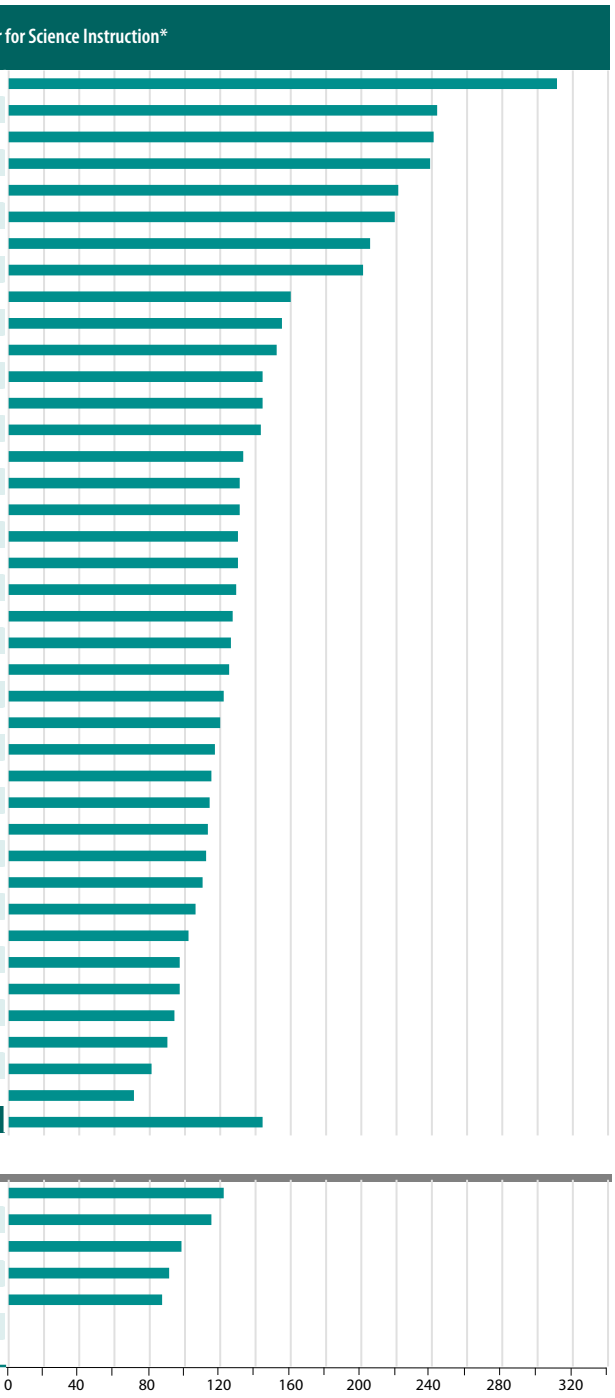
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 9.2: Instructional Time Spent on Science

Reported by Principals and Teachers

Country		Total Instructional Hours per Year		Hours per Year for Science Instruction*
Malta *		964 (0.3)	r	311 (1.0)
Lebanon *	r	945 (14.8)	r	243 (10.7)
Georgia *	r	864 (16.7)	s	241 (6.8)
Kazakhstan *		933 (19.4)		239 (5.4)
Slovenia *	r	867 (10.3)	r	221 (4.7)
Russian Federation *		884 (9.4)	r	219 (2.9)
Lithuania *		856 (10.2)		205 (4.2)
Hungary *		842 (10.3)		201 (5.4)
Morocco *		1364 (25.8)	r	160 (4.5)
Qatar	r	1085 (1.9)	r	155 (2.6)
Botswana (9)	r	1107 (19.5)	s	152 (4.8)
Chinese Taipei		1132 (9.7)		144 (2.3)
United States		1135 (8.8)	s	144 (2.4)
Oman	r	980 (14.5)	r	143 (3.1)
New Zealand	r	966 (6.9)	r	133 (2.5)
Japan		1036 (6.1)		131 (1.7)
Jordan		976 (12.5)		131 (2.3)
Malaysia	r	1172 (15.6)	r	130 (4.0)
Saudi Arabia		1112 (18.7)		130 (5.7)
Israel	r	1133 (15.6)	r	129 (3.5)
South Africa (9)	s	1234 (19.8)	s	127 (4.9)
Australia	r	1011 (6.3)	s	126 (1.6)
Bahrain		1032 (1.0)	r	125 (10.2)
Sweden *		921 (8.6)		122 (4.1)
Iran, Islamic Rep. of		971 (16.9)		120 (3.1)
Kuwait	r	997 (18.6)	r	117 (3.0)
United Arab Emirates	r	1016 (6.4)	s	115 (4.3)
Egypt		1099 (21.2)		114 (2.9)
Chile	r	1127 (18.0)	s	113 (5.0)
Turkey		983 (22.6)		112 (3.0)
Thailand		1209 (6.8)		110 (1.7)
Singapore		1065 (0.0)		106 (1.4)
Hong Kong SAR		995 (11.7)		102 (2.8)
England	r	1009 (8.3)	s	97 (3.8)
Canada	r	949 (4.9)	s	97 (2.2)
Korea, Rep. of		947 (6.0)		94 (2.1)
Ireland	r	963 (3.2)	r	90 (0.9)
Norway (9)		895 (8.9)	r	81 (1.5)
Italy	r	1047 (9.6)	r	71 (1.3)
International Avg.		1021 (2.1)		144 (0.7)
Benchmarking Participants Teaching General/Integrated Science				
Abu Dhabi, UAE	r	1024 (11.0)	s	122 (6.6)
Dubai, UAE	r	1010 (1.3)	s	115 (3.5)
Quebec, Canada		906 (7.0)	r	98 (2.7)
Ontario, Canada	r	970 (6.0)	s	91 (3.3)
Norway (8)		888 (6.3)	r	87 (1.9)
Buenos Aires, Argentina	s	1164 (46.7)		x x
Florida, US	s	1155 (39.9)		x x



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

* For countries teaching science as separate subjects, total hours across subjects.

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

A dash (-) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

Exhibit 9.2: Instructional Time Spent on Science (Continued)

For Countries Teaching Science as Separate Subjects

Country	Hours per Year for Instruction									
	All Science Subjects		Biology		Chemistry		Physics		Earth Science	
Malta	r	311 (1.0)	r	92 (0.5)	s	89 (0.6)	r	99 (0.4)	r	31 (0.3)
Lebanon	r	243 (10.7)	r	90 (6.9)	r	73 (4.7)	r	80 (7.2)		- -
Georgia	s	241 (6.8)	r	61 (3.3)	s	61 (2.2)	r	60 (1.9)	s	59 (2.3)
Kazakhstan		239 (5.4)		61 (1.9)		61 (2.2)		60 (2.0)		58 (1.7)
Slovenia	r	221 (4.7)	r	52 (2.0)	r	59 (1.5)	r	60 (2.7)	r	51 (1.8)
Russian Federation	r	219 (2.9)	r	54 (1.5)	r	55 (1.1)	r	57 (1.8)		53 (0.7)
Lithuania		205 (4.2)		34 (1.5)		59 (2.7)		56 (1.2)		56 (1.9)
Hungary		201 (5.4)		54 (2.4)		51 (2.4)		49 (1.7)		47 (1.6)
Morocco	r	160 (4.5)	r	40 (1.4)	r	40 (1.6)	r	40 (1.6)	r	40 (1.4)
Sweden		122 (4.1)		39 (1.5)		40 (1.3)		43 (1.7)		- -
International Avg.		216 (1.7)		58 (0.9)		59 (0.7)		60 (0.9)		49 (0.6)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

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

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

Exhibit 9.4: Percentages of Students Taught the TIMSS Science Topics*

Reported by Teachers

Country	All Science (22 topics)	Biology (7 topics)	Chemistry (6 topics)	Physics (5 topics)	Earth Science (4 topics)
Australia	r 59 (1.0)	r 55 (1.2)	r 61 (1.3)	r 54 (1.3)	r 67 (2.4)
Bahrain	84 (0.6)	90 (1.0)	80 (0.8)	75 (1.4)	93 (1.1)
Botswana (9)	60 (1.3)	88 (1.4)	42 (1.6)	50 (2.4)	50 (2.6)
Canada	r 67 (1.1)	r 73 (1.5)	r 54 (1.7)	r 61 (1.8)	r 81 (2.2)
Chile	r 83 (1.3)	r 85 (1.9)	r 81 (2.1)	r 81 (2.0)	r 87 (2.4)
Chinese Taipei	67 (1.0)	89 (2.6)	89 (0.7)	61 (1.1)	5 (1.5)
Egypt	82 (1.0)	82 (1.3)	81 (1.4)	82 (1.2)	85 (1.9)
England	r 81 (1.0)	r 83 (1.4)	r 78 (1.1)	r 85 (1.3)	r 77 (1.9)
Georgia	70 (0.8)	55 (1.8)	69 (1.7)	68 (1.6)	98 (0.6)
Hong Kong SAR	55 (1.3)	64 (2.2)	46 (1.9)	72 (1.6)	34 (3.1)
Hungary	87 (0.7)	79 (1.2)	99 (0.5)	86 (0.9)	85 (1.9)
Iran, Islamic Rep. of	76 (1.2)	70 (1.6)	81 (1.4)	81 (1.6)	76 (1.9)
Ireland	66 (0.8)	66 (1.3)	84 (1.3)	69 (1.4)	r 34 (2.1)
Israel	70 (1.3)	65 (1.9)	86 (1.1)	78 (1.3)	44 (2.8)
Italy	79 (1.0)	86 (1.1)	86 (1.8)	67 (1.6)	71 (2.5)
Japan	60 (0.8)	56 (1.2)	67 (1.1)	73 (1.4)	40 (1.7)
Jordan	89 (0.9)	89 (1.0)	90 (1.1)	85 (1.5)	90 (1.5)
Kazakhstan	82 (0.7)	68 (1.5)	84 (1.4)	85 (0.9)	96 (0.9)
Korea, Rep. of	60 (1.0)	49 (1.6)	59 (1.4)	76 (1.1)	64 (1.5)
Kuwait	80 (1.3)	81 (1.6)	81 (1.5)	75 (1.5)	80 (2.5)
Lebanon	r 83 (1.3)	r 80 (2.5)	85 (1.7)	86 (2.7)	- -
Lithuania	74 (1.0)	77 (1.8)	63 (1.8)	67 (2.3)	91 (1.2)
Malaysia	61 (1.5)	64 (1.6)	64 (1.8)	72 (1.7)	37 (2.6)
Malta	r 61 (0.3)	r 48 (0.5)	r 82 (0.7)	53 (0.3)	59 (0.2)
Morocco	63 (0.8)	70 (0.9)	54 (1.1)	57 (1.4)	r 75 (1.7)
New Zealand	50 (1.2)	47 (2.0)	58 (1.8)	55 (1.7)	40 (2.4)
Norway (9)	63 (1.0)	55 (1.6)	81 (1.6)	46 (1.7)	71 (2.1)
Oman	81 (0.8)	82 (0.8)	72 (1.3)	81 (1.5)	93 (1.3)
Qatar	77 (1.1)	74 (1.5)	77 (1.5)	83 (1.4)	75 (1.7)
Russian Federation	- -	- -	- -	- -	- -
Saudi Arabia	85 (1.1)	85 (1.5)	88 (1.3)	77 (1.9)	90 (1.8)
Singapore	68 (0.9)	69 (1.4)	78 (1.3)	85 (1.0)	28 (2.1)
Slovenia	70 (0.6)	72 (1.0)	80 (1.0)	43 (1.4)	87 (1.5)
South Africa (9)	79 (1.5)	85 (1.6)	88 (1.3)	76 (2.3)	56 (3.3)
Sweden	71 (0.9)	66 (1.3)	74 (1.5)	74 (1.7)	- -
Thailand	73 (1.1)	67 (2.0)	85 (1.5)	69 (1.5)	72 (1.6)
Turkey	87 (0.7)	90 (0.9)	100 (0.2)	94 (0.8)	55 (2.5)
United Arab Emirates	s 82 (0.8)	s 80 (1.1)	s 84 (0.8)	s 82 (1.2)	s 85 (1.2)
United States	r 85 (1.1)	r 90 (1.1)	r 82 (1.7)	r 76 (1.8)	r 90 (1.2)
International Avg.	73 (0.2)	73 (0.2)	76 (0.2)	72 (0.3)	68 (0.3)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

* Percentage mostly taught before or in the assessment year averaged across topics.

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

A dash (-) indicates comparable data not available.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

Exhibit 9.4: Percentages of Students Taught the TIMSS Science Topics* (Continued)

Country	All Science (22 topics)	Biology (7 topics)	Chemistry (6 topics)	Physics (5 topics)	Earth Science (4 topics)
Benchmarking Participants					
Buenos Aires, Argentina	x x	x x	x x	x x	x x
Ontario, Canada	r 68 (1.5)	r 79 (1.9)	r 48 (2.4)	r 68 (2.5)	r 78 (3.0)
Quebec, Canada	66 (1.8)	66 (2.4)	66 (2.9)	48 (2.6)	87 (3.0)
Norway (8)	41 (1.2)	39 (1.5)	52 (2.1)	25 (1.5)	49 (2.4)
Abu Dhabi, UAE	r 85 (1.4)	r 83 (2.1)	r 83 (1.8)	r 87 (1.8)	r 87 (2.4)
Dubai, UAE	s 79 (0.7)	s 77 (1.0)	r 83 (0.8)	s 74 (1.2)	s 83 (1.2)
Florida, US	s 90 (2.0)	s 90 (2.4)	s 86 (3.8)	s 86 (2.3)	s 98 (1.4)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

TIMSS 2015 Science Topics

A. Biology

1) Differences among major taxonomic groups of organisms
2) Major organs and organ systems in humans and other organisms
3) Cells, their structure and functions, including respiration and photosynthesis as cellular processes
4) Life cycles, sexual reproduction, and heredity
5) Role of variation and adaptation in survival/extinction of species in a changing environment
6) Interdependence of populations of organisms in an ecosystem and factors affecting population size in an ecosystem
7) Human health and the importance of diet and exercise in maintaining health

B. Chemistry

1) Classification, composition, and particulate structure of matter
2) Physical and chemical properties of matter
3) Mixtures and solutions
4) Properties and uses of common acids and bases
5) Chemical change
6) The role of electrons in chemical bonds

C. Physics

1) Physical states and changes in matter
2) Energy forms, transformations, heat, and temperature
3) Basic properties/behaviors of light and sound
4) Electric circuits and properties and uses of permanent magnets and electromagnets
5) Forces and motion

D. Earth Science

1) Earth's structure and physical features
2) Earth's processes, cycles, and history
3) Earth's resources, their use and conservation
4) Earth in the solar system and the universe

Exhibit 9.6: Teachers Emphasize Science Investigation

Reported by Teachers

Students were scored according to their teachers' responses to how often they used each of eight instructional activities on the *Emphasize Science Investigation* scale. Students with teachers who emphasized science investigation in **About Half the Lessons or More** had a score on the scale of at least 11.3, which corresponds to their teachers using all eight activities in "about half the lessons," on average. All other students had teachers who emphasized science investigation in **Less than Half the Lessons**.

Country		About Half the Lessons or More		Less than Half the Lessons		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Oman		69 (2.9)	456 (3.1)	31 (2.9)	453 (5.6)	11.9 (0.10)
Iran, Islamic Rep. of		62 (3.1)	463 (4.7)	38 (3.1)	446 (6.6)	11.6 (0.11)
Lebanon		52 (3.9)	403 (6.2)	48 (3.9)	392 (9.2)	11.3 (0.11)
Kuwait		48 (4.5)	407 (8.7)	52 (4.5)	411 (7.3)	11.2 (0.15)
Morocco		46 (2.4)	396 (3.4)	54 (2.4)	391 (2.9)	11.1 (0.08)
United Arab Emirates	r	44 (2.5)	487 (4.6)	56 (2.5)	471 (4.0)	10.8 (0.11)
Jordan		43 (3.6)	437 (5.7)	57 (3.6)	418 (4.5)	10.9 (0.13)
Egypt		42 (4.1)	375 (7.3)	58 (4.1)	367 (5.5)	10.7 (0.16)
Saudi Arabia		40 (4.3)	408 (7.2)	60 (4.3)	388 (5.9)	10.8 (0.18)
Kazakhstan		39 (2.6)	530 (6.6)	61 (2.6)	535 (5.1)	10.7 (0.13)
Bahrain		38 (3.2)	477 (4.1)	62 (3.2)	457 (3.5)	10.6 (0.13)
Turkey		38 (3.2)	496 (7.4)	62 (3.2)	492 (4.8)	10.7 (0.12)
Qatar		37 (4.0)	450 (6.9)	63 (4.0)	459 (4.8)	10.7 (0.14)
South Africa (9)		35 (4.0)	363 (9.5)	65 (4.0)	355 (7.2)	10.3 (0.18)
Thailand		31 (4.0)	469 (8.9)	69 (4.0)	450 (5.1)	10.1 (0.16)
Malaysia		30 (3.4)	478 (8.9)	70 (3.4)	465 (5.7)	10.4 (0.16)
Israel		27 (2.7)	498 (9.5)	73 (2.7)	512 (4.9)	10.0 (0.11)
Botswana (9)		26 (3.6)	391 (6.5)	74 (3.6)	395 (3.5)	10.0 (0.15)
Chile		25 (4.4)	443 (8.1)	75 (4.4)	460 (4.8)	9.8 (0.18)
Hong Kong SAR		25 (3.6)	565 (6.6)	75 (3.6)	539 (5.0)	10.1 (0.13)
United States	r	21 (2.5)	541 (6.1)	79 (2.5)	531 (3.5)	9.7 (0.12)
Ireland		20 (2.5)	540 (4.7)	80 (2.5)	535 (3.0)	10.1 (0.11)
Japan		18 (3.2)	567 (3.7)	82 (3.2)	572 (2.0)	9.9 (0.13)
England	r	18 (1.9)	547 (6.1)	82 (1.9)	536 (5.2)	10.0 (0.08)
Georgia		17 (1.7)	443 (4.4)	83 (1.7)	443 (3.3)	9.5 (0.08)
Australia	r	16 (2.4)	520 (7.0)	84 (2.4)	515 (3.0)	9.8 (0.10)
Korea, Rep. of		16 (2.7)	555 (3.3)	84 (2.7)	556 (2.4)	9.3 (0.15)
Italy		15 (2.7)	494 (8.9)	85 (2.7)	499 (2.9)	9.1 (0.15)
Slovenia		14 (1.4)	553 (3.4)	86 (1.4)	551 (2.5)	9.4 (0.07)
Hungary		13 (1.3)	547 (4.6)	87 (1.3)	523 (3.5)	9.2 (0.07)
Canada	r	12 (2.3)	522 (10.3)	88 (2.3)	528 (2.3)	9.2 (0.12)
Chinese Taipei		11 (2.6)	581 (6.3)	89 (2.6)	568 (2.3)	8.9 (0.14)
Russian Federation		11 (1.5)	556 (8.7)	89 (1.5)	543 (4.3)	8.9 (0.08)
New Zealand		10 (1.9)	516 (12.3)	90 (1.9)	516 (3.7)	9.5 (0.11)
Malta		8 (0.3)	477 (4.0)	92 (0.3)	482 (1.7)	9.1 (0.02)
Singapore		8 (1.6)	617 (15.1)	92 (1.6)	595 (3.5)	9.0 (0.09)
Lithuania		7 (1.0)	514 (5.1)	93 (1.0)	520 (2.9)	8.4 (0.07)
Norway (9)		5 (2.0)	512 (20.6)	95 (2.0)	510 (3.1)	8.3 (0.12)
Sweden		5 (1.2)	497 (19.7)	95 (1.2)	524 (3.5)	8.4 (0.13)
International Avg.		27 (0.5)	490 (1.3)	73 (0.5)	485 (0.7)	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

Exhibit 9.6: Teachers Emphasize Science Investigation (Continued)

Country		About Half the Lessons or More		Less than Half the Lessons		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Benchmarking Participants						
Dubai, UAE	r	52 (2.4)	526 (4.8)	48 (2.4)	520 (4.8)	11.3 (0.09)
Abu Dhabi, UAE	r	41 (5.6)	456 (13.4)	59 (5.6)	453 (8.2)	10.7 (0.24)
Florida, US	s	19 (5.6)	504 (18.4)	81 (5.6)	522 (9.5)	9.5 (0.32)
Quebec, Canada		13 (4.3)	514 (22.0)	87 (4.3)	530 (4.8)	9.0 (0.21)
Ontario, Canada	r	11 (2.6)	518 (10.6)	89 (2.6)	527 (2.4)	9.4 (0.14)
Norway (8)		4 (1.7)	487 (8.0)	96 (1.7)	490 (2.7)	8.3 (0.14)
Buenos Aires, Argentina		x x	x x	x x	x x	x x

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

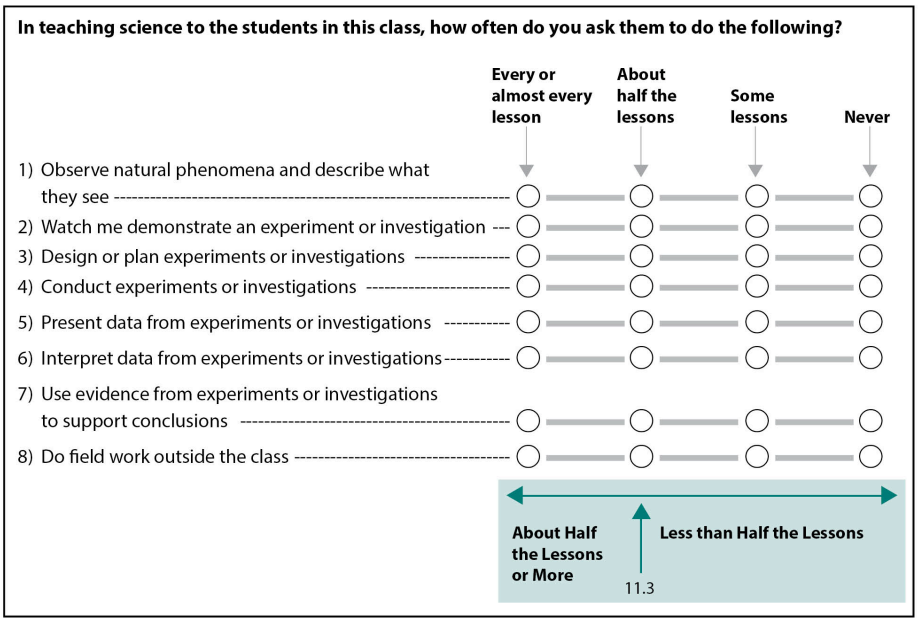


Exhibit 9.8: Resources for Conducting Science Experiments

Reported by Principals

Country	Schools Have a Science Laboratory				Teachers Have Assistance Available when Students are Conducting Experiments			
	Yes		No		Yes		No	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Hong Kong SAR	100 (0.0)	545 (4.2)	0 (0.0)	~ ~	98 (1.2)	544 (4.2)	2 (1.2)	~ ~
Ireland	100 (0.0)	530 (2.9)	0 (0.0)	~ ~	12 (2.9)	515 (15.1)	88 (2.9)	532 (2.9)
Malta	100 (0.0)	480 (1.6)	0 (0.0)	~ ~	92 (0.1)	479 (1.7)	8 (0.1)	489 (3.9)
Sweden	100 (0.0)	522 (3.4)	0 (0.0)	~ ~	16 (3.1)	525 (9.3)	84 (3.1)	522 (3.6)
England r	100 (0.0)	544 (4.7)	0 (0.0)	~ ~	r 67 (4.9)	541 (6.3)	33 (4.9)	550 (11.2)
Singapore	100 (0.0)	597 (3.2)	0 (0.0)	~ ~	98 (0.0)	597 (3.2)	2 (0.0)	~ ~
New Zealand	99 (0.3)	512 (3.3)	1 (0.3)	~ ~	50 (5.4)	508 (6.0)	50 (5.4)	515 (5.5)
Japan	99 (0.6)	571 (1.8)	1 (0.6)	~ ~	38 (3.9)	579 (4.0)	62 (3.9)	566 (2.3)
Korea, Rep. of	99 (0.7)	556 (2.2)	1 (0.7)	~ ~	49 (3.8)	560 (2.9)	51 (3.8)	551 (3.1)
Australia	99 (0.9)	514 (2.9)	1 (0.9)	~ ~	69 (3.7)	515 (3.6)	31 (3.7)	511 (5.3)
Malaysia	99 (0.9)	471 (4.2)	1 (0.9)	~ ~	89 (2.9)	472 (4.4)	11 (2.9)	460 (14.2)
Bahrain	98 (0.1)	466 (2.2)	2 (0.1)	~ ~	93 (0.2)	463 (2.3)	7 (0.2)	498 (5.3)
Qatar	98 (0.0)	457 (3.1)	2 (0.0)	~ ~	91 (0.5)	451 (3.2)	9 (0.5)	513 (6.7)
United Arab Emirates	98 (1.3)	474 (2.5)	2 (1.3)	~ ~	95 (0.5)	475 (2.5)	5 (0.5)	494 (7.2)
Chinese Taipei	98 (1.0)	571 (2.1)	2 (1.0)	~ ~	88 (2.3)	572 (2.4)	12 (2.3)	554 (9.5)
Kuwait	98 (1.5)	410 (5.8)	2 (1.5)	~ ~	89 (2.9)	406 (5.8)	11 (2.9)	447 (26.0)
Oman	97 (0.8)	454 (2.7)	3 (0.8)	433 (8.6)	82 (2.5)	456 (3.0)	18 (2.5)	442 (7.4)
Egypt	96 (1.3)	373 (4.4)	4 (1.3)	347 (10.2)	94 (2.0)	375 (4.5)	6 (2.0)	315 (11.5)
Norway (9)	93 (2.4)	509 (3.1)	7 (2.4)	515 (16.0)	35 (4.4)	510 (4.6)	65 (4.4)	509 (3.9)
Thailand	93 (1.9)	457 (4.4)	7 (1.9)	442 (11.0)	22 (3.3)	472 (10.8)	78 (3.3)	451 (4.6)
Jordan	93 (1.6)	428 (3.5)	7 (1.6)	406 (11.1)	86 (2.3)	428 (3.9)	14 (2.3)	413 (8.4)
Saudi Arabia	92 (2.7)	401 (4.6)	8 (2.7)	347 (15.7)	87 (3.2)	400 (4.8)	13 (3.2)	372 (14.5)
Lebanon	89 (2.8)	406 (5.5)	11 (2.8)	339 (16.4)	75 (4.0)	402 (7.2)	25 (4.0)	388 (13.0)
Israel	88 (2.3)	509 (4.3)	12 (2.3)	487 (13.7)	85 (2.4)	508 (4.4)	15 (2.4)	499 (13.8)
Botswana (9)	87 (3.0)	394 (3.4)	13 (3.0)	380 (10.3)	54 (4.7)	390 (5.0)	46 (4.7)	397 (4.9)
Russian Federation	84 (2.9)	546 (4.3)	16 (2.9)	534 (11.6)	51 (3.1)	547 (4.6)	49 (3.1)	542 (5.9)
Kazakhstan	82 (3.3)	531 (4.7)	18 (3.3)	538 (14.5)	94 (1.8)	533 (4.5)	6 (1.8)	526 (21.3)
Morocco	80 (2.4)	396 (2.9)	20 (2.4)	384 (4.6)	44 (3.1)	399 (4.0)	56 (3.1)	390 (3.1)
Turkey	78 (2.7)	502 (4.5)	22 (2.7)	464 (9.2)	13 (2.7)	510 (11.1)	87 (2.7)	491 (4.1)
United States	74 (3.2)	534 (3.8)	26 (3.2)	524 (5.7)	27 (3.2)	536 (4.9)	73 (3.2)	529 (4.0)
Iran, Islamic Rep. of	73 (3.0)	467 (5.0)	27 (3.0)	428 (6.5)	26 (2.5)	466 (8.7)	74 (2.5)	453 (4.7)
Georgia	73 (3.1)	446 (3.3)	27 (3.1)	436 (6.7)	13 (2.8)	463 (8.6)	87 (2.8)	441 (3.4)
Italy	71 (4.2)	501 (3.4)	29 (4.2)	491 (5.5)	12 (2.2)	501 (10.8)	88 (2.2)	499 (2.9)
Canada	69 (3.2)	532 (2.4)	31 (3.2)	516 (3.7)	45 (3.1)	536 (3.2)	55 (3.1)	520 (2.6)
Chile	68 (3.8)	463 (4.8)	32 (3.8)	436 (5.8)	17 (3.6)	461 (11.7)	83 (3.6)	454 (4.3)
Slovenia	50 (4.5)	551 (3.4)	50 (4.5)	552 (3.7)	80 (3.3)	551 (3.0)	20 (3.3)	554 (4.9)
South Africa (9)	49 (2.8)	397 (8.7)	51 (2.8)	320 (5.6)	46 (3.9)	359 (7.1)	54 (3.9)	359 (10.0)
Hungary	30 (3.9)	542 (8.8)	70 (3.9)	519 (3.3)	22 (3.8)	548 (11.5)	78 (3.8)	520 (3.5)
Lithuania	11 (3.0)	528 (7.7)	89 (3.0)	518 (3.2)	15 (2.9)	519 (7.6)	85 (2.9)	519 (3.3)
International Avg.	85 (0.4)	489 (0.7)	15 (0.4)	450 (2.0)	58 (0.5)	489 (1.1)	42 (0.5)	481 (1.5)
Benchmarking Participants								
Quebec, Canada	100 (0.0)	535 (3.4)	0 (0.0)	~ ~	95 (1.1)	536 (3.5)	5 (1.1)	522 (14.5)
Dubai, UAE	98 (0.0)	527 (2.1)	2 (0.0)	~ ~	92 (0.2)	525 (2.2)	8 (0.2)	528 (5.1)
Abu Dhabi, UAE	96 (3.3)	446 (5.5)	4 (3.3)	560 (31.7)	96 (1.1)	450 (5.7)	4 (1.1)	477 (14.6)
Florida, US s	94 (3.7)	508 (8.9)	6 (3.7)	559 (12.0)	s 42 (8.6)	508 (14.1)	58 (8.6)	514 (10.5)
Norway (8)	94 (2.2)	491 (2.6)	6 (2.2)	494 (17.7)	36 (4.3)	485 (4.7)	64 (4.3)	494 (2.8)
Buenos Aires, Argentina r	94 (2.4)	389 (5.6)	6 (2.4)	365 (10.6)	r 84 (4.3)	389 (5.7)	16 (4.3)	377 (18.0)
Ontario, Canada	54 (4.9)	530 (3.7)	46 (4.9)	514 (3.7)	20 (4.1)	535 (7.7)	80 (4.1)	520 (2.7)

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 9.10: Computer Activities During Science Lessons

Reported by Teachers

Country	Computers Available for Students to Use in Science Lessons			Percent of Students Whose Teachers Have Them Use Computers at Least Monthly				
	Percent of Students	Average Achievement						
	Yes	Yes	No	To Practice Skills and Procedures	To Look Up Ideas and Information	To Do Scientific Procedures or Experiments	To Study Natural Phenomena Through Simulations	To Process and Analyze Data
Sweden	80 (3.1)	520 (3.9)	533 (6.2)	42 (4.0)	74 (3.5)	30 (3.7)	28 (3.4)	52 (4.2)
Kazakhstan	74 (3.0)	534 (5.2)	531 (8.3)	73 (3.1)	74 (3.1)	70 (3.2)	70 (3.1)	72 (3.0)
Australia	r 66 (3.0)	519 (3.0)	509 (5.1)	r 53 (3.3)	r 65 (3.0)	r 47 (3.5)	r 49 (3.2)	r 55 (3.1)
Russian Federation	64 (2.2)	547 (4.6)	539 (6.3)	54 (2.3)	60 (2.5)	46 (2.2)	40 (2.4)	50 (2.5)
Egypt	61 (3.5)	377 (5.7)	362 (6.7)	54 (3.7)	58 (3.6)	50 (3.6)	50 (3.8)	42 (3.9)
New Zealand	60 (4.0)	517 (4.7)	514 (7.3)	38 (4.3)	56 (4.4)	26 (3.3)	40 (4.6)	35 (4.0)
Canada	r 58 (2.6)	531 (2.6)	521 (3.6)	r 41 (3.1)	r 55 (2.9)	r 37 (3.1)	r 38 (3.2)	r 40 (3.1)
Georgia	57 (2.5)	446 (3.2)	440 (4.5)	50 (2.6)	54 (2.5)	40 (2.7)	44 (2.4)	50 (2.6)
Chile	r 56 (4.2)	459 (5.3)	454 (5.4)	r 36 (3.8)	r 51 (4.3)	r 30 (3.5)	r 33 (3.8)	r 42 (4.1)
Japan	55 (4.2)	571 (3.0)	570 (3.2)	8 (2.1)	19 (3.2)	11 (2.4)	18 (3.1)	12 (2.7)
Norway (9)	53 (4.1)	511 (3.7)	508 (4.7)	39 (4.4)	46 (4.2)	36 (4.4)	31 (4.2)	34 (4.1)
Lithuania	53 (2.5)	519 (3.3)	519 (3.6)	42 (2.3)	48 (2.4)	36 (2.4)	29 (2.1)	36 (2.2)
Singapore	52 (2.3)	592 (4.9)	602 (4.4)	31 (2.2)	41 (2.2)	27 (1.8)	34 (2.2)	27 (1.9)
United States	r 51 (3.4)	541 (4.4)	527 (4.3)	r 40 (2.9)	r 49 (3.3)	r 41 (3.2)	r 40 (3.0)	r 41 (3.0)
Korea, Rep. of	50 (3.9)	554 (3.3)	557 (2.7)	25 (3.2)	30 (3.4)	28 (3.5)	28 (3.3)	26 (3.2)
United Arab Emirates	r 50 (2.7)	486 (4.4)	472 (5.5)	r 44 (2.7)	r 48 (2.7)	r 43 (2.7)	r 41 (2.6)	r 44 (2.8)
Thailand	49 (4.1)	468 (6.4)	445 (5.8)	40 (4.2)	47 (4.2)	42 (4.0)	45 (4.3)	40 (4.3)
Italy	48 (3.9)	499 (4.2)	498 (3.7)	30 (3.4)	44 (3.8)	28 (3.5)	26 (3.0)	32 (3.4)
England	r 48 (3.3)	543 (5.8)	534 (6.3)	r 23 (2.6)	r 44 (3.4)	r 18 (2.3)	r 24 (2.7)	r 28 (2.7)
Jordan	44 (4.0)	438 (4.9)	417 (5.0)	39 (3.8)	44 (4.1)	36 (3.7)	36 (3.9)	33 (3.4)
Chinese Taipei	44 (3.8)	574 (4.1)	566 (2.8)	17 (2.7)	23 (3.0)	26 (3.4)	19 (2.8)	19 (2.6)
Qatar	42 (2.7)	452 (5.5)	459 (5.1)	39 (2.6)	41 (2.7)	35 (2.4)	38 (2.5)	36 (2.9)
Hungary	42 (2.5)	522 (5.1)	529 (4.4)	34 (2.3)	38 (2.4)	29 (2.0)	32 (2.3)	30 (2.2)
Israel	41 (3.3)	522 (7.5)	499 (5.3)	36 (3.1)	38 (3.1)	33 (3.1)	33 (3.0)	32 (3.0)
Iran, Islamic Rep. of	39 (3.9)	477 (5.3)	443 (6.0)	31 (3.3)	36 (3.6)	33 (3.7)	28 (3.3)	24 (2.9)
Saudi Arabia	38 (4.1)	413 (7.7)	386 (5.6)	31 (4.1)	32 (4.2)	31 (4.1)	30 (4.0)	28 (4.1)
Kuwait	38 (4.3)	410 (10.9)	408 (6.3)	36 (4.1)	38 (4.3)	36 (4.2)	34 (4.1)	32 (4.1)
Bahrain	36 (2.1)	463 (4.9)	467 (3.3)	27 (2.5)	34 (2.2)	31 (2.5)	31 (2.4)	26 (2.7)
Slovenia	32 (2.6)	551 (3.4)	551 (2.6)	23 (2.4)	29 (2.5)	19 (2.3)	25 (2.5)	25 (2.5)
Turkey	30 (3.4)	528 (6.9)	480 (4.4)	27 (3.4)	28 (3.4)	27 (3.2)	25 (3.3)	25 (3.3)
Ireland	26 (3.1)	533 (4.3)	538 (3.3)	12 (2.5)	17 (2.8)	10 (2.2)	12 (2.1)	11 (2.4)
Morocco	23 (2.2)	401 (5.2)	391 (2.5)	13 (1.6)	19 (2.0)	13 (1.5)	18 (1.9)	16 (1.7)
Hong Kong SAR	21 (3.6)	555 (8.9)	542 (4.6)	12 (2.9)	17 (3.4)	12 (3.1)	15 (3.1)	14 (2.8)
Oman	15 (2.2)	458 (6.2)	455 (3.1)	13 (2.2)	14 (2.1)	13 (2.0)	13 (2.1)	12 (1.9)
Lebanon	12 (2.6)	427 (13.9)	393 (5.7)	8 (2.3)	10 (2.6)	10 (2.6)	9 (2.6)	10 (2.6)
Malaysia	10 (1.8)	493 (8.7)	467 (4.8)	5 (1.3)	9 (1.8)	3 (0.9)	7 (1.4)	4 (1.2)
South Africa (9)	9 (1.7)	419 (17.4)	352 (5.9)	5 (1.5)	6 (1.4)	5 (1.5)	5 (1.4)	5 (1.6)
Botswana (9)	7 (2.4)	368 (10.1)	396 (3.0)	2 (1.3)	5 (1.9)	2 (1.1)	4 (1.7)	2 (1.1)
Malta	7 (0.3)	477 (4.5)	481 (1.7)	5 (0.3)	5 (0.2)	5 (0.3)	5 (0.3)	5 (0.2)
International Avg.	42 (0.5)	493 (1.0)	483 (0.8)	30 (0.5)	37 (0.5)	28 (0.5)	29 (0.5)	29 (0.5)
Benchmarking Participants								
Ontario, Canada	r 75 (3.9)	529 (3.0)	519 (4.8)	r 51 (4.6)	r 72 (4.6)	r 52 (4.7)	r 51 (4.9)	r 52 (4.7)
Dubai, UAE	r 68 (2.5)	528 (3.7)	515 (4.7)	r 58 (2.6)	r 68 (2.5)	r 56 (2.5)	r 63 (2.6)	r 61 (3.8)
Norway (8)	52 (4.2)	490 (3.2)	490 (4.0)	43 (4.0)	47 (4.1)	29 (3.8)	36 (4.3)	38 (3.5)
Florida, US	s 47 (8.1)	509 (14.9)	527 (10.3)	s 43 (7.8)	s 46 (8.0)	s 43 (8.4)	s 45 (8.0)	s 42 (7.7)
Abu Dhabi, UAE	r 31 (5.0)	469 (13.2)	449 (9.5)	r 28 (5.0)	r 30 (5.0)	r 27 (4.9)	r 24 (4.4)	r 26 (4.9)
Quebec, Canada	26 (4.1)	541 (5.9)	522 (5.7)	21 (3.9)	23 (4.1)	13 (3.1)	16 (3.7)	16 (3.7)
Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x	x x

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

An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 9.11: Student Use of Internet for Schoolwork

Reported by Students

Country	Percent of Students Who Use the Internet to Do the Following Tasks				
	Access the Textbook or Other Course Materials	Access Assignments Posted Online by the Teacher	Collaborate with Classmates on Assignments or Projects	Communicate with the Teacher	Find Information, Articles, or Tutorials to Aid in Understanding Science
Australia	55 (1.4)	66 (1.2)	63 (0.8)	46 (1.1)	57 (0.9)
Bahrain	56 (1.0)	43 (1.1)	77 (0.8)	41 (1.1)	62 (0.9)
Botswana (9)	46 (0.8)	37 (1.0)	58 (1.1)	36 (0.8)	58 (0.8)
Canada	45 (1.5)	58 (2.0)	76 (1.0)	32 (1.2)	52 (1.2)
Chile	62 (1.0)	37 (1.4)	79 (0.9)	25 (1.2)	59 (1.1)
Chinese Taipei	74 (0.9)	50 (1.1)	72 (1.0)	28 (1.0)	46 (0.8)
Egypt	57 (1.1)	34 (1.0)	58 (1.0)	56 (1.2)	66 (1.0)
England	54 (1.5)	71 (1.4)	53 (1.4)	33 (1.9)	64 (1.1)
Georgia	76 (1.3)	44 (1.5)	73 (1.3)	31 (1.4)	65 (1.0)
Hong Kong SAR	51 (1.3)	64 (1.9)	76 (1.3)	33 (1.2)	65 (1.1)
Hungary	40 (1.1)	58 (1.2)	76 (1.1)	26 (1.3)	49 (1.0)
Iran, Islamic Rep. of	60 (1.4)	40 (1.1)	56 (1.2)	31 (1.0)	57 (1.1)
Ireland	34 (1.2)	35 (2.6)	50 (1.2)	12 (1.2)	39 (1.0)
Israel	64 (1.2)	68 (1.4)	60 (1.2)	32 (1.3)	60 (0.9)
Italy	50 (1.1)	34 (2.1)	75 (1.1)	27 (1.5)	39 (1.1)
Japan	23 (0.8)	16 (0.9)	28 (1.0)	5 (0.5)	32 (0.8)
Jordan	65 (1.1)	42 (1.2)	70 (1.3)	49 (1.2)	65 (1.0)
Kazakhstan	65 (1.1)	39 (1.5)	76 (0.9)	24 (1.3)	71 (0.9)
Korea, Rep. of	51 (1.0)	43 (1.3)	69 (1.1)	13 (0.7)	49 (0.9)
Kuwait	x x	x x	x x	x x	x x
Lebanon	57 (1.3)	43 (1.7)	77 (1.5)	42 (1.7)	62 (1.4)
Lithuania	52 (1.0)	83 (1.0)	84 (0.7)	29 (1.1)	74 (0.9)
Malaysia	60 (1.1)	27 (1.1)	80 (1.0)	45 (1.2)	73 (1.2)
Malta	45 (0.8)	65 (0.6)	80 (0.6)	35 (0.8)	60 (0.7)
Morocco	47 (1.1)	64 (1.1)	36 (1.2)	64 (1.1)	41 (1.1)
New Zealand	48 (1.4)	61 (2.2)	60 (1.5)	38 (1.8)	58 (1.0)
Norway (9)	52 (1.3)	86 (1.2)	81 (1.1)	34 (1.7)	74 (0.9)
Oman	68 (0.9)	47 (1.0)	80 (0.7)	39 (1.0)	75 (1.0)
Qatar	59 (1.0)	61 (0.8)	66 (0.7)	43 (0.9)	64 (0.8)
Russian Federation	68 (1.0)	49 (1.9)	82 (0.9)	29 (1.5)	74 (0.9)
Saudi Arabia	44 (1.3)	55 (1.8)	39 (1.9)	57 (1.8)	46 (1.5)
Singapore	57 (0.7)	90 (0.5)	84 (0.7)	49 (0.6)	71 (0.7)
Slovenia	68 (1.6)	62 (1.7)	70 (1.2)	27 (1.3)	64 (1.0)
South Africa (9)	59 (1.1)	40 (1.3)	72 (1.1)	43 (1.4)	63 (1.0)
Sweden	67 (1.4)	81 (1.7)	71 (1.5)	47 (1.7)	72 (1.2)
Thailand	81 (0.9)	56 (1.7)	88 (0.7)	46 (1.5)	76 (0.9)
Turkey	54 (0.9)	24 (0.8)	75 (0.9)	19 (0.7)	66 (0.9)
United Arab Emirates	70 (0.6)	69 (0.9)	83 (0.6)	44 (0.8)	75 (0.5)
United States	52 (1.4)	64 (1.7)	61 (1.0)	40 (1.4)	57 (1.0)
International Avg.	56 (0.2)	53 (0.2)	69 (0.2)	36 (0.2)	61 (0.2)
Benchmarking Participants					
Buenos Aires, Argentina	55 (1.5)	56 (2.0)	75 (1.2)	25 (1.7)	51 (1.2)
Ontario, Canada	48 (2.1)	60 (2.6)	77 (1.1)	35 (1.9)	56 (1.6)
Quebec, Canada	43 (1.7)	58 (3.0)	77 (1.3)	28 (1.4)	43 (1.5)
Norway (8)	52 (1.3)	86 (1.2)	72 (1.2)	28 (1.6)	73 (0.9)
Abu Dhabi, UAE	70 (1.2)	58 (2.0)	84 (0.9)	42 (1.6)	72 (0.9)
Dubai, UAE	71 (0.9)	84 (0.6)	83 (0.8)	46 (0.9)	78 (0.8)
Florida, US	63 (2.1)	71 (2.2)	56 (2.1)	42 (2.9)	59 (1.5)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
An "x" indicates data are available for less than 50% of students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 9.12: Weekly Time Students Spend on Assigned Science Homework

Reported by Students

The general/integrated science panel summarizes responses for countries where students are enrolled in science as a single subject. The following panels for biology, chemistry, physics, and earth science summarize responses for countries where students are taught science as separate subjects.

Weekly Time Students Spend on Assigned General/Integrated Science Homework

General/Integrated Science	3 Hours or More		More than 45 Minutes but Less than 3 Hours		45 Minutes or Less	
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
South Africa (9)	15 (0.7)	345 (5.4)	39 (0.8)	374 (6.2)	47 (1.0)	360 (6.4)
Thailand	11 (0.8)	463 (5.8)	48 (1.0)	465 (4.3)	41 (1.2)	446 (4.8)
Malaysia	11 (0.5)	468 (4.9)	47 (0.9)	486 (3.7)	42 (1.0)	463 (5.4)
Botswana (9)	10 (0.6)	363 (6.1)	33 (1.0)	400 (2.9)	57 (1.1)	404 (3.7)
Singapore	9 (0.5)	606 (3.8)	52 (0.9)	609 (2.6)	39 (1.2)	579 (4.9)
Turkey	9 (0.7)	481 (6.3)	39 (1.1)	500 (4.3)	52 (1.3)	497 (4.5)
Egypt	8 (0.5)	355 (5.7)	24 (0.7)	373 (5.1)	68 (0.9)	384 (4.2)
Iran, Islamic Rep. of	7 (0.5)	455 (6.8)	31 (1.0)	468 (4.7)	62 (1.1)	453 (4.3)
Italy	6 (0.5)	492 (7.1)	37 (1.3)	501 (3.1)	57 (1.3)	500 (2.8)
Chinese Taipei	6 (0.5)	582 (6.2)	36 (1.2)	584 (2.8)	58 (1.4)	559 (2.2)
United Arab Emirates	6 (0.3)	464 (5.0)	26 (0.6)	499 (3.2)	68 (0.7)	474 (2.3)
Ireland	5 (0.5)	510 (6.1)	33 (1.2)	539 (3.0)	61 (1.5)	535 (3.1)
Jordan	5 (0.4)	399 (7.2)	25 (0.9)	427 (4.1)	70 (1.0)	437 (3.4)
Bahrain	5 (0.4)	434 (9.1)	18 (0.8)	469 (4.1)	77 (1.0)	472 (2.5)
Qatar	5 (0.4)	436 (10.6)	26 (0.9)	481 (4.9)	69 (0.9)	455 (3.2)
Canada	4 (0.5)	526 (6.9)	23 (1.5)	535 (3.8)	73 (1.8)	527 (2.2)
United States	4 (0.4)	525 (6.6)	22 (1.1)	540 (3.9)	74 (1.3)	531 (2.8)
Hong Kong SAR	4 (0.4)	533 (7.4)	34 (1.3)	549 (3.4)	62 (1.4)	546 (4.6)
Norway (9)	4 (0.5)	475 (7.4)	32 (1.3)	509 (3.5)	64 (1.5)	513 (3.1)
Israel	4 (0.3)	478 (8.9)	18 (0.9)	497 (5.7)	78 (1.0)	515 (3.9)
Australia	3 (0.4)	518 (7.3)	24 (0.9)	529 (3.9)	73 (1.0)	510 (2.7)
Oman	3 (0.3)	407 (11.0)	15 (0.5)	446 (4.4)	82 (0.6)	462 (2.7)
Chile	3 (0.4)	456 (8.8)	26 (1.3)	452 (4.0)	71 (1.4)	458 (3.4)
Saudi Arabia	3 (0.3)	352 (11.8)	14 (0.7)	390 (9.0)	83 (0.8)	405 (4.5)
New Zealand	3 (0.4)	515 (10.5)	23 (1.3)	534 (4.5)	74 (1.6)	510 (3.0)
Kuwait	2 (0.2)	~ ~	12 (0.8)	419 (13.7)	86 (0.9)	413 (4.9)
England	1 (0.2)	~ ~	26 (1.3)	568 (5.0)	72 (1.4)	529 (4.1)
Japan	1 (0.1)	~ ~	15 (1.4)	560 (3.9)	84 (1.5)	576 (2.0)
Korea, Rep. of	1 (0.2)	~ ~	8 (0.7)	546 (5.4)	91 (0.8)	557 (2.3)
International Avg.	5 (0.1)	466 (1.5)	28 (0.2)	491 (0.9)	67 (0.2)	485 (0.7)
Benchmarking Participants Teaching General/Integrated Science						
Buenos Aires, Argentina r	7 (0.8)	392 (10.7)	30 (1.4)	398 (5.4)	63 (1.8)	387 (5.2)
Dubai, UAE	6 (0.4)	524 (8.4)	32 (0.8)	543 (3.3)	63 (1.0)	518 (2.1)
Florida, US	5 (1.3)	517 (18.5)	21 (2.2)	511 (9.4)	73 (3.3)	512 (5.9)
Abu Dhabi, UAE	5 (0.4)	439 (12.3)	24 (1.5)	475 (9.9)	71 (1.7)	455 (4.8)
Ontario, Canada	4 (0.6)	520 (9.8)	23 (2.0)	534 (4.3)	72 (2.4)	524 (2.6)
Quebec, Canada	4 (0.7)	537 (8.3)	24 (1.9)	537 (5.3)	72 (2.3)	533 (4.3)
Norway (8)	4 (0.5)	477 (7.8)	31 (1.5)	492 (3.1)	65 (1.7)	491 (2.8)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

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

Exhibit 9.12: Weekly Time Students Spend on Assigned Science Homework (Continued)

A. How often does your teacher give you homework in <science/biology/chemistry/physics/earth science>?

1) Every day
2) 3 or 4 times a week
3) 1 or 2 times a week
4) Less than once a week
5) Never

B. When your teacher gives you homework in <science/biology/chemistry/physics/earth science>, about how many minutes do you usually spend on your homework?

1) My teacher never gives me homework
2) 1-15 minutes
3) 16-30 minutes
4) 31-60 minutes
5) 61-90 minutes
6) More than 90 minutes

The weekly time spent on <science> homework was calculated by multiplying how often students were given homework weekly by the minutes they spent on that homework.

The values for Part A were: Every day = 5; 3 or 4 times a week = 3.5; 1 or 2 times a week = 1.5; Less than once a week = 0.5; and Never = 0.

The values for Part B were: My teacher never gives me homework = 0; 1-15 minutes = 8; 16-30 minutes = 23; 31-60 minutes = 45; 61-90 minutes = 75; and More than 90 minutes = 105.

Separate Science Panels

Weekly Time Students Spend on Assigned Biology Homework

Biology		3 Hours or More		More than 45 Minutes but Less than 3 Hours		45 Minutes or Less	
Country		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Kazakhstan		22 (1.1)	534 (6.1)	42 (1.0)	537 (5.2)	36 (1.2)	531 (5.0)
Russian Federation		11 (0.8)	534 (8.2)	35 (0.9)	536 (4.3)	54 (1.2)	553 (4.4)
Georgia		8 (0.7)	435 (6.8)	29 (1.2)	457 (4.8)	63 (1.6)	449 (3.3)
Lithuania		5 (0.4)	497 (8.0)	20 (1.0)	508 (3.9)	76 (1.2)	524 (3.0)
Morocco		3 (0.3)	376 (7.3)	20 (0.5)	390 (3.9)	77 (0.7)	401 (2.5)
Lebanon		3 (0.3)	385 (11.4)	16 (0.9)	394 (8.1)	81 (1.0)	405 (5.3)
Malta	s	3 (0.3)	490 (13.5)	20 (0.9)	529 (5.1)	78 (0.9)	490 (2.7)
Hungary		2 (0.2)	~ ~	14 (0.8)	510 (5.8)	84 (0.9)	533 (3.5)
Sweden		1 (0.2)	~ ~	16 (1.2)	518 (7.1)	83 (1.3)	528 (3.2)
Slovenia		1 (0.2)	~ ~	7 (0.7)	526 (5.8)	92 (0.8)	555 (2.4)
International Avg.		6 (0.2)	465 (3.4)	22 (0.3)	490 (1.8)	72 (0.3)	497 (1.2)

Weekly Time Students Spend on Assigned Chemistry Homework

Chemistry		3 Hours or More		More than 45 Minutes but Less than 3 Hours		45 Minutes or Less	
Country		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Kazakhstan		28 (1.3)	536 (6.1)	42 (1.1)	539 (4.8)	30 (1.0)	527 (5.3)
Russian Federation		19 (0.9)	538 (6.2)	45 (1.0)	544 (4.7)	36 (1.3)	550 (4.4)
Georgia		12 (0.8)	438 (5.7)	34 (1.1)	457 (3.9)	54 (1.4)	449 (4.0)
Lithuania		10 (0.8)	498 (5.9)	31 (1.1)	511 (3.8)	59 (1.5)	528 (3.1)
Morocco	r	4 (0.3)	378 (6.8)	20 (0.6)	389 (3.7)	76 (0.6)	400 (2.6)
Lebanon		3 (0.4)	370 (12.2)	20 (0.9)	399 (7.0)	77 (1.0)	404 (5.4)
Hungary		3 (0.3)	502 (8.4)	17 (1.0)	519 (4.7)	80 (1.2)	532 (3.6)
Slovenia		3 (0.4)	522 (9.0)	14 (1.0)	537 (4.6)	84 (1.2)	556 (2.5)
Malta	s	2 (0.3)	~ ~	15 (0.8)	567 (4.8)	82 (0.8)	486 (2.7)
Sweden		1 (0.4)	~ ~	16 (1.1)	517 (6.4)	83 (1.4)	529 (3.4)
International Avg.		9 (0.2)	473 (2.8)	25 (0.3)	498 (1.6)	66 (0.4)	496 (1.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 9.12: Weekly Time Students Spend on Assigned Science Homework (Continued)

Weekly Time Students Spend on Assigned Physics Homework

Physics	3 Hours or More		More than 45 Minutes but Less than 3 Hours		45 Minutes or Less	
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Kazakhstan	28 (1.2)	537 (6.5)	41 (1.0)	539 (4.5)	31 (0.9)	526 (5.7)
Russian Federation	18 (1.1)	535 (7.0)	44 (0.7)	545 (4.5)	38 (1.4)	549 (4.0)
Georgia	15 (0.7)	451 (4.5)	36 (1.0)	455 (4.5)	49 (1.3)	444 (3.9)
Lithuania	10 (0.9)	502 (5.7)	29 (1.3)	514 (4.6)	61 (1.8)	526 (3.1)
Slovenia	5 (0.5)	522 (7.4)	20 (1.2)	541 (4.4)	75 (1.5)	558 (2.4)
Morocco	4 (0.2)	374 (6.6)	21 (0.6)	393 (3.5)	75 (0.6)	400 (2.5)
Malta	4 (0.3)	455 (9.1)	27 (0.8)	499 (3.5)	70 (0.9)	485 (2.0)
Lebanon	4 (0.4)	369 (15.3)	20 (1.0)	397 (6.9)	76 (1.1)	405 (5.4)
Hungary	3 (0.3)	492 (8.2)	16 (1.0)	511 (6.0)	81 (1.2)	533 (3.4)
Sweden	1 (0.2)	~ ~	16 (1.1)	516 (6.4)	83 (1.1)	529 (3.3)
International Avg.	9 (0.2)	471 (2.8)	27 (0.3)	491 (1.6)	64 (0.4)	495 (1.2)

Weekly Time Students Spend on Assigned Earth Science Homework

Earth Science	3 Hours or More		More than 45 Minutes but Less than 3 Hours		45 Minutes or Less	
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Kazakhstan	22 (1.2)	531 (5.6)	39 (1.0)	538 (5.2)	39 (1.1)	533 (5.1)
Russian Federation	10 (0.6)	532 (7.3)	33 (1.1)	536 (4.7)	57 (1.3)	553 (4.4)
Lithuania	8 (0.6)	516 (6.1)	28 (1.0)	514 (3.6)	64 (1.3)	523 (3.2)
Georgia	8 (0.7)	438 (7.0)	24 (0.9)	450 (4.0)	68 (1.2)	452 (3.7)
Morocco	4 (0.3)	376 (7.6)	20 (0.5)	392 (3.6)	77 (0.6)	401 (2.5)
Hungary	2 (0.3)	~ ~	15 (1.0)	513 (6.1)	83 (1.1)	532 (3.5)
Malta r	2 (0.3)	~ ~	9 (0.5)	475 (6.0)	89 (0.6)	482 (1.9)
Slovenia	1 (0.2)	~ ~	6 (0.7)	528 (6.3)	93 (0.8)	554 (2.5)
Lebanon	- -	- -	- -	- -	- -	- -
Sweden	- -	- -	- -	- -	- -	- -
International Avg.	7 (0.2)	479 (3.0)	22 (0.3)	493 (1.8)	71 (0.4)	504 (1.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 9.14: Teaching Limited by Student Needs

Reported by Teachers

Students were scored according to their teachers' responses concerning six needs on the *Teaching Limited by Student Needs* scale. Students with teachers who felt **Not Limited** by student needs had a score on the scale of at least 11.4, which corresponds to their teachers feeling "not at all" limited by three of the six needs and to "some" extent limited by the other three needs, on average. Students with teachers who felt **Very Limited** by student needs had a score no higher than 7.4, which corresponds to their teachers reporting feeling limited "a lot" by three of the six needs and to "some" extent limited by the other three needs, on average. All other students had teachers who felt **Somewhat Limited** by student needs.

Country	Not Limited		Somewhat Limited		Very Limited		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Japan	76 (3.4)	575 (2.1)	24 (3.4)	558 (3.0)	0 (0.0)	~ ~	12.5 (0.15)
Slovenia	46 (2.3)	558 (3.1)	50 (2.3)	546 (2.8)	4 (0.9)	543 (6.5)	11.0 (0.10)
Norway (9)	45 (4.0)	519 (4.5)	52 (4.0)	504 (3.2)	3 (1.2)	475 (10.2)	10.8 (0.14)
Singapore	44 (2.7)	629 (4.1)	55 (2.6)	572 (5.8)	1 (0.5)	~ ~	11.0 (0.09)
Hungary	42 (2.5)	551 (3.3)	50 (2.2)	512 (3.9)	8 (1.6)	481 (11.0)	10.8 (0.13)
England r	42 (3.0)	575 (4.4)	54 (2.9)	517 (5.3)	5 (1.0)	466 (17.1)	10.7 (0.14)
Ireland	41 (3.2)	546 (3.4)	54 (3.3)	533 (3.7)	5 (1.3)	485 (12.9)	10.7 (0.11)
Kazakhstan	41 (3.1)	542 (6.2)	51 (2.8)	526 (5.1)	8 (1.4)	529 (14.1)	10.6 (0.16)
United Arab Emirates r	41 (2.4)	514 (4.6)	55 (2.4)	454 (4.2)	4 (0.9)	443 (19.8)	10.8 (0.09)
Malta	40 (0.5)	506 (2.4)	52 (0.5)	468 (1.9)	8 (0.2)	423 (4.7)	10.6 (0.02)
Hong Kong SAR	38 (5.0)	565 (5.5)	58 (4.9)	533 (5.3)	4 (1.7)	531 (31.3)	10.6 (0.17)
New Zealand	37 (2.9)	552 (5.5)	58 (3.1)	502 (4.7)	5 (1.4)	419 (18.7)	10.5 (0.10)
Sweden	35 (3.6)	537 (5.3)	62 (3.5)	516 (4.3)	3 (1.1)	489 (17.3)	10.6 (0.15)
Australia r	33 (3.1)	540 (5.1)	61 (3.0)	507 (3.3)	6 (1.5)	467 (10.9)	10.5 (0.15)
Russian Federation	30 (2.3)	554 (6.3)	59 (2.9)	540 (4.7)	10 (1.4)	540 (6.2)	10.0 (0.08)
Canada r	30 (3.4)	541 (5.2)	64 (3.9)	523 (3.0)	7 (1.6)	505 (7.9)	10.1 (0.13)
Chinese Taipei	30 (3.4)	593 (4.7)	60 (3.8)	562 (2.7)	10 (2.3)	547 (7.3)	10.0 (0.15)
Lebanon	29 (3.9)	393 (8.3)	67 (4.0)	399 (6.8)	4 (1.1)	415 (25.6)	10.1 (0.12)
Lithuania	26 (2.3)	536 (4.4)	63 (2.3)	516 (3.1)	10 (1.3)	496 (6.2)	10.0 (0.10)
Israel	25 (2.5)	553 (9.9)	57 (3.2)	503 (5.5)	18 (2.4)	462 (9.9)	9.7 (0.12)
Qatar	25 (3.0)	506 (6.2)	67 (3.3)	444 (5.5)	8 (2.0)	398 (15.8)	10.1 (0.11)
Italy	24 (3.4)	508 (6.1)	65 (3.9)	495 (3.2)	11 (2.4)	495 (11.2)	10.0 (0.13)
Oman	22 (3.0)	473 (5.0)	58 (3.5)	454 (4.0)	20 (2.1)	439 (6.9)	9.6 (0.13)
Korea, Rep. of	22 (3.6)	561 (5.2)	64 (3.7)	555 (2.5)	14 (2.5)	548 (4.0)	9.8 (0.17)
Thailand	21 (3.1)	485 (8.0)	74 (2.9)	450 (5.1)	5 (1.8)	424 (17.0)	10.0 (0.12)
Malaysia	20 (2.6)	522 (7.0)	72 (3.0)	460 (5.5)	8 (2.1)	414 (21.6)	9.8 (0.11)
Georgia	19 (1.5)	453 (4.1)	76 (1.7)	442 (3.4)	6 (1.1)	438 (7.0)	9.8 (0.07)
Saudi Arabia	19 (3.2)	420 (13.9)	71 (3.9)	390 (5.2)	10 (2.5)	396 (9.2)	9.5 (0.13)
United States r	18 (2.2)	556 (6.6)	74 (2.4)	532 (3.4)	9 (1.5)	493 (13.7)	9.7 (0.10)
Kuwait	18 (2.5)	426 (15.6)	75 (3.1)	406 (6.4)	8 (2.0)	400 (10.4)	9.8 (0.12)
Bahrain	15 (2.0)	503 (11.8)	73 (3.0)	458 (3.3)	12 (2.4)	453 (8.2)	9.6 (0.10)
Egypt	14 (2.6)	382 (12.0)	71 (3.6)	372 (5.1)	15 (2.6)	353 (14.4)	9.3 (0.12)
Iran, Islamic Rep. of	13 (2.3)	490 (12.4)	65 (3.7)	456 (4.8)	22 (2.9)	440 (7.6)	9.0 (0.12)
Chile	12 (2.8)	502 (12.7)	67 (4.5)	462 (4.5)	21 (3.7)	413 (5.5)	8.9 (0.14)
Jordan	12 (2.4)	469 (9.6)	76 (3.4)	424 (3.7)	12 (2.4)	400 (9.9)	9.4 (0.11)
Botswana (9)	11 (2.7)	413 (12.1)	79 (3.7)	392 (3.4)	9 (2.7)	382 (8.4)	9.4 (0.12)
South Africa (9)	11 (2.0)	410 (24.2)	72 (3.0)	353 (7.0)	17 (2.5)	346 (11.3)	9.2 (0.10)
Turkey	11 (2.2)	542 (11.3)	64 (3.5)	497 (4.8)	25 (2.8)	462 (6.4)	8.9 (0.12)
Morocco	8 (1.1)	425 (8.7)	68 (2.1)	393 (2.8)	24 (2.0)	384 (3.2)	8.8 (0.07)
International Avg.	28 (0.5)	511 (1.4)	62 (0.5)	480 (0.7)	10 (0.3)	454 (2.2)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

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

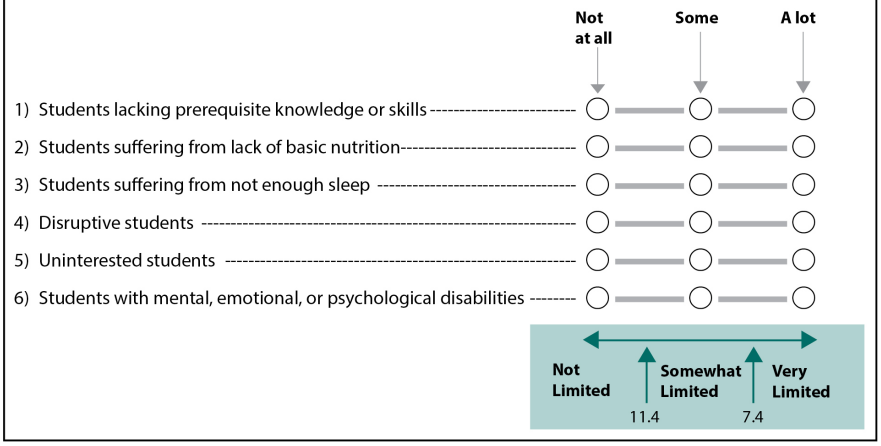
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students. An "x" indicates data are available for less than 50% of students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 9.14: Teaching Limited by Student Needs (Continued)

Country		Not Limited		Somewhat Limited		Very Limited		Average Scale Score
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Benchmarking Participants								
Dubai, UAE	r	59 (2.2)	544 (3.9)	40 (2.1)	491 (5.4)	1 (0.6)	~ ~	11.7 (0.09)
Norway (8)		37 (3.3)	499 (3.4)	59 (3.6)	488 (2.9)	4 (1.2)	449 (14.2)	10.7 (0.15)
Quebec, Canada		36 (5.0)	540 (10.8)	56 (6.1)	521 (6.5)	8 (3.0)	523 (12.6)	10.3 (0.22)
Abu Dhabi, UAE	r	35 (4.2)	487 (12.2)	60 (4.5)	436 (6.2)	5 (2.0)	438 (38.7)	10.3 (0.20)
Ontario, Canada	r	25 (4.2)	540 (4.0)	68 (4.4)	524 (3.3)	7 (1.9)	491 (6.6)	10.0 (0.16)
Florida, US	s	23 (7.2)	529 (23.7)	64 (6.4)	521 (9.2)	13 (4.3)	486 (20.0)	9.7 (0.27)
Buenos Aires, Argentina		x x	x x	x x	x x	x x	x x	x x

In your view, to what extent do the following limit how you teach this class?



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 9.16: Frequency of Student Absences

Reported by Students

Country	Never or Almost Never		Once a Month		Once Every Two Weeks		Once a Week or More	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Korea, Rep. of	96 (0.3)	558 (2.2)	3 (0.2)	486 (8.7)	1 (0.1)	~ ~	0 (0.1)	~ ~
Chinese Taipei	89 (0.6)	574 (1.9)	8 (0.5)	551 (5.9)	1 (0.2)	~ ~	2 (0.2)	~ ~
Japan	87 (0.6)	575 (1.8)	8 (0.5)	558 (4.0)	3 (0.3)	526 (9.2)	2 (0.2)	~ ~
Hong Kong SAR	87 (0.8)	550 (3.8)	9 (0.5)	538 (4.5)	2 (0.3)	~ ~	2 (0.3)	~ ~
Singapore	82 (0.7)	609 (2.8)	12 (0.5)	568 (5.3)	3 (0.2)	518 (8.9)	3 (0.3)	472 (10.0)
Thailand	71 (1.0)	471 (4.4)	13 (0.6)	436 (5.1)	6 (0.4)	421 (6.1)	9 (0.6)	395 (5.3)
Morocco	70 (0.6)	405 (2.4)	17 (0.4)	376 (3.2)	5 (0.3)	362 (6.9)	8 (0.3)	354 (5.7)
Iran, Islamic Rep. of	70 (1.0)	467 (4.0)	22 (0.9)	444 (5.2)	4 (0.3)	413 (8.5)	4 (0.3)	386 (8.0)
Norway (9)	69 (0.9)	516 (2.7)	22 (0.8)	501 (4.3)	6 (0.4)	500 (5.7)	2 (0.3)	~ ~
England	69 (1.0)	549 (3.8)	24 (0.8)	525 (4.9)	5 (0.4)	505 (7.8)	3 (0.3)	444 (9.5)
South Africa (9)	66 (1.0)	376 (5.9)	17 (0.6)	353 (7.2)	5 (0.3)	312 (9.4)	12 (0.6)	293 (4.3)
Lebanon	66 (1.2)	418 (5.2)	18 (0.7)	386 (6.9)	6 (0.6)	354 (10.5)	10 (0.6)	333 (7.4)
Malta	66 (0.9)	508 (2.1)	23 (0.7)	461 (3.4)	6 (0.4)	419 (7.1)	5 (0.4)	365 (8.1)
Sweden	65 (1.1)	535 (3.2)	23 (0.9)	512 (5.2)	8 (0.6)	507 (6.1)	5 (0.6)	457 (9.4)
Botswana (9)	64 (0.8)	422 (2.8)	19 (0.6)	374 (4.3)	5 (0.3)	270 (8.6)	13 (0.4)	329 (5.2)
Ireland	63 (0.9)	543 (2.9)	27 (0.8)	520 (3.8)	7 (0.4)	497 (6.2)	3 (0.3)	445 (8.5)
United Arab Emirates	62 (0.6)	495 (2.3)	21 (0.4)	477 (3.3)	8 (0.3)	436 (4.5)	9 (0.3)	394 (3.9)
Lithuania	62 (1.1)	523 (3.2)	25 (0.9)	521 (3.9)	9 (0.6)	514 (5.4)	4 (0.4)	466 (8.7)
United States	62 (0.8)	539 (2.9)	26 (0.6)	529 (3.1)	8 (0.3)	512 (3.9)	4 (0.3)	447 (6.3)
Chile	60 (1.2)	461 (3.2)	21 (0.8)	456 (4.4)	10 (0.5)	459 (4.7)	8 (0.6)	401 (6.5)
Canada	60 (0.8)	534 (2.3)	27 (0.7)	526 (2.4)	9 (0.4)	517 (3.4)	4 (0.3)	472 (6.5)
Australia	59 (0.8)	525 (2.6)	28 (0.8)	510 (3.4)	9 (0.4)	495 (3.8)	5 (0.3)	438 (6.1)
Russian Federation	58 (1.2)	550 (4.5)	23 (0.9)	543 (4.6)	12 (0.7)	538 (5.9)	6 (0.5)	506 (8.9)
Turkey	58 (1.0)	519 (4.1)	27 (0.7)	478 (4.0)	9 (0.5)	452 (6.2)	6 (0.4)	400 (7.4)
Oman	57 (0.9)	472 (2.5)	25 (0.7)	451 (3.9)	6 (0.4)	405 (7.1)	12 (0.5)	409 (4.2)
Kazakhstan	57 (1.3)	541 (4.8)	30 (1.2)	527 (5.1)	9 (0.6)	510 (7.8)	5 (0.4)	503 (10.5)
Slovenia	57 (1.0)	557 (2.9)	32 (0.9)	552 (3.0)	8 (0.5)	531 (5.6)	3 (0.4)	505 (9.9)
Italy	55 (1.0)	510 (2.8)	27 (0.8)	500 (3.2)	13 (0.7)	476 (4.4)	5 (0.5)	431 (8.2)
Jordan	52 (1.0)	453 (3.2)	30 (0.8)	421 (3.9)	9 (0.4)	391 (6.4)	9 (0.5)	347 (7.3)
Israel	50 (1.0)	528 (3.9)	30 (0.8)	508 (4.2)	12 (0.5)	486 (6.2)	8 (0.6)	422 (8.4)
Qatar	47 (0.8)	497 (3.7)	31 (0.7)	452 (3.3)	11 (0.5)	399 (5.2)	11 (0.4)	355 (6.7)
Bahrain	45 (0.8)	496 (2.8)	32 (0.7)	464 (2.9)	12 (0.5)	427 (4.8)	12 (0.4)	394 (5.4)
Malaysia	45 (1.2)	498 (4.0)	26 (0.6)	473 (4.8)	11 (0.6)	445 (6.3)	18 (0.8)	420 (5.6)
Hungary	43 (0.9)	553 (3.2)	45 (0.9)	520 (4.2)	9 (0.5)	485 (5.9)	4 (0.4)	426 (8.8)
Egypt	40 (1.2)	390 (5.1)	20 (0.6)	368 (5.5)	15 (0.7)	360 (5.9)	24 (1.0)	353 (5.8)
Kuwait	37 (1.4)	460 (7.3)	28 (1.0)	416 (5.7)	18 (0.7)	376 (6.2)	18 (1.0)	338 (7.7)
Georgia	33 (1.2)	466 (4.2)	38 (1.1)	446 (3.2)	19 (0.9)	435 (4.8)	11 (0.7)	384 (5.7)
Saudi Arabia	32 (1.3)	424 (6.3)	28 (0.8)	399 (4.6)	20 (0.8)	385 (5.2)	20 (1.2)	361 (6.1)
New Zealand	- -	- -	- -	- -	- -	- -	- -	- -
International Avg.	61 (0.2)	502 (0.6)	23 (0.1)	477 (0.7)	8 (0.1)	447 (1.1)	8 (0.1)	407 (1.3)
Benchmarking Participants								
Norway (8)	71 (0.9)	493 (2.5)	22 (0.7)	491 (3.6)	5 (0.4)	472 (7.8)	2 (0.2)	~ ~
Quebec, Canada	71 (1.1)	536 (4.1)	21 (1.0)	531 (4.5)	6 (0.6)	519 (7.4)	2 (0.4)	~ ~
Dubai, UAE	65 (0.9)	540 (2.3)	22 (0.9)	519 (4.0)	6 (0.4)	489 (5.4)	7 (0.5)	443 (6.0)
Abu Dhabi, UAE	60 (1.1)	477 (5.2)	21 (0.8)	456 (8.5)	9 (0.6)	409 (7.0)	11 (0.6)	368 (7.3)
Ontario, Canada	55 (0.9)	533 (2.5)	29 (0.8)	525 (2.9)	11 (0.6)	515 (4.0)	4 (0.3)	468 (8.2)
Florida, US	53 (1.1)	520 (6.1)	28 (0.9)	515 (6.6)	12 (0.8)	492 (8.4)	7 (0.9)	437 (8.2)
Buenos Aires, Argentina	48 (1.1)	398 (5.3)	23 (0.9)	404 (5.3)	16 (0.8)	378 (6.4)	13 (1.0)	321 (7.1)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

TIMSS 2015

CHAPTER 10: STUDENT ENGAGEMENT AND ATTITUDES

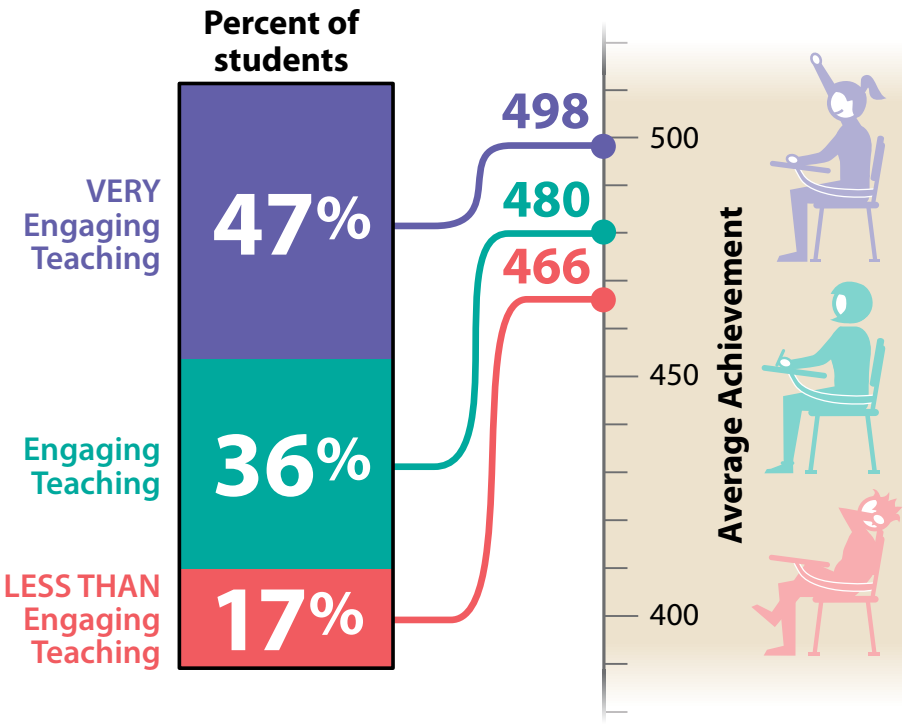
TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

IEA
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

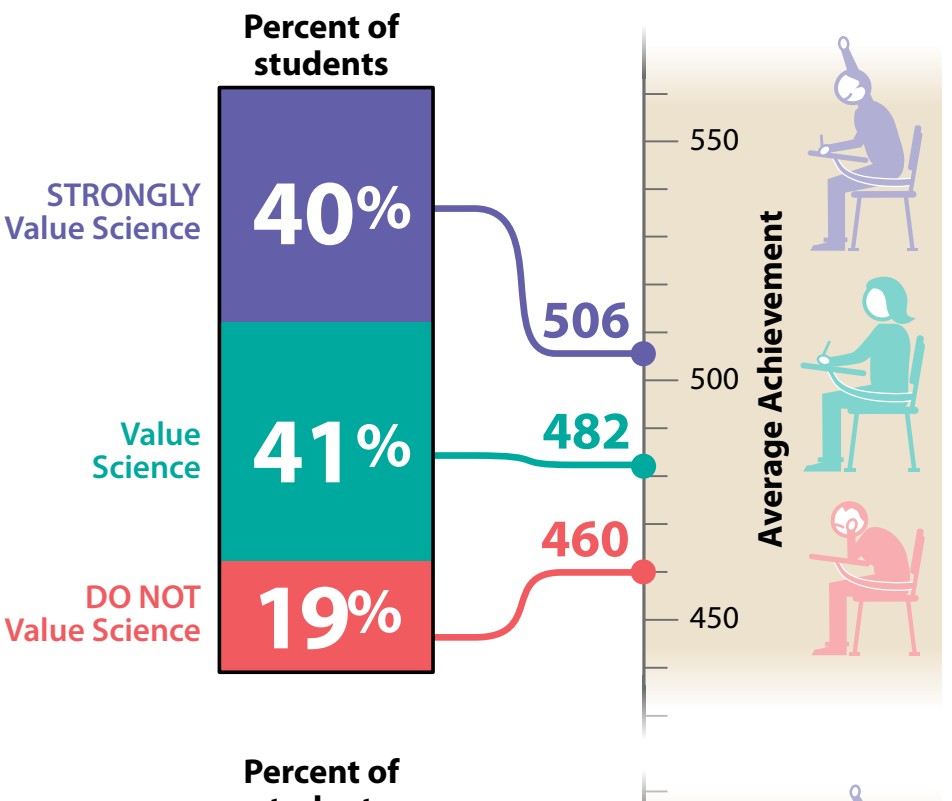
Students' Attitudes Toward Science

The eighth grade students were positive about their teaching and about learning science. They were also positive about valuing science. They were less positive about their confidence in science.

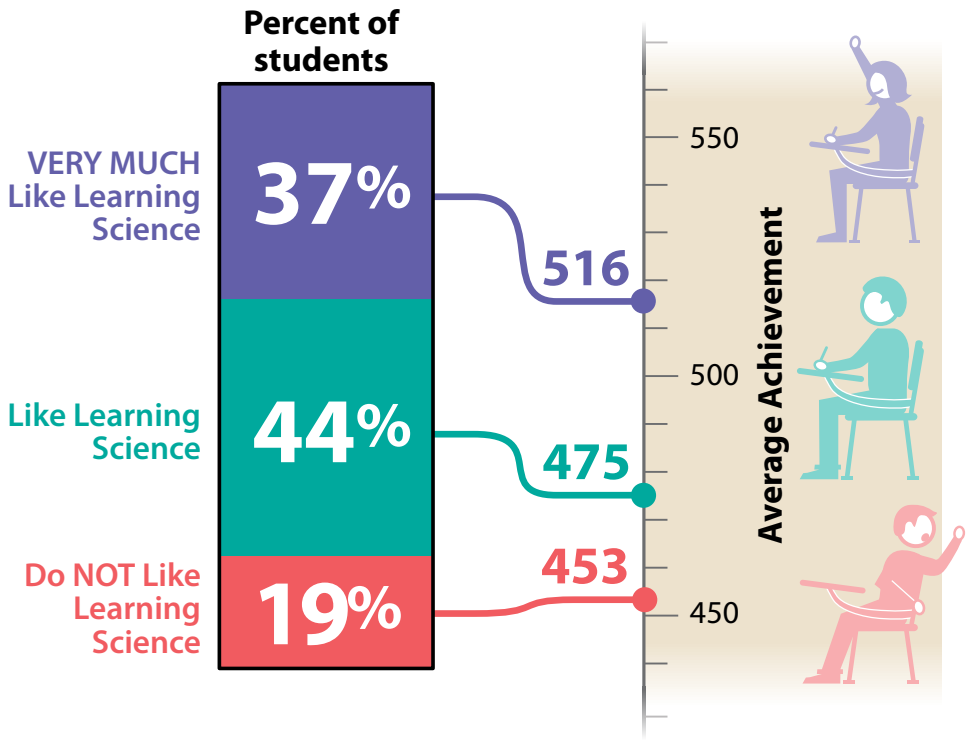
Most students study science as a general/integrated subject (83%), were positive about their instruction—47% reported VERY engaging teaching and 36% engaging teaching. Students studying separate science subjects were equally positive about their instructors.



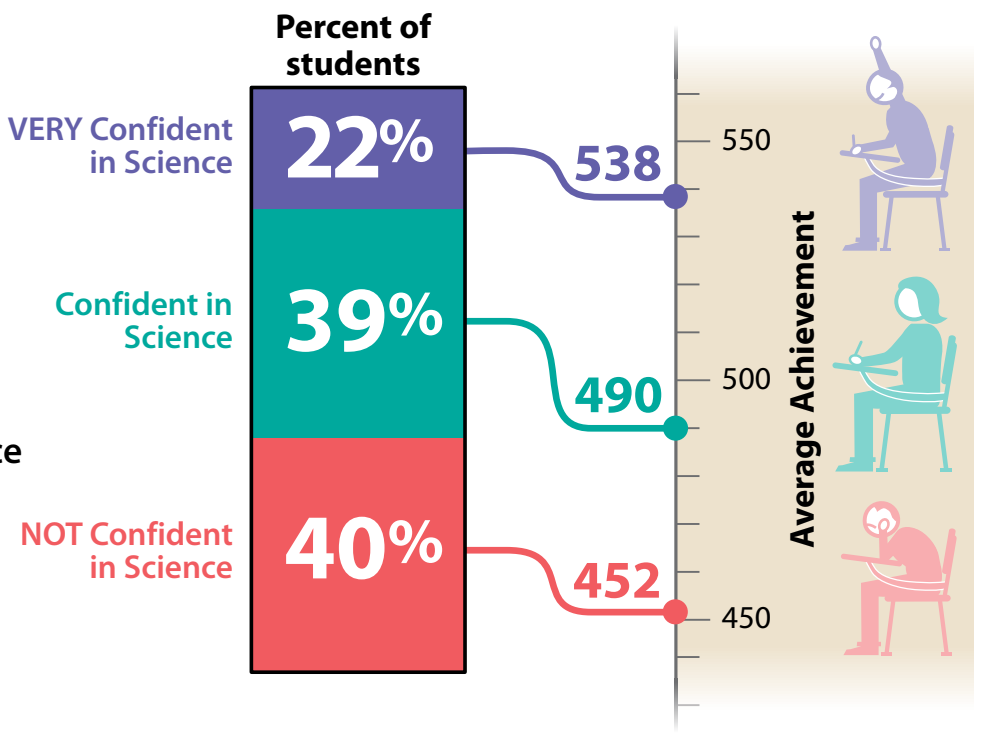
Most students (81%) STRONGLY valued or valued science.



The majority of students (81%) VERY MUCH liked or liked learning science. Students studying separate science subjects liked learning physics less than the other science subjects.



The majority of students (61%) were VERY confident or confident in science, but 40% were NOT confident. Students studying separate science subjects were less confident about physics.



Trends 2011-2015: 24 Countries—General/Integrated Science

Between 2011 and 2015, there were more increases than decreases in students' attitudes.

- The scale average for *Students Value Science* increased in **10** countries and decreased in **1** country.
- The scale average for *Students Like Learning Science* increased in **10** countries and decreased in **1** country.
- The scale average for *Students Confident in Science* increased in **6** countries and decreased in **3** countries.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.
http://timss2015.org/download-center/

IEA TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 10.2: Students' Views on Engaging Teaching in Science Lessons

Reported by Students

The general/integrated science panel summarizes responses for countries where students are enrolled in science as a single subject. The following panels for biology, chemistry, physics, and earth science summarize responses for countries where students are taught science as separate subjects.

For general/integrated science, students were scored according to their degree of agreement with ten statements on the *Students' Views on Engaging Teaching in Science Lessons* scale. Students who experienced **Very Engaging Teaching** in science lessons had a score on the scale of at least 10.2, which corresponds to their "agreeing a lot" with five of the ten statements and "agreeing a little" with the other five, on average. Students who experienced teaching that was **Less than Engaging** had a score no higher than 8.1, which corresponds to their "disagreeing a little" with five of the ten statements and "agreeing a little" with the other five, on average. All other students experienced **Engaging Teaching** in science lessons. For biology, chemistry, physics, and earth science, a comparable procedure was used.

Engaging Teaching in General/Integrated Science

General/Integrated Science	Very Engaging Teaching		Engaging Teaching		Less than Engaging Teaching		Average Scale Score
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Jordan	71 (1.2)	439 (3.4)	21 (0.8)	412 (3.9)	7 (0.6)	398 (8.0)	11.1 (0.05)
Egypt	69 (1.2)	390 (4.1)	24 (0.9)	343 (5.8)	7 (0.5)	331 (7.5)	10.9 (0.05)
Turkey	67 (1.4)	505 (3.7)	25 (0.9)	475 (6.6)	8 (0.8)	464 (6.3)	10.7 (0.06)
Oman	65 (1.0)	468 (2.8)	28 (0.9)	439 (3.2)	7 (0.5)	422 (6.3)	10.7 (0.04)
Kuwait	63 (1.3)	419 (5.5)	27 (0.9)	405 (6.7)	10 (1.0)	385 (9.4)	10.6 (0.06)
Iran, Islamic Rep. of	61 (1.3)	461 (4.4)	29 (0.9)	450 (4.5)	10 (0.7)	452 (7.3)	10.6 (0.06)
South Africa (9)	59 (1.2)	365 (5.3)	32 (0.8)	350 (6.8)	9 (0.6)	365 (9.3)	10.5 (0.04)
Saudi Arabia	57 (1.7)	411 (5.0)	30 (1.1)	389 (5.6)	13 (1.1)	370 (8.7)	10.4 (0.08)
Botswana (9)	56 (1.3)	415 (2.6)	32 (0.9)	370 (4.1)	11 (0.7)	383 (7.7)	10.4 (0.06)
Bahrain	54 (1.1)	482 (2.5)	31 (0.7)	457 (4.0)	15 (0.8)	441 (6.4)	10.3 (0.05)
Chile	51 (1.7)	460 (3.7)	34 (1.0)	451 (3.7)	15 (1.0)	446 (4.6)	10.2 (0.07)
United States	51 (1.0)	539 (2.9)	32 (0.7)	529 (3.2)	17 (0.9)	515 (4.5)	10.2 (0.05)
Thailand	50 (1.2)	461 (4.1)	42 (0.9)	452 (4.8)	8 (0.6)	451 (8.2)	10.2 (0.04)
Qatar	49 (1.3)	478 (3.8)	33 (0.9)	454 (4.0)	18 (1.0)	418 (5.1)	10.1 (0.06)
Malaysia	49 (1.4)	489 (3.5)	42 (1.0)	467 (4.8)	9 (0.8)	408 (10.4)	10.2 (0.05)
United Arab Emirates	47 (1.0)	495 (3.0)	38 (0.7)	469 (2.9)	15 (0.6)	451 (4.2)	10.1 (0.04)
Canada	45 (1.5)	535 (2.5)	39 (0.8)	525 (2.6)	16 (1.2)	518 (4.1)	10.0 (0.07)
Israel	45 (1.3)	517 (4.5)	31 (0.8)	512 (4.5)	23 (1.1)	489 (5.2)	9.8 (0.07)
Ireland	45 (1.4)	545 (2.9)	34 (0.9)	535 (3.3)	21 (1.3)	509 (4.6)	9.8 (0.07)
New Zealand	42 (1.4)	527 (3.5)	40 (0.8)	509 (3.6)	18 (0.9)	492 (5.4)	9.9 (0.06)
Australia	38 (1.3)	534 (2.9)	39 (0.9)	507 (2.9)	22 (1.0)	490 (4.9)	9.6 (0.06)
England	38 (1.3)	545 (4.1)	42 (0.8)	540 (4.3)	20 (1.1)	522 (5.9)	9.7 (0.06)
Italy	37 (1.5)	500 (3.0)	44 (0.9)	501 (2.9)	18 (1.1)	495 (4.4)	9.6 (0.06)
Singapore	35 (0.9)	606 (4.1)	52 (0.7)	595 (3.3)	13 (0.8)	578 (5.2)	9.8 (0.04)
Norway (9)	35 (1.6)	521 (3.5)	43 (1.2)	509 (3.4)	23 (1.6)	495 (4.4)	9.5 (0.08)
Hong Kong SAR	34 (1.5)	557 (3.9)	48 (0.9)	545 (4.4)	17 (1.3)	526 (7.2)	9.6 (0.08)
Chinese Taipei	21 (1.0)	591 (3.4)	48 (1.0)	573 (2.6)	31 (1.3)	549 (3.1)	9.0 (0.05)
Japan	11 (0.7)	592 (3.6)	46 (1.4)	581 (2.2)	43 (1.7)	555 (2.4)	8.4 (0.05)
Korea, Rep. of	10 (0.6)	604 (5.0)	47 (1.2)	567 (2.3)	43 (1.5)	533 (2.8)	8.4 (0.05)
International Avg.	47 (0.2)	498 (0.7)	36 (0.2)	480 (0.8)	17 (0.2)	464 (1.2)	
Benchmarking Participants Teaching General/Integrated Science							
Dubai, UAE	50 (1.3)	535 (2.8)	36 (1.1)	519 (3.5)	14 (0.5)	507 (4.9)	10.2 (0.05)
Florida, US	50 (2.3)	521 (6.5)	31 (1.4)	503 (6.9)	19 (1.6)	495 (8.5)	10.2 (0.10)
Buenos Aires, Argentina	49 (1.6)	391 (5.5)	33 (1.0)	392 (5.3)	18 (1.3)	384 (6.9)	10.0 (0.08)
Ontario, Canada	49 (1.8)	532 (2.9)	35 (1.0)	520 (2.7)	17 (1.6)	517 (5.2)	10.1 (0.09)
Abu Dhabi, UAE	45 (2.3)	473 (7.8)	39 (1.3)	447 (4.9)	16 (1.5)	434 (8.8)	10.0 (0.10)
Norway (8)	44 (1.3)	497 (2.9)	40 (1.0)	487 (2.8)	16 (1.0)	479 (4.2)	9.9 (0.05)
Quebec, Canada	38 (2.3)	541 (4.3)	47 (1.3)	531 (4.5)	15 (1.9)	522 (7.4)	9.8 (0.10)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

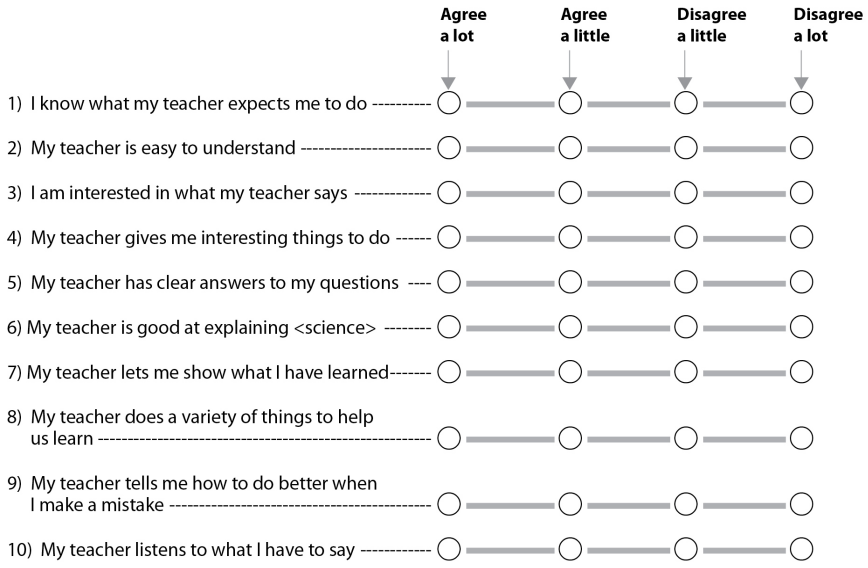
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70% but less than 85% of the students.

Exhibit 10.2: Students' Views on Engaging Teaching in Science Lessons (Continued)

How much do you agree with these statements about your <science/biology/chemistry/physics/earth science> lessons?



	Very Engaging Teaching	Engaging Teaching	Less than Engaging Teaching
For General/ Integrated Science	10.2		8.1
For Biology	10.0		7.7
For Chemistry	10.2		8.1
For Physics	10.3		8.1
For Earth Science	10.2		8.0

Separate Science Panels

Engaging Teaching in Biology

Biology	Very Engaging Teaching		Engaging Teaching		Less than Engaging Teaching		Average Scale Score
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Morocco	65 (1.3)	399 (2.6)	26 (0.9)	387 (3.8)	9 (0.7)	395 (4.7)	10.5 (0.06)
Lebanon	65 (1.5)	417 (5.0)	25 (1.2)	389 (7.2)	10 (0.8)	371 (10.6)	10.7 (0.07)
Georgia	60 (1.2)	457 (3.2)	35 (1.0)	434 (4.3)	4 (0.5)	416 (9.8)	10.7 (0.05)
Malta	59 (1.4)	548 (3.0)	27 (1.3)	518 (5.8)	13 (1.0)	490 (7.2)	10.3 (0.06)
Russian Federation	53 (1.6)	547 (4.6)	39 (1.3)	543 (4.7)	8 (0.7)	539 (5.9)	10.2 (0.06)
Kazakhstan	53 (1.7)	543 (4.7)	44 (1.5)	524 (5.5)	3 (0.5)	516 (10.1)	10.4 (0.07)
Hungary	45 (1.4)	533 (4.2)	42 (1.1)	520 (3.9)	13 (1.0)	535 (7.7)	9.8 (0.06)
Lithuania	41 (1.5)	516 (4.0)	42 (1.0)	519 (2.7)	17 (1.4)	529 (5.5)	9.5 (0.08)
Sweden	30 (1.5)	534 (4.9)	49 (1.2)	527 (3.8)	21 (1.6)	513 (4.8)	9.1 (0.07)
Slovenia	25 (1.4)	555 (3.5)	54 (1.1)	551 (2.8)	21 (1.6)	551 (3.4)	9.0 (0.08)
International Avg.	50 (0.5)	505 (1.3)	38 (0.4)	491 (1.5)	12 (0.3)	485 (2.3)	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 10.2: Students' Views on Engaging Teaching in Science Lessons (Continued)

Engaging Teaching in Chemistry

Chemistry	Very Engaging Teaching		Engaging Teaching		Less than Engaging Teaching		Average Scale Score
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Lebanon	66 (1.7)	415 (4.7)	22 (1.1)	380 (8.1)	12 (1.2)	377 (11.8)	10.8 (0.09)
Morocco	60 (1.2)	401 (3.0)	29 (0.9)	389 (3.5)	11 (0.6)	389 (4.5)	10.5 (0.05)
Malta r	55 (1.6)	578 (3.6)	29 (1.5)	558 (6.0)	16 (1.2)	542 (8.5)	10.4 (0.07)
Georgia	54 (1.5)	459 (3.7)	36 (1.3)	436 (4.0)	10 (0.9)	420 (6.4)	10.5 (0.06)
Russian Federation	50 (2.0)	552 (4.5)	36 (1.1)	541 (4.9)	14 (1.4)	527 (5.3)	10.2 (0.09)
Kazakhstan	49 (1.4)	547 (5.1)	46 (1.2)	523 (5.2)	5 (0.5)	514 (7.8)	10.4 (0.05)
Lithuania	41 (1.8)	525 (3.3)	36 (1.0)	512 (2.9)	23 (1.8)	520 (6.3)	9.7 (0.10)
Hungary	32 (1.4)	534 (5.3)	42 (1.1)	522 (3.9)	27 (1.4)	530 (4.6)	9.3 (0.07)
Sweden	27 (1.6)	536 (5.1)	49 (1.1)	529 (3.7)	23 (1.6)	513 (4.8)	9.3 (0.07)
Slovenia	26 (1.2)	570 (3.6)	52 (1.1)	551 (2.8)	22 (1.3)	534 (3.7)	9.3 (0.06)
International Avg.	46 (0.5)	512 (1.3)	38 (0.4)	494 (1.5)	16 (0.4)	487 (2.1)	

Engaging Teaching in Physics

Physics	Very Engaging Teaching		Engaging Teaching		Less than Engaging Teaching		Average Scale Score
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Lebanon	64 (1.6)	416 (4.7)	23 (0.9)	384 (7.3)	13 (1.2)	386 (12.0)	10.7 (0.08)
Morocco	61 (1.2)	402 (2.5)	29 (0.8)	385 (3.8)	11 (0.6)	395 (4.7)	10.6 (0.05)
Malta	51 (1.0)	513 (2.4)	32 (0.9)	487 (3.8)	17 (0.7)	454 (4.7)	10.2 (0.04)
Georgia	51 (1.3)	458 (3.2)	37 (0.9)	436 (4.9)	13 (1.3)	438 (5.7)	10.4 (0.07)
Russian Federation	49 (1.4)	553 (4.7)	39 (0.9)	541 (4.5)	12 (1.0)	524 (5.1)	10.3 (0.07)
Kazakhstan	48 (1.5)	548 (4.9)	48 (1.5)	523 (5.3)	5 (0.5)	518 (7.5)	10.4 (0.05)
Lithuania	36 (1.8)	530 (4.7)	39 (1.0)	513 (3.3)	25 (1.9)	512 (4.6)	9.6 (0.10)
Hungary	36 (1.6)	538 (4.5)	42 (1.1)	520 (4.1)	22 (1.4)	527 (5.4)	9.6 (0.07)
Sweden	28 (1.5)	535 (5.2)	49 (1.1)	529 (3.6)	23 (1.5)	513 (5.5)	9.4 (0.07)
Slovenia	21 (1.1)	568 (4.3)	51 (1.0)	549 (2.9)	28 (1.6)	544 (3.3)	9.0 (0.07)
International Avg.	44 (0.5)	506 (1.3)	39 (0.3)	487 (1.4)	17 (0.4)	481 (2.0)	

Engaging Teaching in Earth Science

Earth Science	Very Engaging Teaching		Engaging Teaching		Less than Engaging Teaching		Average Scale Score
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Morocco	61 (1.2)	400 (2.9)	30 (0.9)	388 (3.2)	10 (0.8)	393 (4.9)	10.5 (0.05)
Georgia	58 (1.2)	455 (3.6)	35 (1.1)	439 (3.9)	7 (0.5)	408 (9.1)	10.6 (0.05)
Kazakhstan	49 (1.4)	544 (4.7)	47 (1.3)	525 (5.7)	4 (0.4)	532 (11.2)	10.5 (0.05)
Russian Federation	48 (1.7)	546 (4.8)	40 (1.1)	546 (4.7)	12 (1.2)	536 (6.1)	10.2 (0.08)
Lithuania	46 (1.6)	526 (4.2)	37 (1.1)	513 (3.0)	17 (1.4)	516 (4.5)	9.9 (0.08)
Malta	36 (0.9)	492 (3.9)	37 (0.8)	477 (3.5)	27 (0.9)	465 (3.9)	9.4 (0.05)
Hungary	36 (1.6)	532 (4.8)	43 (1.0)	523 (4.0)	21 (1.6)	531 (5.2)	9.5 (0.08)
Slovenia	26 (1.4)	555 (4.1)	53 (1.0)	552 (2.7)	21 (1.6)	546 (3.3)	9.2 (0.08)
Lebanon	- -	- -	- -	- -	- -	- -	- -
Sweden	- -	- -	- -	- -	- -	- -	- -
International Avg.	45 (0.5)	506 (1.5)	40 (0.4)	496 (1.4)	15 (0.4)	491 (2.3)	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 10.4: Students Like Learning Science

Reported by Students

The general/integrated science panel summarizes responses for countries where students are enrolled in science as a single subject. The following panels for biology, chemistry, physics, and earth science summarize responses for countries where students are taught science as separate subjects.

For general/integrated science, students were scored according to their degree of agreement with nine statements on the *Students Like Learning Science* scale. Students who **Very Much Like Learning Science** had a score on the scale of at least 10.7, which corresponds to their "agreeing a lot" with five of the nine statements and "agreeing a little" with the other four, on average. Students who **Do Not Like Learning Science** had a score no higher than 8.3, which corresponds to their "disagreeing a little" with five of the nine statements and "agreeing a little" with the other four, on average. All other students **Like Learning Science**. For biology, chemistry, physics, and earth science, a comparable procedure was used.

Students Like Learning General/Integrated Science

General/Integrated Science	Very Much Like Learning Science		Like Learning Science		Do Not Like Learning Science		Average Scale Score	Difference in Average Scale Score from 2011	
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement			
Botswana (9)	57 (1.1)	432 (2.5)	36 (0.9)	353 (3.7)	7 (0.4)	333 (9.6)	11.1 (0.05)	0.1 (0.07)	
Jordan	53 (1.3)	453 (3.2)	37 (0.9)	405 (4.2)	9 (0.8)	397 (6.8)	11.0 (0.06)	0.4 (0.08)	▲
Turkey	52 (1.3)	514 (4.2)	38 (0.9)	474 (4.6)	10 (0.7)	467 (6.4)	10.8 (0.06)	0.1 (0.07)	
Malaysia	51 (1.3)	498 (3.2)	42 (1.0)	454 (5.0)	7 (0.7)	389 (10.3)	10.9 (0.06)	0.5 (0.09)	▲
Oman	51 (1.0)	480 (2.5)	41 (0.8)	434 (3.1)	8 (0.5)	423 (5.1)	10.9 (0.04)	0.2 (0.06)	▲
Egypt	49 (1.5)	416 (4.0)	43 (1.2)	336 (4.7)	8 (0.5)	322 (8.2)	10.8 (0.06)	◊ ◊	
Kuwait	48 (1.3)	433 (5.4)	39 (1.1)	396 (7.1)	13 (0.9)	380 (8.2)	10.7 (0.06)	◊ ◊	
Iran, Islamic Rep. of	48 (1.2)	475 (4.6)	41 (0.8)	440 (4.1)	11 (0.7)	442 (5.8)	10.7 (0.06)	-0.1 (0.07)	
South Africa (9)	46 (1.1)	382 (5.6)	42 (0.8)	341 (6.1)	12 (0.7)	345 (10.0)	10.6 (0.05)	0.2 (0.07)	▲
United Arab Emirates	42 (0.8)	515 (2.6)	43 (0.5)	456 (3.2)	16 (0.6)	441 (3.2)	10.4 (0.04)	0.1 (0.06)	
Bahrain	41 (1.1)	501 (3.0)	41 (0.9)	450 (3.2)	18 (0.9)	432 (5.6)	10.4 (0.05)	0.5 (0.07)	▲
Saudi Arabia	41 (1.7)	430 (5.1)	40 (1.0)	381 (5.6)	19 (1.3)	370 (5.5)	10.3 (0.09)	-0.1 (0.11)	
Singapore	38 (0.8)	622 (3.8)	47 (0.8)	588 (3.3)	15 (0.6)	558 (4.5)	10.3 (0.04)	0.1 (0.05)	
Qatar	38 (1.1)	507 (3.2)	43 (1.1)	439 (3.6)	19 (0.9)	411 (4.8)	10.2 (0.05)	0.1 (0.08)	
Thailand	37 (1.3)	477 (4.4)	55 (1.1)	445 (4.3)	8 (0.6)	434 (6.8)	10.3 (0.05)	0.2 (0.07)	▲
United States	36 (0.9)	556 (3.0)	42 (0.7)	524 (3.0)	21 (0.8)	504 (3.3)	10.0 (0.05)	0.4 (0.06)	▲
Ireland	33 (1.3)	565 (3.2)	41 (0.9)	534 (2.7)	26 (1.2)	493 (4.2)	9.8 (0.07)	◊ ◊	
Canada	33 (1.0)	547 (2.7)	46 (0.8)	526 (2.2)	21 (0.8)	504 (3.1)	9.9 (0.04)	◊ ◊	
England	31 (1.1)	569 (4.4)	44 (1.1)	536 (3.9)	25 (1.2)	504 (5.0)	9.8 (0.06)	-0.1 (0.08)	
New Zealand	31 (1.3)	542 (4.2)	47 (0.8)	509 (3.9)	22 (1.0)	484 (3.6)	9.8 (0.07)	0.5 (0.09)	▲
Hong Kong SAR	30 (1.0)	574 (3.8)	51 (0.8)	542 (4.2)	19 (1.1)	512 (5.2)	9.9 (0.06)	0.1 (0.08)	
Italy	29 (1.2)	515 (3.2)	48 (0.9)	499 (2.7)	23 (1.1)	478 (4.4)	9.7 (0.06)	0.1 (0.07)	
Israel	29 (1.2)	535 (4.5)	41 (0.9)	508 (4.6)	31 (1.3)	485 (5.1)	9.5 (0.07)	0.1 (0.10)	
Chile	29 (1.3)	475 (3.7)	49 (0.9)	448 (3.6)	22 (1.1)	444 (4.1)	9.7 (0.06)	-0.5 (0.08)	▼
Norway (9)	28 (1.2)	539 (3.7)	49 (0.9)	505 (3.2)	23 (1.1)	483 (3.8)	9.7 (0.06)	◊ ◊	
Australia	28 (1.1)	550 (3.2)	43 (0.8)	512 (2.6)	29 (1.0)	482 (3.8)	9.6 (0.05)	0.2 (0.09)	▲
Chinese Taipei	18 (0.6)	620 (3.4)	46 (0.8)	574 (2.4)	36 (0.9)	538 (2.5)	9.2 (0.04)	0.2 (0.06)	▲
Japan	15 (0.7)	606 (2.9)	48 (1.0)	579 (1.9)	37 (1.2)	546 (2.5)	9.0 (0.05)	0.0 (0.07)	
Korea, Rep. of	10 (0.5)	622 (5.1)	41 (0.8)	572 (2.5)	49 (1.1)	528 (2.3)	8.6 (0.04)	-0.1 (0.06)	
International Avg.	37 (0.2)	516 (0.7)	44 (0.2)	475 (0.7)	19 (0.2)	453 (1.1)			
Benchmarking Participants Teaching General/Integrated Science									
Dubai, UAE	49 (1.0)	552 (2.2)	38 (0.8)	504 (3.2)	13 (0.6)	486 (4.1)	10.7 (0.04)	0.1 (0.06)	
Abu Dhabi, UAE	37 (2.0)	497 (6.8)	46 (1.2)	435 (6.2)	17 (1.4)	428 (7.0)	10.2 (0.10)	0.0 (0.12)	
Norway (8)	35 (1.1)	507 (3.1)	45 (1.0)	485 (2.9)	20 (0.9)	470 (3.7)	10.1 (0.05)	0.2 (0.09)	
Ontario, Canada	34 (1.1)	544 (3.5)	44 (0.9)	524 (2.6)	22 (0.9)	499 (3.5)	10.0 (0.05)	0.3 (0.08)	▲
Florida, US	33 (1.3)	537 (6.7)	45 (1.2)	505 (6.7)	22 (1.4)	481 (7.1)	9.9 (0.08)	0.4 (0.13)	▲
Quebec, Canada	30 (2.0)	554 (4.4)	51 (1.4)	529 (3.6)	19 (1.3)	512 (5.8)	9.8 (0.08)	0.4 (0.10)	▲
Buenos Aires, Argentina	22 (0.9)	404 (5.3)	47 (1.1)	388 (5.4)	31 (1.2)	379 (6.2)	9.3 (0.05)	◊ ◊	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

A diamond (◊) indicates the country did not participate in the 2011 assessment.

A dash (–) indicates comparable data are not available.

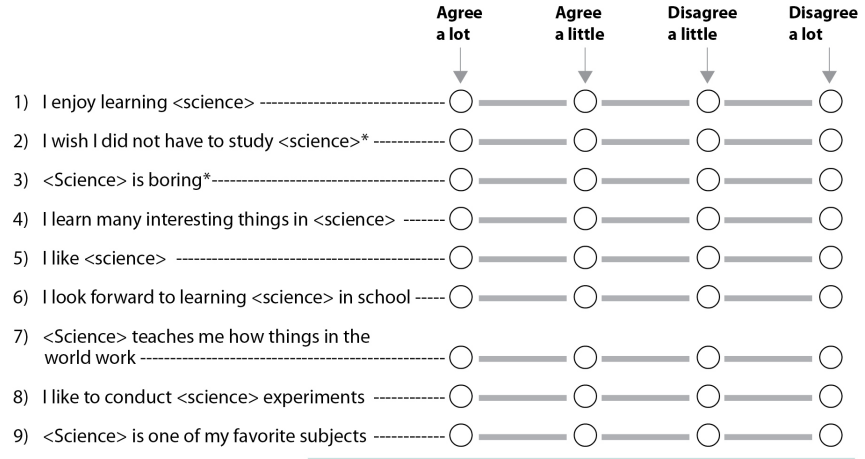
An "r" indicates data are available for at least 70% but less than 85% of the students.

▲ Significantly higher than 2011

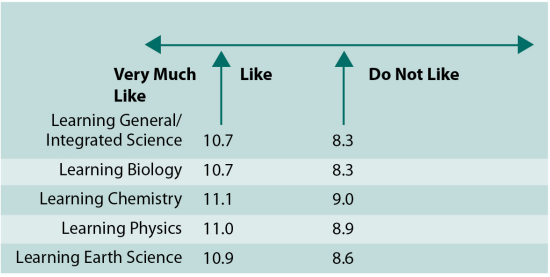
▼ Significantly lower than 2011

Exhibit 10.4: Students Like Learning Science (Continued)

How much do you agree with these statements about learning <science/biology/chemistry/physics/earth science>?



* Reverse coded



Separate Science Panels

Students Like Learning Biology

Biology	Very Much Like Learning Biology		Like Learning Biology		Do Not Like Learning Biology		Average Scale Score	Difference in Average Scale Score from 2011
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Malta	55 (1.3)	557 (2.7)	33 (1.0)	512 (5.6)	12 (0.9)	481 (6.0)	10.9 (0.06)	◊ ◊
Morocco	53 (1.2)	412 (2.4)	39 (0.9)	378 (3.6)	8 (0.6)	378 (4.6)	11.0 (0.05)	0.2 (0.07) ▲
Kazakhstan	46 (1.5)	544 (4.7)	50 (1.2)	525 (5.0)	4 (0.6)	522 (9.1)	10.7 (0.07)	0.1 (0.08)
Lebanon	42 (1.5)	438 (5.0)	44 (1.4)	383 (5.9)	14 (0.9)	365 (8.6)	10.4 (0.07)	0.6 (0.09) ▲
Georgia	39 (1.4)	463 (3.8)	50 (1.2)	439 (3.6)	11 (0.9)	423 (6.4)	10.4 (0.06)	-0.5 (0.08) ▼
Russian Federation	35 (1.3)	550 (5.2)	52 (0.8)	540 (4.1)	13 (1.1)	544 (6.3)	10.1 (0.06)	0.1 (0.07)
Lithuania	31 (1.3)	526 (4.0)	46 (1.1)	515 (3.1)	23 (1.2)	518 (4.3)	9.7 (0.07)	-0.1 (0.09)
Hungary	27 (1.3)	543 (4.2)	47 (0.9)	522 (3.8)	26 (1.3)	523 (4.9)	9.6 (0.06)	0.1 (0.10)
Sweden	20 (1.1)	539 (5.3)	52 (1.0)	529 (3.9)	28 (1.5)	511 (3.8)	9.3 (0.06)	0.1 (0.08)
Slovenia	16 (1.0)	557 (3.7)	47 (1.1)	552 (3.1)	38 (1.7)	549 (3.1)	8.9 (0.07)	0.4 (0.10) ▲
International Avg.	36 (0.4)	513 (1.3)	46 (0.3)	489 (1.3)	18 (0.4)	482 (1.9)		

Significantly higher than 2011 ▲
Significantly lower than 2011 ▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 10.4: Students Like Learning Science (Continued)

Students Like Learning Chemistry

Chemistry	Very Much Like Learning Chemistry		Like Learning Chemistry		Do Not Like Learning Chemistry		Average Scale Score	Difference in Average Scale Score from 2011
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Malta r	51 (1.7)	589 (3.2)	31 (1.6)	551 (5.7)	17 (1.3)	522 (8.3)	11.2 (0.08)	◊ ◊
Morocco	43 (1.1)	418 (3.0)	45 (0.8)	377 (3.0)	11 (0.5)	384 (3.9)	11.0 (0.04)	0.1 (0.05) ▲
Kazakhstan	40 (1.5)	552 (5.2)	53 (1.2)	524 (5.2)	8 (0.7)	511 (6.9)	10.9 (0.05)	-0.1 (0.08)
Lebanon	38 (1.7)	431 (5.9)	48 (1.5)	384 (6.2)	14 (1.3)	389 (10.0)	10.8 (0.07)	0.3 (0.09) ▲
Russian Federation	31 (1.4)	561 (5.0)	46 (0.8)	541 (4.8)	23 (1.4)	530 (5.0)	10.3 (0.07)	0.0 (0.09)
Georgia	29 (1.4)	471 (4.4)	51 (1.1)	437 (3.9)	20 (1.4)	434 (4.5)	10.4 (0.07)	- -
Lithuania	26 (1.4)	536 (3.5)	42 (1.2)	518 (3.4)	33 (1.7)	507 (4.5)	9.9 (0.08)	0.1 (0.10)
Slovenia	17 (0.9)	582 (4.0)	42 (1.1)	556 (2.6)	40 (1.5)	534 (3.5)	9.6 (0.06)	0.2 (0.09) ▲
Sweden	17 (1.0)	553 (6.9)	46 (1.1)	531 (4.2)	37 (1.5)	510 (3.3)	9.7 (0.06)	0.1 (0.08)
Hungary	15 (1.0)	557 (6.6)	38 (1.0)	522 (4.2)	47 (1.5)	523 (4.0)	9.3 (0.06)	0.1 (0.09)
International Avg.	31 (0.4)	525 (1.6)	44 (0.4)	494 (1.4)	25 (0.4)	485 (1.8)		

Students Like Learning Physics

Physics	Very Much Like Learning Physics		Like Learning Physics		Do Not Like Learning Physics		Average Scale Score	Difference in Average Scale Score from 2011
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Morocco	45 (1.1)	417 (2.6)	44 (0.8)	378 (3.1)	11 (0.6)	384 (4.2)	11.0 (0.05)	0.1 (0.06)
Kazakhstan	38 (1.6)	554 (5.1)	55 (1.4)	523 (4.9)	8 (0.7)	520 (6.8)	10.8 (0.05)	0.0 (0.08)
Malta	35 (0.8)	535 (2.7)	40 (0.8)	489 (3.3)	26 (0.7)	448 (3.2)	10.3 (0.04)	◊ ◊
Lebanon	33 (1.5)	445 (5.4)	49 (1.4)	386 (6.3)	17 (1.2)	391 (10.1)	10.5 (0.07)	0.3 (0.09) ▲
Russian Federation	29 (1.0)	563 (5.4)	51 (0.8)	542 (4.5)	20 (1.2)	524 (4.8)	10.2 (0.05)	-0.3 (0.07) ▼
Georgia	24 (1.0)	471 (4.1)	49 (1.3)	439 (3.7)	27 (1.7)	440 (4.5)	10.0 (0.06)	-0.7 (0.09) ▼
Lithuania	19 (1.4)	554 (4.4)	42 (1.1)	518 (3.3)	39 (1.9)	503 (3.8)	9.5 (0.09)	0.1 (0.11)
Hungary	18 (1.0)	557 (5.2)	39 (1.2)	524 (4.4)	43 (1.7)	519 (3.8)	9.4 (0.07)	0.0 (0.08)
Sweden	17 (1.2)	558 (5.8)	43 (1.0)	529 (4.5)	40 (1.6)	511 (3.0)	9.5 (0.07)	0.2 (0.08)
Slovenia	11 (0.7)	585 (5.6)	37 (1.3)	557 (3.2)	53 (1.6)	542 (2.9)	9.0 (0.06)	0.6 (0.07) ▲
International Avg.	27 (0.4)	524 (1.5)	45 (0.4)	489 (1.3)	28 (0.4)	478 (1.6)		

Students Like Learning Earth Science

Earth Science	Very Much Like Learning Earth Science		Like Learning Earth Science		Do Not Like Learning Earth Science		Average Scale Score	Difference in Average Scale Score from 2011
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Morocco	46 (1.0)	414 (2.5)	44 (0.8)	379 (3.2)	10 (0.6)	386 (4.9)	10.9 (0.05)	0.1 (0.06)
Kazakhstan	39 (1.4)	545 (4.5)	55 (1.2)	527 (5.4)	6 (0.5)	532 (9.3)	10.6 (0.05)	0.0 (0.08)
Georgia	32 (1.1)	468 (4.1)	55 (1.0)	437 (4.0)	14 (0.9)	431 (6.5)	10.3 (0.05)	-0.6 (0.07) ▼
Lithuania	30 (1.3)	535 (4.4)	47 (1.0)	514 (3.4)	23 (1.2)	511 (4.3)	9.9 (0.07)	-0.1 (0.10)
Russian Federation	23 (1.2)	547 (6.5)	54 (1.2)	546 (4.5)	23 (1.4)	540 (4.7)	9.8 (0.06)	-0.1 (0.08)
Malta	20 (0.9)	509 (4.7)	39 (1.0)	474 (3.5)	41 (0.9)	467 (3.0)	9.1 (0.05)	◊ ◊
Hungary	16 (0.9)	540 (5.6)	40 (1.1)	523 (4.0)	45 (1.7)	528 (3.9)	9.0 (0.07)	0.0 (0.11)
Slovenia	15 (1.0)	558 (4.3)	43 (1.3)	555 (3.0)	42 (1.8)	547 (2.9)	9.0 (0.08)	0.2 (0.10)
Lebanon	- -	- -	- -	- -	- -	- -	- -	- -
Sweden	- -	- -	- -	- -	- -	- -	- -	- -
International Avg.	28 (0.4)	515 (1.7)	47 (0.4)	494 (1.4)	25 (0.4)	493 (1.9)		

Significantly higher than 2011 ▲

Significantly lower than 2011 ▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 10.6: Students Confident in Science

Reported by Students

The general/integrated science panel summarizes responses for countries where students are enrolled in science as a single subject. The following panels for biology, chemistry, physics, and earth science summarize responses for countries where students are taught science as separate subjects.

For general/integrated science, students were scored according to their degree of agreement with eight statements on the *Students Confident in Science* scale. Students **Very Confident in Science** had a score on the scale of at least 11.5, which corresponds to their "agreeing a lot" with four of the eight statements and "agreeing a little" with the other four, on average. Students who were **Not Confident in Science** had a score no higher than 9.2, eight which corresponds to their "disagreeing a little" with four of the eight statements and "agreeing a little" with the other four, on average. All other students were **Confident in Science**. For biology, chemistry, physics, and earth science, a comparable procedure was used.

Students Confident in General/Integrated Science

General/Integrated Science	Very Confident in Science		Confident in Science		Not Confident in Science		Average Scale Score	Difference in Average Scale Score from 2011
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Kuwait	34 (1.4)	461 (6.3)	44 (1.2)	402 (6.1)	23 (1.1)	359 (5.8)	10.8 (0.06)	◊ ◊
Turkey	32 (1.0)	545 (4.2)	38 (0.8)	486 (4.3)	30 (1.0)	450 (4.7)	10.7 (0.05)	0.4 (0.07) ▲
Israel	32 (1.0)	565 (3.7)	35 (0.6)	508 (4.3)	34 (1.0)	458 (4.7)	10.5 (0.06)	-0.1 (0.09)
Iran, Islamic Rep. of	31 (1.0)	495 (4.9)	41 (0.8)	450 (4.1)	28 (1.1)	424 (4.5)	10.7 (0.05)	-0.1 (0.07)
Oman	31 (0.9)	495 (3.1)	45 (0.8)	451 (2.7)	25 (0.8)	419 (3.7)	10.7 (0.04)	0.0 (0.05)
United States	30 (0.9)	568 (3.0)	39 (0.5)	533 (3.0)	30 (0.9)	495 (3.3)	10.5 (0.05)	0.2 (0.06) ▲
Jordan	29 (1.1)	484 (4.0)	42 (0.7)	426 (3.4)	29 (1.1)	384 (4.5)	10.7 (0.05)	-0.1 (0.07)
Norway (9)	29 (1.1)	556 (3.6)	43 (0.9)	508 (3.4)	28 (1.1)	465 (3.6)	10.5 (0.06)	◊ ◊
Bahrain	28 (0.7)	527 (2.9)	42 (0.8)	467 (3.4)	31 (0.7)	418 (3.8)	10.6 (0.04)	0.3 (0.06) ▲
United Arab Emirates	27 (0.7)	536 (2.7)	44 (0.6)	476 (2.3)	30 (0.8)	429 (3.3)	10.5 (0.03)	-0.1 (0.05)
Egypt	26 (1.3)	445 (4.0)	44 (0.8)	366 (4.3)	30 (1.1)	328 (4.6)	10.6 (0.06)	◊ ◊
Saudi Arabia	26 (1.3)	452 (5.8)	42 (1.0)	399 (4.3)	31 (1.3)	356 (6.5)	10.5 (0.06)	-0.1 (0.08)
Ireland	26 (1.0)	585 (3.2)	36 (0.9)	543 (2.3)	38 (1.3)	492 (3.4)	10.0 (0.07)	◊ ◊
Qatar	26 (0.9)	524 (3.2)	41 (0.8)	464 (3.8)	33 (0.9)	405 (4.2)	10.4 (0.04)	0.0 (0.08)
Italy	24 (1.2)	533 (3.3)	49 (0.9)	500 (2.9)	27 (1.1)	467 (3.7)	10.3 (0.06)	0.4 (0.07) ▲
Canada	24 (0.7)	563 (2.8)	43 (0.8)	531 (2.4)	32 (0.9)	498 (2.5)	10.2 (0.04)	◊ ◊
England	21 (0.9)	585 (4.7)	41 (0.9)	547 (3.5)	38 (1.2)	503 (4.3)	9.9 (0.06)	-0.3 (0.09) ▼
South Africa (9)	21 (0.9)	406 (6.3)	45 (0.8)	355 (5.4)	35 (1.0)	342 (7.1)	10.1 (0.05)	0.1 (0.06)
Australia	17 (0.8)	571 (3.1)	37 (0.8)	526 (3.2)	45 (1.2)	482 (3.0)	9.7 (0.05)	-0.1 (0.08)
Singapore	17 (0.6)	633 (4.7)	40 (0.6)	608 (3.5)	44 (0.9)	572 (3.5)	9.7 (0.04)	0.0 (0.05)
New Zealand	16 (0.7)	572 (4.3)	39 (0.9)	528 (3.7)	45 (1.1)	482 (3.1)	9.7 (0.04)	0.1 (0.07)
Chile	16 (0.7)	499 (4.4)	42 (1.0)	459 (3.5)	42 (1.3)	434 (3.7)	9.8 (0.05)	-0.2 (0.07) ▼
Botswana (9)	14 (0.7)	470 (4.0)	43 (0.9)	392 (3.1)	42 (1.1)	376 (3.5)	9.8 (0.04)	-0.1 (0.06)
Hong Kong SAR	13 (0.6)	592 (4.4)	38 (1.1)	560 (3.8)	49 (1.2)	523 (4.8)	9.4 (0.06)	0.2 (0.07) ▲
Chinese Taipei	9 (0.4)	646 (3.4)	25 (0.7)	606 (2.9)	66 (0.9)	545 (2.1)	8.6 (0.04)	0.3 (0.06) ▲
Korea, Rep. of	7 (0.5)	642 (4.5)	23 (0.7)	599 (3.0)	70 (0.9)	532 (1.9)	8.7 (0.04)	-0.1 (0.05)
Thailand	7 (0.5)	513 (6.3)	37 (0.9)	467 (4.6)	57 (1.1)	442 (4.2)	9.3 (0.03)	0.0 (0.05)
Malaysia	6 (0.3)	512 (5.3)	25 (0.6)	455 (4.8)	69 (0.7)	477 (4.2)	8.7 (0.03)	-0.4 (0.05) ▼
Japan	5 (0.4)	637 (4.8)	26 (0.8)	606 (2.4)	68 (0.9)	553 (2.1)	8.6 (0.04)	0.1 (0.06)
International Avg.	22 (0.2)	538 (0.8)	39 (0.2)	490 (0.7)	40 (0.2)	452 (0.8)		
Benchmarking Participants Teaching General/Integrated Science								
Dubai, UAE	33 (0.8)	567 (2.7)	41 (0.8)	521 (2.6)	26 (0.8)	481 (3.2)	10.7 (0.04)	-0.1 (0.07)
Norway (8)	33 (1.1)	523 (3.0)	44 (0.9)	487 (2.7)	24 (0.9)	450 (4.3)	10.6 (0.05)	0.3 (0.07) ▲
Florida, US	27 (1.4)	552 (6.3)	38 (1.2)	517 (6.2)	34 (1.3)	471 (6.8)	10.4 (0.07)	0.2 (0.13)
Ontario, Canada	25 (1.1)	561 (3.6)	41 (1.1)	528 (2.8)	34 (1.2)	497 (3.1)	10.2 (0.06)	0.1 (0.07)
Quebec, Canada	24 (1.2)	563 (4.2)	48 (1.0)	536 (3.8)	28 (1.3)	503 (3.9)	10.3 (0.06)	0.1 (0.08)
Abu Dhabi, UAE	24 (1.6)	518 (6.8)	45 (1.1)	458 (5.4)	32 (1.9)	407 (6.7)	10.4 (0.08)	-0.1 (0.10)
Buenos Aires, Argentina	17 (0.8)	430 (6.5)	42 (1.1)	399 (5.4)	41 (1.3)	366 (5.7)	9.8 (0.06)	◊ ◊

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

A diamond (◊) indicates the country did not participate in the 2011 assessment.

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70% but less than 85% of the students.

▲ Significantly higher than 2011
▼ Significantly lower than 2011

Exhibit 10.6: Students Confident in Science (Continued)

How much do you agree with these statements about <science /biology/chemistry/physics/ earth science >?

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
1) I usually do well in <science>	○	○	○	○
2) <Science> is more difficult for me than for many of my classmates*	○	○	○	○
3) <Science> is not one of my strengths*	○	○	○	○
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>	○	○	○	○
7) <Science> is harder for me than any other subject*	○	○	○	○
8) <Science> makes me confused*	○	○	○	○

* Reverse coded

	Very Confident	Confident	Not Confident
For General/ Integrated Science	11.5		9.2
For Biology	11.1		8.6
For Chemistry	11.6		9.5
For Physics	11.6		9.4
For Earth Science	11.2		8.7

Separate Science Panels

Students Confident in Biology

Biology / Country	Very Confident in Biology		Confident in Biology		Not Confident in Biology		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Malta	34 (1.3)	585 (3.2)	36 (1.2)	527 (3.7)	30 (1.2)	481 (4.5)	10.2 (0.07)	◊ ◊
Hungary	32 (1.2)	560 (3.7)	45 (1.0)	522 (4.0)	23 (1.2)	496 (5.8)	10.2 (0.06)	0.2 (0.09) ▲
Kazakhstan	31 (1.4)	558 (5.0)	55 (1.0)	528 (4.9)	14 (0.9)	503 (6.7)	10.6 (0.07)	0.0 (0.10)
Georgia	29 (1.1)	486 (3.3)	45 (0.9)	448 (4.0)	26 (1.2)	402 (4.7)	10.2 (0.05)	-0.4 (0.08) ▼
Russian Federation	28 (1.1)	561 (4.7)	50 (0.8)	542 (4.6)	22 (1.0)	529 (5.2)	10.2 (0.06)	0.0 (0.08)
Lebanon	27 (1.5)	463 (6.3)	40 (1.0)	399 (5.8)	33 (1.5)	366 (6.7)	10.1 (0.08)	0.1 (0.10)
Lithuania	25 (1.2)	551 (4.0)	47 (1.1)	513 (3.4)	27 (1.3)	501 (3.8)	10.0 (0.07)	0.1 (0.09)
Morocco	19 (0.7)	445 (2.9)	47 (0.7)	392 (2.7)	33 (1.1)	373 (3.8)	9.7 (0.04)	-0.4 (0.05) ▼
Slovenia	19 (1.2)	585 (3.9)	51 (1.1)	554 (2.8)	30 (1.3)	527 (3.7)	9.6 (0.06)	-0.1 (0.08)
Sweden	18 (0.9)	563 (4.9)	51 (1.0)	534 (3.6)	31 (1.3)	491 (3.6)	9.6 (0.05)	-0.1 (0.07)
International Avg.	26 (0.4)	536 (1.4)	47 (0.3)	496 (1.3)	27 (0.4)	467 (1.6)		

Significantly higher than 2011 ▲
Significantly lower than 2011 ▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 10.6: Students Confident in Science (Continued)

Students Confident in Chemistry

Chemistry	Very Confident in Chemistry		Confident in Chemistry		Not Confident in Chemistry		Average Scale Score	Difference in Average Scale Score from 2011
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Malta r	35 (1.4)	599 (3.6)	33 (1.4)	575 (4.4)	32 (1.5)	522 (6.8)	10.8 (0.08)	◊ ◊
Lebanon	26 (1.3)	454 (6.1)	40 (0.9)	395 (5.6)	34 (1.2)	373 (7.0)	10.6 (0.06)	0.0 (0.09)
Kazakhstan	24 (1.1)	560 (5.7)	49 (1.0)	534 (4.8)	27 (1.2)	512 (5.1)	10.7 (0.05)	0.0 (0.08)
Georgia	23 (0.8)	494 (3.9)	39 (1.1)	454 (3.6)	39 (1.4)	413 (3.7)	10.3 (0.05)	- -
Slovenia	20 (0.9)	602 (3.4)	42 (1.1)	559 (2.9)	39 (1.2)	519 (3.6)	10.1 (0.05)	0.0 (0.07)
Lithuania	19 (1.2)	557 (4.1)	40 (1.0)	523 (3.4)	41 (1.5)	498 (3.6)	10.1 (0.07)	0.3 (0.09) ▲
Russian Federation	18 (1.2)	576 (6.0)	34 (1.0)	549 (4.4)	48 (1.5)	530 (4.9)	9.9 (0.07)	0.0 (0.09)
Morocco	17 (0.6)	452 (3.8)	46 (0.7)	392 (3.0)	38 (1.0)	377 (3.1)	10.3 (0.03)	-0.2 (0.05) ▼
Sweden	16 (0.8)	574 (5.0)	44 (1.0)	536 (4.1)	40 (1.2)	498 (3.5)	10.0 (0.05)	-0.1 (0.06)
Hungary	16 (0.9)	579 (5.2)	36 (1.1)	531 (4.9)	48 (1.5)	510 (4.3)	9.8 (0.06)	0.1 (0.09)
International Avg.	21 (0.3)	545 (1.5)	40 (0.3)	505 (1.3)	39 (0.4)	475 (1.5)		

Students Confident in Physics

Physics	Very Confident in Physics		Confident in Physics		Not Confident in Physics		Average Scale Score	Difference in Average Scale Score from 2011
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Malta	23 (0.7)	565 (3.2)	35 (0.8)	505 (3.0)	42 (0.8)	447 (2.7)	10.2 (0.04)	◊ ◊
Hungary	23 (0.9)	580 (4.2)	38 (1.0)	530 (4.1)	39 (1.4)	496 (4.2)	10.2 (0.06)	0.1 (0.08)
Lebanon	22 (1.4)	468 (6.1)	41 (1.2)	401 (5.6)	37 (1.3)	373 (6.2)	10.5 (0.06)	0.1 (0.09)
Kazakhstan	22 (1.2)	560 (5.9)	51 (0.9)	534 (5.0)	27 (1.1)	516 (5.1)	10.6 (0.06)	0.1 (0.09)
Morocco	18 (0.6)	450 (3.2)	47 (0.7)	391 (2.7)	35 (1.0)	377 (3.2)	10.3 (0.03)	-0.2 (0.05) ▼
Russian Federation	16 (0.8)	579 (5.1)	41 (0.9)	551 (4.6)	42 (1.2)	525 (4.7)	10.0 (0.05)	-0.3 (0.07) ▼
Georgia	16 (0.9)	498 (4.5)	35 (1.3)	454 (3.9)	48 (1.3)	426 (4.2)	9.9 (0.05)	-0.4 (0.07) ▼
Sweden	16 (0.9)	578 (4.8)	44 (0.9)	538 (3.4)	40 (1.4)	495 (3.8)	10.0 (0.06)	-0.1 (0.07)
Lithuania	13 (1.1)	576 (4.7)	36 (1.2)	526 (3.6)	51 (1.6)	500 (3.2)	9.6 (0.07)	0.3 (0.09) ▲
Slovenia	13 (0.6)	609 (4.2)	41 (1.2)	565 (3.2)	47 (1.3)	525 (2.9)	9.6 (0.05)	0.3 (0.07) ▲
International Avg.	18 (0.3)	546 (1.5)	41 (0.3)	499 (1.3)	41 (0.4)	468 (1.3)		

Students Confident in Earth Science

Earth Science	Very Confident in Earth Science		Confident in Earth Science		Not Confident in Earth Science		Average Scale Score	Difference in Average Scale Score from 2011
Country	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Kazakhstan	31 (1.3)	558 (4.7)	53 (0.9)	528 (5.2)	16 (0.9)	511 (6.2)	10.6 (0.07)	-0.1 (0.10)
Lithuania	26 (1.1)	552 (3.8)	46 (1.1)	518 (3.6)	28 (1.1)	490 (3.8)	10.1 (0.06)	0.1 (0.08)
Hungary	25 (1.3)	561 (4.0)	42 (1.0)	527 (4.4)	32 (1.5)	504 (4.2)	9.9 (0.07)	0.1 (0.10)
Georgia	25 (0.9)	493 (3.8)	42 (1.0)	450 (3.9)	33 (1.1)	406 (4.7)	10.0 (0.05)	-0.2 (0.08) ▼
Russian Federation	25 (1.3)	563 (4.9)	50 (0.8)	547 (4.4)	25 (1.3)	522 (4.7)	10.1 (0.06)	0.0 (0.08)
Malta	21 (0.8)	534 (4.2)	37 (1.0)	492 (4.0)	42 (1.0)	442 (3.2)	9.5 (0.05)	◊ ◊
Slovenia	20 (1.0)	584 (3.3)	49 (0.9)	557 (3.1)	30 (1.2)	522 (3.4)	9.8 (0.06)	0.0 (0.08)
Morocco	17 (0.6)	446 (3.3)	47 (0.7)	394 (2.6)	36 (1.0)	374 (3.5)	9.7 (0.04)	-0.4 (0.05) ▼
Lebanon	- -	- -	- -	- -	- -	- -	- -	- -
Sweden	- -	- -	- -	- -	- -	- -	- -	- -
International Avg.	24 (0.4)	536 (1.4)	46 (0.3)	502 (1.4)	30 (0.4)	471 (1.5)		

▲ Significantly higher than 2011
▼ Significantly lower than 2011

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 10.7: Students Value Science

Reported by Students

Students were scored according to their degree of agreement with nine statements on the *Students Value Science* scale. Students who **Strongly Value Science** had a score on the scale of at least 10.7, which corresponds to their "agreeing a lot" with five of the nine statements and "agreeing a little" with the other four, on average. Students who **Do Not Value Science** had a score no higher than 8.4, which corresponds to their "disagreeing a little" with five of the nine statements and "agreeing a little" with the other four, on average. All other students **Value Science**.

Country	Strongly Value Science		Value Science		Do Not Value Science		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Botswana (9)	73 (0.8)	423 (2.3)	23 (0.7)	332 (4.2)	4 (0.3)	292 (9.6)	11.6 (0.03)	0.2 (0.04) ▲
Jordan	68 (0.9)	440 (3.2)	25 (0.8)	414 (4.4)	7 (0.5)	391 (7.3)	11.4 (0.04)	0.2 (0.06) ▲
Egypt	65 (1.2)	392 (3.9)	29 (0.9)	347 (5.4)	6 (0.4)	334 (6.9)	11.3 (0.05)	◊ ◊
Oman	62 (1.0)	469 (2.7)	32 (0.9)	438 (3.5)	6 (0.4)	429 (5.7)	11.1 (0.04)	-0.1 (0.05)
Morocco	59 (1.0)	402 (2.7)	33 (0.7)	387 (3.4)	8 (0.4)	389 (4.5)	11.0 (0.04)	- -
Lebanon	58 (1.3)	420 (5.0)	32 (1.1)	381 (6.4)	10 (0.7)	359 (9.2)	11.0 (0.05)	- -
Iran, Islamic Rep. of	57 (1.1)	465 (4.8)	32 (0.8)	446 (4.2)	10 (0.6)	446 (5.1)	10.9 (0.05)	0.4 (0.06) ▲
South Africa (9)	57 (1.2)	366 (5.6)	31 (0.8)	344 (6.1)	12 (0.8)	383 (9.4)	10.8 (0.05)	0.1 (0.07)
Kuwait	54 (1.1)	422 (5.8)	36 (1.0)	405 (6.1)	10 (0.6)	381 (7.8)	10.7 (0.04)	◊ ◊
Bahrain	52 (1.1)	485 (2.6)	34 (0.9)	457 (3.6)	14 (0.6)	435 (5.0)	10.6 (0.04)	0.4 (0.06) ▲
Qatar	50 (1.0)	486 (3.8)	35 (0.9)	443 (3.6)	15 (0.5)	411 (4.7)	10.6 (0.04)	0.1 (0.07)
Thailand	49 (1.2)	472 (4.6)	45 (1.1)	442 (4.2)	6 (0.4)	427 (7.2)	10.7 (0.04)	0.2 (0.06) ▲
Saudi Arabia	49 (1.5)	411 (5.5)	36 (1.0)	391 (5.0)	15 (1.1)	381 (6.3)	10.5 (0.07)	0.0 (0.09)
United Arab Emirates	48 (0.7)	504 (2.8)	39 (0.5)	460 (2.6)	13 (0.5)	438 (4.1)	10.5 (0.03)	0.1 (0.05)
Turkey	46 (1.0)	505 (4.5)	40 (0.8)	485 (4.5)	14 (0.8)	485 (5.2)	10.4 (0.05)	0.4 (0.06) ▲
Georgia	43 (1.2)	454 (3.7)	45 (1.1)	444 (4.0)	12 (0.8)	430 (6.8)	10.5 (0.05)	- -
Kazakhstan	41 (1.2)	546 (4.8)	49 (1.0)	525 (5.2)	10 (0.8)	527 (6.6)	10.5 (0.05)	- -
Israel	40 (1.1)	523 (4.6)	36 (0.7)	512 (4.4)	24 (1.0)	481 (4.9)	10.0 (0.06)	0.3 (0.08) ▲
England	39 (1.1)	558 (4.1)	43 (0.8)	536 (3.9)	18 (0.9)	502 (4.5)	10.1 (0.05)	0.0 (0.07)
United States	38 (0.8)	550 (3.2)	42 (0.7)	529 (2.8)	19 (0.6)	501 (3.1)	10.1 (0.03)	0.3 (0.05) ▲
Malaysia	38 (1.0)	483 (3.4)	54 (0.8)	481 (4.3)	9 (0.8)	387 (8.9)	10.4 (0.04)	0.1 (0.08)
Russian Federation	38 (1.4)	544 (5.2)	48 (1.2)	545 (4.1)	14 (0.6)	543 (5.9)	10.2 (0.05)	- -
Lithuania	38 (1.1)	525 (3.5)	47 (0.9)	517 (3.1)	15 (0.8)	515 (5.2)	10.2 (0.04)	- -
Singapore	37 (0.8)	621 (3.4)	53 (0.7)	589 (3.4)	10 (0.5)	548 (4.7)	10.2 (0.03)	0.1 (0.04)
Malta	37 (0.7)	536 (2.9)	37 (0.8)	475 (2.8)	26 (0.7)	436 (3.6)	9.9 (0.03)	◊ ◊
Canada	37 (0.8)	546 (2.5)	44 (0.8)	525 (2.4)	19 (0.8)	501 (2.9)	10.1 (0.03)	◊ ◊
Chile	32 (1.1)	458 (4.3)	41 (0.9)	453 (3.6)	27 (0.8)	455 (3.4)	9.7 (0.05)	-0.2 (0.06) ▼
New Zealand	30 (0.8)	537 (4.1)	46 (0.7)	514 (3.4)	24 (0.9)	486 (3.2)	9.7 (0.04)	0.5 (0.06) ▲
Ireland	30 (0.9)	557 (3.4)	43 (0.8)	540 (3.0)	27 (1.0)	501 (3.8)	9.6 (0.05)	◊ ◊
Australia	27 (0.9)	547 (3.2)	41 (0.6)	517 (2.7)	32 (0.8)	482 (3.4)	9.4 (0.04)	0.3 (0.08) ▲
Hong Kong SAR	24 (1.0)	565 (5.0)	46 (1.0)	549 (4.2)	31 (1.2)	528 (4.3)	9.4 (0.05)	-0.1 (0.07)
Sweden	21 (1.0)	535 (5.7)	50 (0.9)	532 (3.7)	28 (1.3)	503 (3.8)	9.4 (0.05)	- -
Norway (9)	21 (0.9)	526 (4.4)	51 (0.8)	515 (3.1)	29 (0.9)	489 (3.4)	9.4 (0.04)	◊ ◊
Hungary	21 (0.9)	539 (6.8)	48 (0.8)	526 (3.4)	32 (1.1)	522 (3.5)	9.3 (0.04)	- -
Slovenia	20 (0.8)	577 (4.2)	52 (0.9)	556 (2.9)	28 (1.0)	525 (3.2)	9.3 (0.04)	- -
Italy	15 (0.7)	516 (4.5)	46 (1.1)	502 (2.9)	40 (1.1)	490 (3.3)	9.0 (0.04)	0.1 (0.05)
Korea, Rep. of	13 (0.6)	605 (4.2)	51 (0.9)	566 (1.9)	36 (0.9)	522 (2.5)	9.0 (0.04)	0.1 (0.05)
Chinese Taipei	11 (0.5)	616 (4.5)	38 (0.9)	589 (2.5)	51 (1.0)	546 (2.1)	8.6 (0.03)	0.1 (0.06)
Japan	9 (0.5)	605 (3.6)	44 (0.8)	586 (2.0)	47 (0.9)	550 (2.3)	8.6 (0.03)	0.1 (0.05)
International Avg.	40 (0.2)	506 (0.7)	41 (0.1)	482 (0.6)	19 (0.1)	460 (0.9)		

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

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

A diamond (◊) indicates the country did not participate in the 2011 assessment.

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70% but less than 85% of the students.

▲ Significantly higher than 2011

▼ Significantly lower than 2011

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 10.7: Students Value Science (Continued)

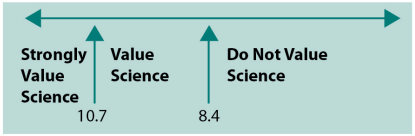
Country	Strongly Value Science		Value Science		Do Not Value Science		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Benchmarking Participants								
Dubai, UAE	52 (1.0)	546 (2.5)	36 (0.8)	509 (2.7)	12 (0.7)	489 (5.0)	10.7 (0.04)	0.3 (0.06) ▲
Abu Dhabi, UAE	47 (1.6)	484 (6.4)	40 (1.0)	438 (5.8)	13 (1.0)	415 (7.2)	10.5 (0.08)	0.1 (0.09)
Ontario, Canada	41 (1.2)	542 (2.8)	41 (0.9)	521 (3.0)	19 (0.9)	500 (3.4)	10.2 (0.04)	0.4 (0.06) ▲
Florida, US	37 (1.1)	526 (6.8)	42 (1.0)	511 (6.6)	21 (0.7)	484 (5.7)	10.0 (0.05)	0.2 (0.09) ▲
Quebec, Canada	30 (1.4)	552 (4.3)	50 (1.5)	534 (3.8)	20 (1.3)	505 (4.4)	9.8 (0.06)	0.4 (0.07) ▲
Norway (8)	24 (0.9)	503 (3.6)	49 (0.8)	490 (2.9)	27 (0.9)	479 (2.9)	9.5 (0.04)	0.2 (0.06) ▲
Buenos Aires, Argentina r	24 (1.2)	383 (6.3)	45 (1.2)	392 (5.5)	31 (1.0)	394 (5.5)	9.3 (0.05)	◊ ◊

▲ Significantly higher than 2011
▼ Significantly lower than 2011

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

How much do you agree with these statements about science?

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
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	○	○	○	○
6) It is important to learn about science to get ahead in the world	○	○	○	○
7) Learning science will give me more job opportunities when I am an adult	○	○	○	○
8) My parents think that it is important that I do well in science	○	○	○	○
9) It is important to do well in science	○	○	○	○



TIMSS 2015

SCIENCE APPENDICES

TIMSS 2015 INTERNATIONAL RESULTS IN SCIENCE

IEA
TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Appendix A.1: Countries Participating in TIMSS 2015 and in Earlier TIMSS Assessments

Country	Grade 4					Grade 8					
	2015	2011	2007	2003	1995	2015	2011	2007	2003	1999	1995
Armenia	○	●	○	●		○	●	○	●		
Australia	●	●	●	●	●	●	●	●	●	○	●
Bahrain	●	●				●	●	●	●		
Belgium (Flemish)	●	●		●					●	●	●
Botswana (6, 9)		●				●	●	○	○		
Bulgaria	●							●	●	●	●
Canada	●				○	●				○	○
Chile	●	●				●	●		●	●	
Chinese Taipei	●	●	●	●		●	●	●	●	●	
Croatia	●	●									
Cyprus	●			●	●			●	●	●	●
Czech Republic	●	●	●		●			●		●	●
Denmark	●	●	●								●
Egypt						●		●	●		
England	●	●	●	●	●	●	●	●	●	●	●
Finland	●	●					●			○	
France	●										●
Georgia	●	●	●			●	●	●			
Germany	●	●	●								●
Hong Kong SAR	●	●	●	●	●	●	●	●	●	●	●
Hungary	●	●	●	●	●	●	●	●	●	●	●
Indonesia	●				○		●	●	○	○	○
Iran, Islamic Rep. of	●	●	●	●	●	●	●	●	●	●	●
Ireland	●	●			●	●					●
Israel					○	●	●	○	○	○	○
Italy	●	●	●	●	○	●	●	●	●	●	○
Japan	●	●	●	●	●	●	●	●	●	●	●
Jordan						●	●	●	●	●	
Kazakhstan	●	●	○			●	●				
Korea, Rep. of	●	●			●	●	●	●	●	●	●
Kuwait	●	●	○		○	●		○			○
Lebanon						●	●	●	●		
Lithuania	●	●	●	●		●	●	●	●	●	●
Malaysia						●	●	●	●	●	
Malta		●				●		●			
Morocco	●	●	○	○		●	●	○	○	○	
Netherlands	●	●	●	●	●				●	●	●
New Zealand	●	●	●	●	●	●	●		●	●	●
Northern Ireland	●	●									
Norway (5,9)	●					●					
Oman	●	●				●	●	●			
Poland	●	○									
Portugal	●	●			●						●
Qatar	●	●	○			●	●	○			
Russian Federation	●	●	●	●		●	●	●	●	●	●
Saudi Arabia	●	●				●	●	○	○		
Serbia	●	●						●	●		
Singapore	●	●	●	●	●	●	●	●	●	●	●
Slovak Republic	●	●	●						●	●	●
Slovenia	●	●	●	●	●	●	●	●	●	○	●
South Africa (5,9)						●	●		○	○	○
Spain	●	●									●
Sweden	●	●	●			●	●	●	●		●
Thailand		●			○	●	●	●		●	○
Turkey	●	●				●	●	○		○	
United Arab Emirates	●	●				●	●				
United States	●	●	●	●	●	●	●	●	●	●	●

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

● Indicates participation in that testing cycle.

○ Indicates participation but data not comparable for measuring trends to 2015, primarily due to countries improving translations or increasing population coverage.

Appendix A.1: Countries Participating in TIMSS 2015 and in Earlier TIMSS Assessments (Continued)

Country	Grade 4					Grade 8					
	2015	2011	2007	2003	1995	2015	2011	2007	2003	1999	1995
Benchmarking Participants											
Buenos Aires, Argentina	●					●					
Ontario, Canada	●	●	●	●	●	●	●	●	●	●	●
Quebec, Canada	●	●	●	●	●	●	●	●	●	●	●
Norway (4,8)	●	●	●	●	●	●	●	●	●		●
Abu Dhabi, UAE	●	●				●	●				
Dubai, UAE	●	●	●			●	●	●			
Florida, US	●	●				●	●				

● Indicates participation in that testing cycle.

○ Indicates participation but data not comparable for measuring trends to 2015, primarily due to countries improving translations or increasing population coverage.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Appendix B.2: Distribution of Items Included in the Assessment by Content Domain, Cognitive Domain, and Item Format

TIMSS Assessment Items	Multiple-Choice Items	Constructed Response Items	Total Items	Percentage of Score Points
Content Domain				
Biology	36 (36)	39 (51)	75 (87)	36%
Chemistry	23 (24)	21 (22)	44 (46)	19%
Physics	33 (34)	23 (23)	56 (57)	24%
Earth Science	29 (30)	16 (19)	45 (49)	21%
Total	121 (124)	99 (115)	220 (239)	100%
Percentage of Score Points	52%	48%		
Cognitive Domain				
Knowing	64 (66)	13 (19)	77 (85)	36%
Applying	44 (45)	47 (53)	91 (98)	41%
Reasoning	13 (13)	39 (43)	52 (56)	23%
Total	121 (124)	99 (115)	220 (239)	100%
Percentage of Score Points	52%	48%		

Score points are shown in parentheses.
Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Appendix C.2: Coverage of TIMSS 2015 Target Population

Country	International Target Population		Exclusions from National Target Population		
	Coverage	Notes on Coverage	School-Level Exclusions	Within-Sample Exclusions	Overall Exclusions
Australia	100%		1.3%	2.2%	3.5%
Bahrain	100%		0.3%	3.5%	3.8%
Botswana (9)	100%		0.0%	0.3%	0.3%
[1] Canada	67%	Students from the provinces of Manitoba, Newfoundland, Ontario, and Quebec	2.5%	2.4%	4.8%
Chile	100%		1.4%	0.5%	1.9%
Chinese Taipei	100%		0.1%	1.6%	1.7%
Egypt	100%		0.1%	0.0%	0.1%
England	100%		2.3%	0.0%	2.3%
[1 2] Georgia	90%	Students taught in Georgian	2.3%	3.7%	6.0%
Hong Kong SAR	100%		1.3%	0.4%	1.6%
Hungary	100%		2.6%	2.9%	5.4%
Iran, Islamic Rep. of	100%		0.5%	1.7%	2.2%
Ireland	100%		0.3%	0.9%	1.2%
[3] Israel	100%		17.6%	5.3%	22.8%
[2] Italy	100%		0.8%	5.3%	6.1%
Japan	100%		0.8%	1.5%	2.3%
Jordan	100%		0.0%	1.0%	1.0%
Kazakhstan	100%		3.0%	0.8%	3.8%
Korea, Rep. of	100%		1.2%	0.9%	2.1%
Kuwait	100%		2.8%	0.5%	3.3%
Lebanon	100%		1.3%	0.0%	1.3%
[2] Lithuania	100%		3.9%	3.0%	7.0%
Malaysia	100%		1.1%	3.2%	4.3%
Malta	100%		1.9%	1.6%	3.5%
Morocco	100%		0.0%	0.0%	0.0%
New Zealand	100%		1.6%	1.5%	3.1%
Norway (9)	100%		1.0%	2.7%	3.7%
Oman	100%		0.1%	0.3%	0.4%
Qatar	100%		1.7%	1.5%	3.2%
Russian Federation	100%		2.3%	1.4%	3.7%
Saudi Arabia	100%		1.9%	0.2%	2.1%
[2] Singapore	100%		7.0%	0.0%	7.0%
Slovenia	100%		2.1%	1.7%	3.8%
South Africa (9)	100%		1.5%	0.0%	1.5%
Sweden	100%		1.8%	3.6%	5.5%
Thailand	100%		0.2%	0.0%	0.2%
Turkey	100%		0.2%	1.1%	1.3%
United Arab Emirates	100%		2.2%	1.5%	3.6%
United States	100%		0.0%	5.1%	5.1%
Benchmarking Participants					
Buenos Aires, Argentina	100%		2.7%	0.0%	2.7%
Ontario, Canada	100%		1.8%	0.8%	2.5%
Quebec, Canada	100%		3.6%	1.7%	5.3%
Norway (8)	100%		1.4%	2.7%	4.1%
Abu Dhabi, UAE	100%		1.8%	2.3%	4.1%
Dubai, UAE	100%		3.6%	1.6%	5.2%
[1] Florida, US	90%	Students from public schools	0.0%	2.8%	2.8%

1 National Target Population does not include all of the International Target Population.
2 National Defined Population covers 90% to 95% of the National Target Population.
3 National Defined Population covers less than 90% of the National Target population (but at least 77%).

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Appendix C.4: School Sample Sizes

Country	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample that Participated	Number of Replacement Schools that Participated	Total Number of Schools that Participated
Australia	290	287	285	0	285
Bahrain	105	105	105	0	105
Botswana (9)	159	159	159	0	159
Canada	344	337	253	23	276
Chile	184	184	154	17	171
Chinese Taipei	190	190	190	0	190
Egypt	214	214	197	14	211
England	150	148	135	8	143
Georgia	162	153	151	2	153
Hong Kong SAR	158	158	123	10	133
Hungary	150	145	140	4	144
Iran, Islamic Rep. of	250	250	250	0	250
Ireland	150	150	149	0	149
Israel	200	200	182	18	200
Italy	165	165	133	28	161
Japan	150	149	142	5	147
Jordan	260	252	252	0	252
Kazakhstan	176	176	168	4	172
Korea, Rep. of	150	150	150	0	150
Kuwait	178	177	168	0	168
Lebanon	150	150	116	22	138
Lithuania	211	208	204	4	208
Malaysia	212	207	207	0	207
Malta	48	48	48	0	48
Morocco	353	345	345	0	345
New Zealand	162	162	120	25	145
Norway (9)	150	150	143	0	143
Oman	310	308	300	1	301
Qatar	136	134	131	0	131
Russian Federation	204	204	204	0	204
Saudi Arabia	154	143	140	3	143
Singapore	167	167	167	0	167
Slovenia	150	150	144	4	148
South Africa (9)	300	292	282	10	292
Sweden	154	150	149	1	150
Thailand	204	204	200	4	204
Turkey	240	218	218	0	218
United Arab Emirates	489	477	477	0	477
United States	300	293	229	17	246
Benchmarking Participants					
Buenos Aires, Argentina	150	150	122	6	128
Ontario, Canada	152	147	135	3	138
Quebec, Canada	176	174	102	20	122
Norway (8)	150	150	142	0	142
Abu Dhabi, UAE	165	156	156	0	156
Dubai, UAE	137	135	135	0	135
Florida, US	54	54	53	0	53

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Appendix C.6: Student Sample Sizes

Country	Within-School Student Participation (Weighted Percentage)	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/School	Number of Students Excluded	Number of Eligible Students	Number of Students Absent	Number of Students Assessed
Australia	91%	11,968	312	88	11,568	1,230	10,338
Bahrain	97%	5,334	66	201	5,067	149	4,918
Botswana (9)	98%	6,192	66	12	6,114	150	5,964
Canada	93%	9,618	70	139	9,409	652	8,757
Chile	93%	5,285	67	21	5,197	348	4,849
Chinese Taipei	98%	5,915	53	50	5,812	101	5,711
Egypt	91%	8,897	273	0	8,624	802	7,822
England	95%	5,252	185	0	5,067	253	4,814
Georgia	98%	4,215	28	46	4,141	106	4,035
Hong Kong SAR	96%	4,363	24	13	4,326	171	4,155
Hungary	97%	5,190	20	112	5,058	165	4,893
Iran, Islamic Rep. of	98%	6,482	80	177	6,225	95	6,130
Ireland	92%	5,214	44	47	5,123	419	4,704
Israel	93%	6,079	41	102	5,936	424	5,512
Italy	95%	5,021	16	282	4,723	242	4,481
Japan	95%	5,037	8	12	5,017	272	4,745
Jordan	96%	8,617	441	0	8,176	311	7,865
Kazakhstan	98%	5,040	61	0	4,979	92	4,887
Korea, Rep. of	98%	5,526	35	55	5,436	127	5,309
Kuwait	90%	5,081	113	0	4,968	465	4,503
Lebanon	96%	4,044	24	0	4,020	147	3,873
Lithuania	93%	4,864	27	148	4,689	342	4,347
Malaysia	98%	10,092	171	41	9,880	154	9,726
Malta	96%	4,063	15	67	3,981	164	3,817
Morocco	95%	13,979	229	0	13,750	715	13,035
New Zealand	90%	9,119	93	47	8,979	837	8,142
Norway (9)	91%	5,354	37	128	5,189	492	4,697
Oman	99%	9,218	161	21	9,036	153	8,883
Qatar	98%	5,691	115	73	5,503	100	5,403
Russian Federation	97%	5,025	52	59	4,914	134	4,780
Saudi Arabia	97%	3,962	72	5	3,885	126	3,759
Singapore	97%	6,341	15	0	6,326	210	6,116
Slovenia	94%	4,654	17	76	4,561	304	4,257
South Africa (9)	96%	13,708	574	0	13,134	620	12,514
Sweden	94%	4,561	43	121	4,397	307	4,090
Thailand	99%	6,761	179	0	6,582	100	6,482
Turkey	98%	6,537	232	71	6,234	155	6,079
United Arab Emirates	97%	18,740	78	106	18,556	544	18,012
United States	94%	11,489	198	439	10,852	631	10,221
Benchmarking Participants							
Buenos Aires, Argentina	85%	3,839	81	0	3,758	505	3,253
Ontario, Canada	93%	4,883	18	24	4,841	321	4,520
Quebec, Canada	92%	4,403	48	92	4,263	313	3,950
Norway (8)	93%	5,339	17	143	5,179	384	4,795
Abu Dhabi, UAE	98%	5,021	26	20	4,975	137	4,838
Dubai, UAE	97%	6,435	24	67	6,344	195	6,149
Florida, US	93%	2,336	38	47	2,251	177	2,074

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Students attending a sampled class at the time the sample was chosen but leaving the class before the assessment was administered were classified as "withdrawn."
Students with a disability or language barrier that prevented them from participating in the assessment were classified as "excluded."
Students not present when the assessment was administered, and not subsequently assessed in a make-up session, were classified as "absent."

Appendix C.8: Participation Rates (Weighted)

Country	School Participation		Class Participation	Student Participation	Overall Participation	
	Before Replacement	After Replacement			Before Replacement	After Replacement
Australia	99%	99%	99%	91%	90%	90%
Bahrain	100%	100%	100%	97%	97%	97%
Botswana (9)	100%	100%	100%	98%	98%	98%
† Canada	80%	85%	99%	93%	73%	78%
Chile	85%	92%	100%	93%	79%	85%
Chinese Taipei	100%	100%	100%	98%	98%	98%
Egypt	95%	100%	100%	91%	87%	91%
England	91%	97%	100%	95%	87%	92%
Georgia	99%	100%	100%	98%	97%	98%
Hong Kong SAR	78%	84%	100%	96%	74%	81%
Hungary	96%	99%	100%	97%	93%	96%
Iran, Islamic Rep. of	100%	100%	100%	98%	98%	98%
Ireland	99%	99%	100%	92%	91%	91%
Israel	91%	100%	100%	93%	84%	93%
Italy	78%	98%	100%	95%	74%	93%
Japan	95%	99%	100%	95%	90%	93%
Jordan	100%	100%	100%	96%	96%	96%
Kazakhstan	97%	99%	100%	98%	95%	97%
Korea, Rep. of	100%	100%	100%	98%	98%	98%
Kuwait	94%	94%	100%	90%	85%	85%
Lebanon	77%	92%	100%	96%	74%	88%
Lithuania	99%	100%	100%	93%	92%	93%
Malaysia	100%	100%	100%	98%	98%	98%
Malta	100%	100%	100%	96%	96%	96%
Morocco	100%	100%	100%	95%	95%	95%
† New Zealand	76%	90%	100%	90%	68%	81%
Norway (9)	96%	96%	100%	91%	87%	87%
Oman	97%	97%	100%	99%	96%	96%
Qatar	98%	98%	100%	98%	96%	96%
Russian Federation	100%	100%	100%	97%	97%	97%
Saudi Arabia	98%	100%	100%	97%	95%	97%
Singapore	100%	100%	100%	97%	97%	97%
Slovenia	96%	99%	100%	94%	89%	92%
South Africa (9)	98%	100%	100%	96%	94%	96%
Sweden	97%	100%	100%	94%	91%	94%
Thailand	98%	100%	100%	99%	96%	99%
Turkey	100%	100%	100%	98%	98%	98%
United Arab Emirates	100%	100%	100%	97%	97%	97%
† United States	78%	84%	99%	94%	73%	78%
Benchmarking Participants						
† Buenos Aires, Argentina	81%	85%	98%	85%	68%	71%
Ontario, Canada	93%	94%	99%	93%	85%	87%
‡ Quebec, Canada	50%	63%	99%	92%	46%	58%
Norway (8)	95%	95%	100%	93%	87%	87%
Abu Dhabi, UAE	100%	100%	100%	98%	98%	98%
Dubai, UAE	100%	100%	100%	97%	97%	97%
Florida, US	98%	98%	99%	93%	90%	90%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

TIMSS guidelines for sampling participation: The minimum acceptable participation rates were 85 percent of both schools and students, or a combined rate (the product of school and student participation) of 75 percent. Participants not meeting these guidelines were annotated as follows:

† Met guidelines for sample participation rates only after replacement schools were included.

‡ Nearly satisfied guidelines for sample participation rates after replacement schools were included.

‡ Did not satisfy guidelines for sample participation rates.

Appendix C.10: Trends in Student Populations

Country	Years of Formal Schooling*						Average Age at Time of Testing					
	2015	2011	2007	2003	1999	1995	2015	2011	2007	2003	1999	1995
Australia	8	8	8	8		8	14.0	14.0	13.9	13.9		13.9
Bahrain	8	8	8	8			14.0	14.4	14.1	14.1		
Botswana (9)	9	9					15.6	15.8				
Chile	8	8		8	8		14.3	14.2		14.2	14.4	
Chinese Taipei	8	8	8	8	8		14.3	14.2	14.2	14.2	14.2	
Egypt	8		8	8			14.1		14.1	14.4		
England	9	9	9	9	9	9	14.1	14.2	14.2	14.3	14.2	14.0
Georgia	8	8	8				13.7	14.2	14.2			
Hong Kong SAR	8	8	8	8	8	8	14.2	14.2	14.4	14.4	14.2	14.2
Hungary	8	8	8	8	8	8	14.7	14.7	14.6	14.5	14.4	14.3
Iran, Islamic Rep. of	8	8	8	8	8	8	14.2	14.3	14.2	14.4	14.6	14.6
Ireland	8					8	14.4					14.4
Israel	8	8					14.0	14.0				
Italy	8	8	8	8	8		13.8	13.8	13.9	13.9	14.0	
Japan	8	8	8	8	8	8	14.5	14.5	14.5	14.4	14.4	14.4
Jordan	8	8	8	8	8		13.8	13.9	14.0	13.9	14.0	
Kazakhstan	8	8					14.3	14.6				
Korea, Rep. of	8	8	8	8	8	8	14.4	14.3	14.3	14.6	14.4	14.2
Kuwait	8		8				13.7		14.4			
Lebanon	8	8	8	8			14.2	14.3	14.4	14.6		
Lithuania	8	8	8	8	8.5	8	14.7	14.7	14.9	14.9	15.2	14.3
Malaysia	8	8	8	8	8		14.3	14.4	14.3	14.3	14.4	
Malta	8		9				13.8		14.0			
Morocco	8	8					14.5	14.7				
New Zealand	8.5 - 9.5	8.5 - 9.5		8.5 - 9.5	8.5 - 9.5	8.5 - 9.5	14.1	14.1		14.1	14.0	14.0
Oman	8	8	8				14.0	14.1	14.3			
Qatar	8	8					14.1	14.0				
Russian Federation	8	8	7 or 8	7 or 8	7 or 8	7 or 8	14.7	14.7	14.6	14.2	14.1	14.0
Saudi Arabia	8	8					14.1	14.1				
Singapore	8	8	8	8	8	8	14.4	14.4	14.4	14.3	14.4	14.5
Slovenia	8	8	7 or 8	7 or 8		7	13.8	13.9	13.8	13.8		13.8
South Africa (9)	9	9					15.7	16.0				
Sweden	8	8	8	8		7	14.7	14.8	14.8	14.9		14.9
Thailand	8	8	8		8		14.4	14.3	14.3		14.5	
Turkey	8	8					13.9	14.0				
United Arab Emirates	8	8					13.9	13.9				
United States	8	8	8	8	8	8	14.2	14.2	14.3	14.2	14.2	14.2
Benchmarking Participants												
Ontario, Canada	8	8	8	8	8	8	13.8	13.8	13.8	13.8	13.9	14.0
Quebec, Canada	8	8	8	8	8	8	14.3	14.2	14.2	14.2	14.3	14.5
Norway (8)	8	8	8	7		7	13.7	13.7	13.8	13.8		13.9
Abu Dhabi, UAE	8	8					13.9	13.8				
Dubai, UAE	8	8	8				13.9	13.9	14.2			
Florida, US	8	8					14.4	14.4				

* Represents years of schooling counting from the first year of ISCED Level 1.

Georgian schools in South Ossetia and Abkhazia were excluded in 2011 due to lack of access and absence of official statistics. Abkhazia refugee schools in other territories of Georgia were included in the sample frame.

Bahrain in 2011, Korea in 2003, Lithuania in 1999, and Dubai (UAE) in 2007 tested the same cohort of students as other countries, but later in the assessment year. South Africa (9) tested one year later.

Trend results for Kuwait do not include private schools. Trend results for Lithuania do not include students taught in Polish or in Russian.

An empty cell indicates a country did not participate in that year's assessment. A dash (–) indicates comparable data not available.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Appendix C.10: Trends in Student Populations (Continued)

Country	Overall Exclusion Rates						Overall Participation Rates (After Replacement)					
	2015	2011	2007	2003	1999	1995	2015	2011	2007	2003	1999	1995
Australia	3.5%	3.2%	1.9%	1.3%		1.0%	90%	88%	93%	83%		70%
Bahrain	3.8%	1.6%	1.5%	0.0%			97%	97%	97%	98%		
Botswana (9)	0.3%	0.0%					98%	98%				
Chile	1.9%	2.8%		2.2%	2.8%		85%	95%		99%	96%	
Chinese Taipei	1.7%	1.3%	3.3%	4.8%	1.6%		98%	99%	99%	99%	99%	
Egypt	0.1%		0.5%	3.4%			91%		98%	97%		
England	2.3%	2.2%	2.3%	2.1%	5.0%	11.0%	92%	70%	75%	46%	77%	77%
Georgia	6.0%	4.5%	3.9%				98%	97%	97%			
Hong Kong SAR	1.6%	5.3%	3.8%	3.4%	0.8%	2.0%	81%	75%	75%	80%	74%	81%
Hungary	5.4%	4.4%	3.9%	8.5%	4.3%	4.0%	96%	95%	96%	94%	93%	87%
Iran, Islamic Rep. of	2.2%	2.2%	0.5%	6.5%	4.4%	0.0%	98%	99%	98%	98%	98%	98%
Ireland	1.2%					0.0%	91%					81%
Israel	22.8%	22.6%					93%	92%				
Italy	6.1%	4.7%	5.0%	3.6%	6.7%		93%	93%	96%	97%	97%	
Japan	2.3%	2.8%	3.5%	0.6%	1.3%	1.0%	93%	87%	91%	93%	89%	90%
Jordan	1.0%	0.4%	2.0%	1.3%	3.0%		96%	96%	96%	96%	99%	
Kazakhstan	3.8%	5.1%					97%	98%				
Korea, Rep. of	2.1%	1.9%	1.6%	4.9%	4.0%	4.0%	98%	99%	99%	98%	100%	95%
Kuwait	3.3%		0.3%				85%		84%			
Lebanon	1.3%	1.4%	1.4%	1.4%			88%	94%	85%	91%		
Lithuania	7.0%	4.8%	4.2%	2.6%	4.5%	7.0%	93%	92%	90%	84%	89%	83%
Malaysia	4.3%	0.1%	3.3%	4.0%	4.6%		98%	98%	98%	98%	99%	
Malta	3.5%		2.9%				96%		94%			
Morocco	0.0%	0.1%					95%	94%				
New Zealand	3.1%	3.2%		4.4%	2.4%	2.0%	81%	88%		90%	91%	94%
Oman	0.4%	1.2%	1.2%				96%	97%	99%			
Qatar	3.2%	4.5%					96%	99%				
Russian Federation	3.7%	6.0%	2.3%	5.5%	1.7%	6.0%	97%	98%	97%	96%	97%	95%
Saudi Arabia	2.1%	1.2%					97%	98%				
Singapore	7.0%	6.0%	1.8%	0.0%	0.0%	5.0%	97%	95%	95%	97%	98%	95%
Slovenia	3.8%	2.3%	1.9%	1.4%		3.0%	92%	92%	92%	91%		77%
South Africa (9)	1.5%	1.4%					96%	95%				
Sweden	5.5%	5.1%	3.6%	2.8%		1.0%	94%	92%	94%	87%		90%
Thailand	0.2%	1.5%	3.4%		3.3%		99%	99%	99%		99%	
Turkey	1.3%	1.5%					98%	97%				
United Arab Emirates	3.6%	2.8%					97%	97%				
United States	5.1%	7.2%	7.9%	4.9%	3.9%	2.0%	78%	81%	77%	73%	85%	78%
Benchmarking Participants												
Ontario, Canada	2.5%	5.6%	6.2%	6.0%	5.1%	-	87%	93%	89%	89%	93%	90%
Quebec, Canada	5.3%	4.9%	13.6%	4.8%	1.3%	-	58%	88%	77%	85%	92%	89%
Norway (8)	4.1%	1.9%	2.6%	2.3%		2.0%	87%	84%	86%	85%		93%
Abu Dhabi, UAE	4.1%	1.7%					98%	96%				
Dubai, UAE	5.2%	4.0%	5.0%				97%	95%	69%			
Florida, US	2.8%	6.9%					90%	84%				

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Appendix D.2: Percentages of Students with Achievement Too Low for Estimation*

Country	Percentage of Students with Achievement Too Low for Estimation	Average Percent Correct
Australia	2 (0.3)	47 (0.5)
Bahrain	6 (0.4)	39 (0.3)
Botswana (9)	10 (0.4)	29 (0.3)
Canada	1 (0.3)	49 (0.4)
Chile	3 (0.3)	36 (0.5)
Chinese Taipei	1 (0.1)	59 (0.4)
Egypt	13 (0.7)	27 (0.5)
England	1 (0.2)	51 (0.8)
Georgia	5 (0.4)	35 (0.5)
Hong Kong SAR	1 (0.2)	53 (0.8)
Hungary	1 (0.3)	50 (0.7)
Iran, Islamic Rep. of	4 (0.4)	37 (0.7)
Ireland	1 (0.2)	50 (0.5)
Israel	4 (0.4)	46 (0.7)
Italy	1 (0.2)	44 (0.4)
Japan	0 (0.1)	59 (0.4)
Jordan	7 (0.5)	33 (0.4)
Kazakhstan	1 (0.2)	51 (1.0)
Korea, Rep. of	0 (0.1)	56 (0.5)
Kuwait	11 (0.9)	31 (0.8)
Lebanon	11 (1.0)	29 (0.7)
Lithuania	1 (0.1)	48 (0.6)
Malaysia	4 (0.5)	40 (0.7)
Malta	5 (0.4)	42 (0.3)
Morocco	9 (0.4)	27 (0.3)
New Zealand	3 (0.2)	47 (0.6)
Norway (9)	2 (0.2)	46 (0.5)
Oman	5 (0.4)	37 (0.4)
Qatar	6 (0.4)	38 (0.5)
Russian Federation	0 (0.1)	54 (0.9)
Saudi Arabia	10 (0.8)	28 (0.6)
Singapore	0 (0.1)	64 (0.7)
Slovenia	0 (0.1)	55 (0.5)
South Africa (9)	15 (0.8)	24 (0.7)
Sweden	2 (0.3)	49 (0.7)
Thailand	3 (0.4)	37 (0.8)
Turkey	3 (0.3)	43 (0.8)
United Arab Emirates	5 (0.3)	41 (0.4)
United States	1 (0.2)	50 (0.6)
Benchmarking Participants		
Buenos Aires, Argentina	15 (1.1)	27 (0.5)
Ontario, Canada	2 (0.4)	49 (0.5)
Quebec, Canada	1 (0.5)	50 (0.9)
Norway (8)	2 (0.3)	42 (0.5)
Abu Dhabi, UAE	6 (0.7)	38 (0.9)
Dubai, UAE	2 (0.2)	50 (0.4)
Florida, US	2 (0.6)	46 (1.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

* Students were considered to have achievement too low for estimation 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.

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

Appendix E.2: Average Percent Correct in the Science Content and Cognitive Domains

Country	Overall Science	Science Content Domains				Science Cognitive Domains		
		Biology	Chemistry	Physics	Earth Science	Knowing	Applying	Reasoning
Australia	47 (0.5)	50 (0.6)	40 (0.6)	44 (0.5)	51 (0.5)	51 (0.5)	48 (0.6)	39 (0.6)
Bahrain	39 (0.3)	40 (0.4)	37 (0.5)	38 (0.3)	41 (0.5)	44 (0.4)	39 (0.4)	32 (0.4)
Botswana (9)	29 (0.3)	31 (0.4)	26 (0.4)	28 (0.3)	27 (0.3)	34 (0.3)	30 (0.3)	19 (0.4)
Canada	49 (0.4)	52 (0.4)	43 (0.5)	47 (0.5)	52 (0.5)	52 (0.5)	50 (0.4)	44 (0.5)
Chile	36 (0.5)	38 (0.5)	31 (0.5)	33 (0.5)	39 (0.6)	43 (0.5)	36 (0.5)	27 (0.6)
Chinese Taipei	59 (0.4)	59 (0.4)	60 (0.5)	56 (0.5)	62 (0.4)	65 (0.4)	59 (0.4)	51 (0.5)
Egypt	27 (0.5)	25 (0.5)	27 (0.6)	29 (0.5)	27 (0.5)	33 (0.6)	26 (0.5)	17 (0.4)
England	51 (0.8)	53 (0.9)	48 (0.9)	50 (0.8)	53 (0.8)	53 (0.7)	53 (0.8)	47 (1.0)
Georgia	35 (0.5)	36 (0.5)	36 (0.6)	33 (0.5)	33 (0.6)	42 (0.5)	34 (0.5)	25 (0.6)
Hong Kong SAR	53 (0.8)	54 (0.8)	49 (0.9)	52 (0.9)	57 (0.8)	57 (0.7)	53 (0.9)	48 (1.0)
Hungary	50 (0.7)	50 (0.6)	50 (0.8)	51 (0.7)	51 (0.7)	54 (0.6)	51 (0.7)	43 (0.8)
Iran, Islamic Rep. of	37 (0.7)	36 (0.7)	35 (0.9)	40 (0.8)	36 (0.7)	43 (0.7)	38 (0.7)	28 (0.8)
Ireland	50 (0.5)	52 (0.6)	46 (0.7)	48 (0.6)	55 (0.6)	53 (0.5)	52 (0.6)	44 (0.7)
Israel	46 (0.7)	47 (0.8)	47 (0.9)	47 (0.7)	46 (0.7)	50 (0.7)	47 (0.7)	41 (0.9)
Italy	44 (0.4)	45 (0.4)	39 (0.5)	43 (0.5)	49 (0.5)	49 (0.4)	45 (0.4)	35 (0.5)
Japan	59 (0.4)	60 (0.4)	56 (0.6)	58 (0.4)	61 (0.4)	61 (0.4)	61 (0.4)	53 (0.5)
Jordan	33 (0.4)	33 (0.4)	32 (0.6)	33 (0.5)	34 (0.5)	39 (0.4)	33 (0.5)	24 (0.5)
Kazakhstan	51 (1.0)	50 (1.0)	55 (1.2)	53 (1.1)	48 (1.0)	55 (1.0)	52 (1.0)	43 (1.1)
Korea, Rep. of	56 (0.5)	56 (0.4)	52 (0.6)	57 (0.6)	57 (0.5)	59 (0.5)	56 (0.5)	51 (0.5)
Kuwait	31 (0.8)	31 (0.8)	30 (0.8)	30 (0.8)	33 (0.8)	37 (0.7)	31 (0.8)	22 (0.9)
Lebanon	29 (0.7)	26 (0.7)	33 (0.9)	31 (0.8)	27 (0.6)	35 (0.7)	29 (0.8)	19 (0.7)
Lithuania	48 (0.6)	50 (0.6)	45 (0.7)	47 (0.6)	49 (0.7)	51 (0.5)	48 (0.6)	43 (0.7)
Malaysia	40 (0.7)	40 (0.7)	37 (0.7)	42 (0.7)	41 (0.7)	45 (0.6)	41 (0.7)	30 (0.7)
Malta	42 (0.3)	42 (0.3)	40 (0.4)	42 (0.4)	44 (0.4)	45 (0.3)	44 (0.3)	34 (0.4)
Morocco	27 (0.3)	26 (0.3)	26 (0.4)	27 (0.4)	29 (0.3)	33 (0.3)	27 (0.3)	18 (0.3)
New Zealand	47 (0.6)	49 (0.6)	42 (0.7)	45 (0.6)	50 (0.8)	49 (0.6)	48 (0.7)	41 (0.7)
Norway (9)	46 (0.5)	45 (0.6)	42 (0.6)	46 (0.6)	50 (0.7)	49 (0.5)	46 (0.6)	41 (0.7)
Oman	37 (0.4)	38 (0.4)	34 (0.5)	35 (0.4)	39 (0.4)	43 (0.4)	37 (0.4)	28 (0.4)
Qatar	38 (0.5)	39 (0.5)	35 (0.6)	38 (0.5)	40 (0.5)	43 (0.4)	39 (0.5)	30 (0.5)
Russian Federation	54 (0.9)	54 (1.0)	55 (1.1)	54 (0.9)	52 (0.9)	60 (1.0)	53 (0.9)	46 (0.9)
Saudi Arabia	28 (0.6)	29 (0.7)	24 (0.7)	26 (0.7)	31 (0.6)	34 (0.6)	27 (0.7)	21 (0.7)
Singapore	64 (0.7)	68 (0.7)	63 (0.8)	65 (0.7)	59 (0.7)	67 (0.6)	66 (0.7)	59 (0.8)
Slovenia	55 (0.5)	56 (0.5)	54 (0.6)	53 (0.5)	59 (0.6)	60 (0.5)	55 (0.5)	49 (0.6)
South Africa (9)	24 (0.7)	25 (0.8)	22 (0.7)	25 (0.6)	25 (0.8)	29 (0.7)	25 (0.8)	15 (0.7)
Sweden	49 (0.7)	49 (0.7)	45 (0.7)	48 (0.7)	52 (0.7)	52 (0.6)	49 (0.7)	43 (0.9)
Thailand	37 (0.8)	39 (0.8)	33 (0.8)	33 (0.8)	39 (0.9)	44 (0.8)	37 (0.9)	26 (0.8)
Turkey	43 (0.8)	44 (0.8)	43 (0.9)	45 (0.8)	42 (0.8)	48 (0.8)	43 (0.8)	37 (0.9)
United Arab Emirates	41 (0.4)	42 (0.4)	40 (0.5)	40 (0.4)	43 (0.4)	47 (0.4)	42 (0.4)	33 (0.4)
United States	50 (0.6)	53 (0.6)	46 (0.7)	46 (0.6)	53 (0.6)	54 (0.6)	52 (0.6)	43 (0.7)
International Avg.	43 (0.1)	44 (0.1)	41 (0.1)	42 (0.1)	45 (0.1)	48 (0.1)	44 (0.1)	36 (0.1)
Benchmarking Participants								
Buenos Aires, Argentina	27 (0.5)	28 (0.6)	20 (0.5)	25 (0.6)	31 (0.8)	34 (0.6)	26 (0.6)	17 (0.6)
Ontario, Canada	49 (0.5)	53 (0.5)	41 (0.6)	47 (0.6)	51 (0.6)	51 (0.5)	50 (0.5)	44 (0.6)
Quebec, Canada	50 (0.9)	50 (0.9)	48 (1.1)	47 (1.0)	55 (1.0)	54 (0.9)	50 (0.9)	44 (1.0)
Norway (8)	42 (0.5)	42 (0.5)	37 (0.6)	40 (0.5)	47 (0.6)	45 (0.5)	43 (0.5)	36 (0.6)
Abu Dhabi, UAE	38 (0.9)	38 (1.1)	36 (1.1)	36 (0.8)	40 (1.0)	43 (0.9)	38 (1.0)	29 (1.0)
Dubai, UAE	50 (0.4)	51 (0.4)	49 (0.5)	49 (0.4)	51 (0.4)	55 (0.4)	50 (0.5)	43 (0.5)
Florida, US	46 (1.2)	49 (1.1)	43 (1.3)	43 (1.2)	48 (1.4)	52 (1.2)	47 (1.1)	38 (1.4)

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Appendix F: Test-Curriculum Matching Analysis

TIMSS went to great lengths to ensure that comparisons of student achievement across countries would be as fair and equitable as possible. The *TIMSS 2015 Assessment Frameworks* were designed to specify the important aspects of science that participating countries agreed should be the focus of an international assessment of science achievement, and the assessment items were developed through a collaborative process with national representatives to faithfully represent the specifications in the frameworks and field tested extensively in participating countries. Finalizing the TIMSS 2015 assessments involved a series of reviews by representatives of the participating countries, experts in science, and testing specialists. At the end of this process, the National Research Coordinators (NRCs) from each country formally approved the TIMSS 2015 assessments, thus accepting them as being sufficiently fair to compare their students' science achievement with that of students from other countries.

Although the assessments were developed to represent an agreed-upon framework and were intended to have as much in common across countries as possible, it was unavoidable that the match between the TIMSS 2015 assessment (or test) and the science curriculum would not be the same in all countries. To restrict test items to just those topics included in the curricula of all participating countries and covered in the same sequence would severely limit test coverage and restrict the research questions that the study is designed to address. The tests, therefore, inevitably have some items measuring topics unfamiliar to some students in some countries.

The Test-Curriculum Matching Analysis (TCMA) was conducted to investigate the extent to which the TIMSS 2015 science assessment matched each country's curriculum. The TCMA also investigates the impact on a country's performance of including only achievement items that were judged to be relevant to its own curriculum.[1]

To gather data about the extent to which the TIMSS 2015 tests matched the curricula of the TIMSS countries and benchmarking participants, NRCs were asked to examine each achievement item and indicate whether the item was in their country's intended curriculum at the grade tested (fourth or eighth grade). The NRCs were asked to choose persons very familiar with the curriculum at these grades to make this determination. In some countries, the curriculum was prescribed for a range of grades and was not explicit about what was to be covered by the end of the fourth or eighth grades. For example, in Poland the curriculum specifies the curricular goals to be achieved by the end of the sixth and ninth grades, but does not provide a grade-by-grade specification. In such

1 Because there also may be curriculum areas covered in some countries that are not covered by the TIMSS 2015 tests, the TCMA does not provide complete information about how well the tests cover the curricula of the countries.

situations, coordinators were asked to make the best judgment possible.[2] Because an item might be in the curriculum for some but not all students in a country, NRCs were asked to consider an item included if it was in the intended curriculum for more than 50 percent of the students. All TIMSS 2015 participants took part in the TCMA analysis except Norway (4) and Buenos Aires at the fourth grade and Egypt, Norway (8), and Buenos Aires at the eighth grade.

Exhibits F.1 through F.4 present the TCMA results for the TIMSS 2015 science test at the fourth and eighth grades. Exhibits F.1 and F.2 show the average percent correct on the science items judged appropriate by each country at the fourth and eighth grades, respectively. Exhibits F.3 and F.4 show the standard errors corresponding to the percentages presented in Exhibits F.1 and F.2.

In Exhibit F.1, the bottom row of the exhibit shows the number of items, in terms of score points, identified as appropriate in each country. At the fourth grade, the maximum number of score points in the assessment was 180 points.[3] Generally, the proportion of items judged appropriate was fairly high. Reading along the bottom row, it can be seen that 2 of the 47 countries that took part in the TCMA analysis judged 100 percent of the items to be included in their curricula. A further 21 countries and 2 of the 5 benchmarking participants judged 75 percent or more (135 score points) to be appropriate.

At the eighth grade, the percentage of items judged appropriate was similar; 2 of the 38 countries judged 100 percent of the items to be appropriate (all 233 score points), and an additional 26 countries and 3 of the 5 benchmarking participants judged 75 percent or more (175 score points) to be appropriate. All but two of the countries and two of the benchmarking participants concurred that more than half of the science items were included in their curricula.

Because most countries indicated that at least some items were not included in their intended curriculum at the grade tested, the data were analyzed to determine whether the inclusion of these items had any effect on the international performance comparisons.[4]

The first column of data in Exhibits F.1 and F.2 show the average percent correct on all test items for each participant, together with its standard error. Subsequent columns show the performance of each participant on those items judged appropriate by the participant listed at the head of the column. Participants are presented in order of their performance based on average percent correct on all items, from highest to lowest. To interpret these exhibits, choosing a country and reading across its row provides the average percent correct for the students in that country on the items selected by each of the countries listed along the top of the exhibit. For example, at the fourth grade, Singapore, where the average percent correct was 81 percent on its own set of items, also had 70 percent correct on the items selected by Korea, 74 percent on the items selected by Japan, 67 percent on the items selected by the Russian Federation, and so forth.

2 Exhibits 5 and 6 of the TIMSS 2015 Encyclopedia provide information on the grade-to-grade structure of the curriculum for each TIMSS 2015 participant.

3 The TIMSS 2015 fourth grade science assessment contained 176 items, yielding 188 score points. However, following item review, eight items were deleted, resulting in 168 items and 180 score points. Similarly, following item review, the 220 items and 239 score points in the eighth grade assessment were reduced to 215 items and 233 score points by deleting five items and reducing the point value of one item.

4 It should be noted that the science achievement presented in Exhibits F.1 and F.2 is based on average percent correct (the percentage of students in a country answering each item correctly, averaged across all items), which is different from the average scale scores that are presented in main tables of the report.

Exhibit F.1: Average Percent Correct for the Test-Curriculum Matching Analysis, Fourth Grade

Based on a subset of items specifically identified by each country as addressing its curriculum

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Singapore	Korea, Rep. of	Japan	Russian Federation	Hong Kong SAR	Chinese Taipei	Finland	Kazakhstan	Poland	United States	Bulgaria	Slovenia	Hungary	Sweden	Norway (5)	England	Czech Republic	Croatia	Ireland	Lithuania	Germany	Denmark	Serbia	Canada	Australia	Slovak Republic	Northern Ireland	Spain	Italy	Netherlands
Singapore	67 (0.8)	81	70	74	67	68	67	72	67	69	67	68	68	68	69	68	69	67	70	68	67	68	67	68	69	69	69	69	67	68	67
Korea, Rep. of	66 (0.4)	67	75	71	68	66	66	70	67	67	67	68	67	67	69	69	67	68	68	66	67	66	70	66	67	68	68	68	67	68	68
Japan	62 (0.4)	64	67	70	61	62	67	67	61	63	62	63	63	62	64	63	63	62	65	63	62	63	64	62	61	63	64	64	62	61	62
Russian Federation	62 (0.7)	61	65	63	63	62	60	66	62	62	62	63	62	62	63	63	62	63	60	61	62	62	65	61	61	62	64	63	62	62	63
Hong Kong SAR	60 (0.6)	60	62	62	61	60	59	65	60	60	60	61	61	60	61	61	59	61	60	59	60	59	63	58	57	60	60	61	60	59	61
Chinese Taipei	59 (0.4)	58	62	62	59	59	61	63	58	60	59	60	60	60	60	60	58	60	60	59	59	59	62	59	57	59	61	60	60	59	59
Finland	58 (0.4)	56	62	59	60	58	57	62	59	59	59	59	59	59	60	61	59	60	57	58	59	59	63	57	58	59	59	60	59	58	60
Kazakhstan	58 (0.9)	61	60	62	59	58	58	62	58	58	58	60	59	59	61	59	59	59	59	58	58	58	60	57	56	59	60	59	58	57	59
Poland	57 (0.5)	53	60	56	61	58	55	62	60	60	57	60	58	59	60	59	59	60	59	57	59	58	63	56	58	59	58	60	59	59	59
United States	57 (0.4)	54	60	57	59	57	53	61	59	58	57	58	58	58	59	59	58	59	56	57	59	57	61	56	58	59	58	60	58	57	60
Bulgaria	57 (1.2)	55	57	56	60	57	53	61	59	58	57	60	57	57	60	58	57	59	57	57	58	56	60	55	56	57	58	58	57	57	59
Slovenia	56 (0.4)	56	60	60	58	57	56	62	57	58	57	58	58	57	58	59	57	58	57	57	58	57	60	56	56	58	59	59	57	57	59
Hungary	56 (0.7)	55	60	58	59	57	55	61	59	58	57	58	57	58	59	60	57	59	56	56	57	56	61	55	56	58	58	58	57	57	58
Sweden	56 (0.7)	53	59	57	58	55	53	59	57	57	56	57	57	57	58	59	56	58	55	56	56	56	60	55	55	57	57	57	56	55	57
Norway (5)	55 (0.5)	51	57	52	57	55	52	58	57	55	55	56	56	56	57	59	55	57	53	54	56	55	60	54	54	55	55	57	56	54	57
England	55 (0.5)	53	57	55	56	55	53	59	55	55	55	55	56	55	57	57	56	56	53	55	56	55	59	53	55	55	56	57	55	54	57
Czech Republic	55 (0.4)	53	59	55	57	55	52	59	57	56	55	56	56	55	56	57	56	56	53	54	56	55	59	53	55	56	55	57	55	56	57
Croatia	54 (0.4)	53	57	56	57	54	53	59	56	56	54	56	56	55	55	57	56	56	58	54	55	55	58	53	54	55	56	57	55	55	56
Ireland	53 (0.5)	50	55	52	54	53	51	57	54	54	53	54	55	54	55	56	53	55	51	53	54	53	58	52	52	54	54	55	54	52	56
Lithuania	53 (0.5)	51	55	54	54	53	54	57	53	54	53	54	54	54	55	55	54	54	53	53	54	53	57	52	51	53	54	55	53	53	54
Germany	53 (0.4)	51	57	56	53	53	54	57	53	53	53	54	54	53	55	55	53	54	51	53	54	53	57	52	51	53	54	54	53	52	55
Denmark	53 (0.4)	48	55	50	54	53	51	56	54	53	53	53	54	53	54	55	52	54	50	52	54	53	58	51	51	53	53	54	53	52	54
Serbia	52 (0.7)	54	55	55	54	53	51	57	54	55	53	55	54	53	54	54	54	54	54	53	54	53	56	52	53	54	55	56	53	53	54
Canada	52 (0.5)	49	54	51	55	52	50	56	54	54	53	54	54	53	54	55	53	54	52	52	54	52	57	51	53	54	53	55	53	53	55
Australia	52 (0.6)	51	55	52	54	52	50	56	53	54	52	53	53	53	54	54	53	54	51	52	53	52	56	51	52	53	53	55	53	52	54
Slovak Republic	52 (0.6)	51	55	55	54	51	51	57	53	52	52	54	53	53	55	53	53	54	50	52	53	52	56	50	51	53	54	54	53	52	55
Northern Ireland	51 (0.5)	48	53	48	53	51	49	55	52	52	51	52	53	52	52	54	52	53	50	51	52	51	56	50	50	52	52	54	52	51	53
Spain	51 (0.5)	48	52	50	54	51	47	55	54	53	51	53	52	52	54	53	52	53	51	51	53	51	55	50	52	52	53	54	52	51	53
Italy	51 (0.5)	50	53	50	53	51	48	55	52	53	50	53	52	51	52	53	52	52	52	51	52	51	55	50	51	52	52	54	51	51	52
Netherlands	50 (0.5)	46	53	47	52	50	48	54	50	51	50	51	51	51	51	53	51	52	48	50	52	51	55	49	50	52	50	52	51	49	52
Belgium (Flemish)	49 (0.4)	46	51	48	50	48	47	53	49	50	49	50	50	49	50	51	49	50	49	48	50	49	53	48	48	49	50	51	49	48	50
New Zealand	49 (0.5)	45	51	48	50	49	47	52	50	50	49	49	50	49	50	51	49	50	48	48	50	49	53	47	48	50	49	51	49	48	50
Portugal	48 (0.3)	46	50	49	52	49	46	54	50	50	49	51	50	49	51	52	49	51	49	48	50	49	53	47	48	49	51	51	49	47	51
Turkey	45 (0.5)	45	48	47	46	46	46	49	45	46	45	47	46	45	47	47	46	46	47	46	46	45	48	44	43	46	46	47	45	44	47
France	44 (0.5)	41	45	44	47	44	44	49	45	45	44	46	45	45	47	46	44	46	44	44	46	44	49	43	43	45	45	47	45	43	46
Cyprus	43 (0.5)	42	45	44	45	43	43	47	44	45	43	44	44	43	45	44	43	44	44	43	44	43	47	43	42	43	44	46	43	42	44
Chile	42 (0.5)	41	44	41	46	43	40	47	45	44	42	44	43	43	45	45	43	44	42	42	44	42	47	41	42	43	44	45	43	42	44
Bahrain	41 (0.4)	42	41	44	43	42	39	45	43	42	41	43	42	42	44	43	43	43	42	41	42	41	44	41	41	42	42	43	42	41	43
United Arab Emirates	41 (0.4)	41	43	43	43	42	40	45	42	41	41	43	42	42	44	43	42	43	41	41	42	41	44	40	41	42	42	43	42	41	43
Georgia	39 (0.7)	40	41	40	41	39	36	44	40	39	39	41	39	39	42	41	39	40	38	38	39	39	42	37	37	40	40	40	39	38	40
Oman	38 (0.5)	39	39	42	40	38	36	42	39	37	38	40	38	39	41	39	39	39	38	38	39	38	40	37	37	38	39	40	38	38	39
Qatar	38 (0.6)	38	39	40	40	38	36	42	39	38	38	39	38	38	40	39	39	39	38	38	39	37	41	37	37	39	39	39	38	38	39
Iran, Islamic Rep. of	34 (0.6)	36	36	37	36	34	35	40	35	34	35	36	35	35	37	37	35	36	35	35	35	35	37	34	33	34	36	37	35	34	37
Indonesia	31 (0.6)	34	33	33	33	32	32	35	32	31	32	33	32	32	34	33	31	32	30	32	32	32	34	31	30	32	33	33	32	31	34
Saudi Arabia	31 (0.6)	31	33	33	33	31	30	35	32	31	32	33	32	31	34	32	32	33	31	31	32	31	34	30	31	32	32	32	32	31	33
Morocco	27 (0.6)	29	28	30	28	27	27	30	27	26	27	28	27	27	29	26	27	27	26	27	27	26	29	26	26	27	27	27	27	27	27
Kuwait	25 (0.7)	26	27	27	27	26	23	29	26	25	26	26	25	26	27	26	26	26	25	25	26	25	28	24	25	26	25	26	26	25	27
International Avg.	50 (0.1)	49	52	51	51	50	48	54	51	51	50	51	51	50	52	52	50	51	50	50	51	50	53	49	49	51	51	52	50	50	51
Benchmarking Participants																															
Florida, US	58 (1.1)	55	60	57	60	58	54	61	60	59	58	59	59	58	60	60	59	60	56	57	59	58	62	57	59	60	58	60	58	58	61
Ontario, Canada	54 (0.5)	51	55	52	56	54	50	57	55	56	54	55	55	54	55	55	54	56	53	54	55	54	58	53	55	55	54	56	54	54	56
Dubai, UAE	53 (0.3)	53	55	55	55	53	52	58	54	53	53	54	53	53	56	55	54	55	53	53	54	52	56	52	53	53	54	55	53	52	55
Quebec, Canada	52 (0.8)	48	53	51	54	52	51	56	54	54	52	54	53	53	54	55	52	54	52	52	54	52	57	51	51	53	54	55	53	51	54
Abu Dhabi, UAE	35 (0.9)	35	37	37	37	36	34	39	36	35	36	37	36	36	38	37	36	37	35	35	36	35	38	34	35	36	36	37	36	35	37
Number of Items (Score Points) Identified*	180	54	61	52	113	146	61	113	125	104	170	140	154	165	107	116	140	141	73	160	148	163	149	152	96	131	128	136	166	129	127

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

* Of the 176 items in the Science test, some extended response items were scored on a two-point scale, resulting in 188 score points. Following item review, eight items were deleted, resulting in 168 items and 180 score points.

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

Exhibit F.1: Average Percent Correct for the Test-Curriculum Matching Analysis, Fourth Grade (Continued)

Based on a subset of items specifically identified by each country as addressing its curriculum

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Belgium (Flemish)	New Zealand	Portugal	Turkey	France	Cyprus	Chile	Bahrain	United Arab Emirates	Georgia	Oman	Qatar	Iran, Islamic Rep. of	Indonesia	Saudi Arabia	Morocco	Kuwait	**Benchmarking Participants**	Florida, US	Ontario, Canada	Dubai, UAE	Quebec, Canada	Abu Dhabi, UAE
Singapore	67 (0.8)	67	70	67	67	68	69	69	67	67	71	68	67	68	68	67	71	67		67	67	68	68	67
Korea, Rep. of	66 (0.4)	66	68	66	67	66	70	67	66	65	68	66	66	67	69	65	68	66		67	65	67	67	66
Japan	62 (0.4)	62	64	62	62	62	64	62	61	60	64	63	62	62	62	60	64	61		62	58	61	62	60
Russian Federation	62 (0.7)	62	62	62	62	62	64	62	61	59	62	62	62	62	64	59	63	61		62	61	61	61	60
Hong Kong SAR	60 (0.6)	59	62	60	60	60	61	60	59	59	60	60	60	60	61	59	61	59		60	57	60	60	58
Chinese Taipei	59 (0.4)	59	61	59	60	59	61	58	58	57	60	60	59	60	62	57	60	58		59	57	58	59	58
Finland	58 (0.4)	60	60	58	59	59	61	59	58	56	58	58	58	59	61	56	60	58		59	57	58	59	57
Kazakhstan	58 (0.9)	58	60	58	58	59	59	59	58	56	59	59	58	58	60	56	61	58		58	58	57	58	57
Poland	57 (0.5)	59	60	57	58	59	60	59	57	53	56	58	57	58	60	53	59	57		57	57	55	58	56
United States	57 (0.4)	58	59	57	58	58	60	59	57	55	57	57	57	58	60	55	59	56		57	59	57	58	56
Bulgaria	57 (1.2)	59	59	57	57	58	59	58	57	53	56	57	57	57	60	53	58	57		57	58	55	57	55
Slovenia	56 (0.4)	59	60	56	57	57	59	57	56	55	58	57	56	58	60	55	59	56		57	56	56	57	55
Hungary	56 (0.7)	59	58	56	57	57	60	58	56	54	56	57	56	57	61	54	59	56		57	57	56	57	55
Sweden	56 (0.7)	56	58	56	57	57	58	56	56	54	57	56	56	56	59	54	57	55		56	55	56	56	54
Norway (5)	55 (0.5)	58	56	55	56	56	57	56	55	52	56	55	55	55	56	52	55	54		55	52	54	56	52
England	55 (0.5)	55	57	55	55	55	57	56	54	53	54	55	55	55	57	53	57	54		55	55	55	55	54
Czech Republic	55 (0.4)	56	57	55	55	56	58	55	55	51	55	54	55	55	58	51	56	54		55	57	53	55	54
Croatia	54 (0.4)	54	58	54	55	56	57	55	54	53	54	55	54	55	58	53	55	53		54	55	55	55	53
Ireland	53 (0.5)	54	55	53	54	54	56	54	53	51	53	53	53	54	56	51	54	52		53	51	53	54	51
Lithuania	53 (0.5)	53	56	53	54	55	55	54	53	50	53	53	53	54	55	50	55	53		53	50	52	53	52
Germany	53 (0.4)	54	55	53	53	54	55	53	53	50	53	53	53	53	54	50	55	52		53	50	53	54	51
Denmark	53 (0.4)	55	54	53	53	53	54	53	52	48	52	52	53	53	53	48	55	52		53	50	50	53	50
Serbia	52 (0.7)	53	56	52	53	54	55	54	52	50	54	53	52	53	57	50	55	52		53	53	52	54	51
Canada	52 (0.5)	53	55	52	53	53	55	54	52	51	53	52	52	53	55	51	54	52		53	54	52	53	51
Australia	52 (0.6)	53	54	52	53	53	55	54	52	50	52	52	52	53	55	50	55	51		52	53	52	52	51
Slovak Republic	52 (0.6)	53	54	52	53	53	54	53	52	48	52	53	52	53	56	48	54	52		52	52	50	52	51
Northern Ireland	51 (0.5)	52	54	51	52	52	54	52	51	49	50	51	51	52	54	49	53	50		51	50	51	52	50
Spain	51 (0.5)	52	54	51	52	53	54	52	51	50	51	52	51	53	55	50	53	50		51	51	52	52	50
Italy	51 (0.5)	52	53	51	51	52	53	52	51	50	50	51	51	52	54	50	52	50		50	52	51	51	50
Netherlands	50 (0.5)	53	52	50	51	51	52	51	50	48	50	50	50	50	53	48	50	49		50	50	50	51	48
Belgium (Flemish)	49 (0.4)	52	51	49	49	50	51	49	49	46	49	49	49	49	51	46	49	48		49	48	48	49	46
New Zealand	49 (0.5)	50	51	49	49	49	51	50	48	47	49	48	49	49	51	47	51	48		49	48	48	49	47
Portugal	48 (0.3)	51	52	48	49	50	53	50	48	46	49	49	48	50	53	46	51	48		49	48	48	49	47
Turkey	45 (0.5)	44	46	45	46	46	47	46	45	45	45	45	45	46	48	45	46	45		45	43	46	45	44
France	44 (0.5)	45	46	44	44	46	47	44	44	42	43	44	44	45	48	42	46	43		44	42	44	45	42
Cyprus	43 (0.5)	43	45	43	44	44	46	44	42	41	44	44	43	44	46	41	46	43		43	41	43	43	41
Chile	42 (0.5)	45	45	42	43	43	46	44	42	41	44	43	42	43	47	41	45	42		42	43	43	43	40
Bahrain	41 (0.4)	41	44	41	42	42	42	42	41	41	41	42	41	43	44	41	43	42		41	42	42	42	41
United Arab Emirates	41 (0.4)	41	43	41	42	42	43	42	41	40	41	42	41	42	44	40	42	41		41	41	42	41	41
Georgia	39 (0.7)	41	41	39	39	39	41	40	38	35	41	39	39	39	42	35	42	39		39	38	37	39	38
Oman	38 (0.5)	37	40	38	39	39	39	38	38	37	38	39	38	39	40	37	39	38		38	39	38	39	38
Qatar	38 (0.6)	38	40	38	38	39	39	39	38	36	38	38	38	39	40	36	40	38		38	38	38	38	38
Iran, Islamic Rep. of	34 (0.6)	35	37	34	35	35	36	35	35	35	37	35	34	36	38	35	36	34		35	33	36	35	34
Indonesia	31 (0.6)	32	34	31	32	32	32	32	32	32	31	32	31	32	35	32	33	32		32	30	33	31	31
Saudi Arabia	31 (0.6)	31	33	31	32	32	32	32	31	29	30	32	31	32	33	29	33	32		32	32	31	31	31
Morocco	27 (0.6)	27	27	27	27	28	27	27	27	25	26	27	27	28	28	25	29	27		27	26	27	27	26
Kuwait	25 (0.7)	24	26	25	26	26	26	26	25	24	25	25	25	26	27	24	26	26		26	26	26	25	26
International Avg.	50 (0.1)	51	52	50	50	51	52	51	50	48	50	50	50	51	52	48	52	49		50	49	50	50	49
Benchmarking Participants																								
Florida, US	58 (1.1)	58	60	58	58	58	60	60	58	57	58	57	58	59	61	57	60	57		58	60	58	58	57
Ontario, Canada	54 (0.5)	54	56	54	54	54	56	55	53	52	53	53	54	54	57	52	56	53		54	56	53	54	52
Dubai, UAE	53 (0.3)	53	55	53	53	54	55	54	53	52	53	53	53	54	56	52	54	53		53	53	54	53	52
Quebec, Canada	52 (0.8)	53	55	52	52	53	55	53	52	50	53	52	52	53	55	50	54	51		52	52	51	53	50
Abu Dhabi, UAE	35 (0.9)	35	37	35	36	36	37	36	35	34	36	36	35	36	37	34	36	35		36	36	36	35	35
Number of Items (Score Points) Identified*	180	72	113	180	175	150	123	147	172	76	80	155	180	156	82	76	107	163		170	62	81	154	133

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit F.2: Average Percent Correct for the Test-Curriculum Matching Analysis, Eighth Grade

Based on a subset of items specifically identified by each country as addressing its curriculum

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Singapore	Chinese Taipei	Japan	Korea, Rep. of	Slovenia	Russian Federation	Hong Kong SAR	Kazakhstan	England	United States	Hungary	Ireland	Canada	Sweden	Lithuania	New Zealand	Australia	Israel	Norway (9)	Italy	Turkey	Malta	United Arab Emirates	Malaysia	Bahrain	Qatar	Iran, Islamic Rep. of	Oman	Thailand	Chile
Singapore	64 (0.7)	68	64	65	66	65	64	66	64	65	65	64	65	65	65	65	67	65	65	65	65	65	65	63	65	65	64	65	65	65	65
Chinese Taipei	59 (0.4)	59	60	59	59	60	58	60	59	59	59	59	60	60	59	59	61	60	60	60	60	60	58	57	59	59	59	59	59	59	60
Japan	59 (0.4)	58	59	61	59	59	59	60	59	59	59	59	59	59	59	60	61	59	58	60	60	59	59	58	59	59	59	59	58	59	59
Korea, Rep. of	56 (0.5)	56	55	53	58	56	55	56	56	56	56	55	56	56	56	57	58	56	56	56	56	56	55	52	55	55	56	56	56	56	56
Slovenia	55 (0.5)	54	56	54	56	57	54	56	55	55	56	55	55	57	55	57	57	56	57	57	56	56	55	56	55	55	55	55	56	56	56
Russian Federation	54 (0.9)	53	54	53	54	55	54	54	54	54	54	54	53	54	53	55	55	54	55	53	55	54	53	53	54	53	54	54	54	54	54
Hong Kong SAR	53 (0.8)	54	53	51	54	54	53	55	53	54	53	53	53	54	53	54	57	54	54	54	54	54	52	49	53	53	53	53	54	54	53
Kazakhstan	51 (1.0)	51	51	51	51	52	52	51	51	52	51	51	50	51	51	52	52	51	52	51	52	52	51	52	52	51	51	51	51	51	52
England	51 (0.8)	51	51	49	51	52	51	51	51	52	51	51	51	52	51	52	54	52	52	53	51	52	51	51	50	51	51	51	51	52	51
United States	50 (0.6)	50	50	48	50	52	49	50	50	50	50	50	50	52	50	52	53	51	52	51	51	51	50	51	50	50	50	50	50	51	51
Hungary	50 (0.7)	50	50	48	50	51	51	50	50	50	50	50	49	51	50	51	53	51	50	50	51	51	51	50	50	50	50	50	50	50	50
Ireland	50 (0.5)	49	50	49	51	51	50	50	50	50	50	50	51	51	50	51	53	51	50	51	51	51	50	49	50	50	50	50	50	51	50
Canada	49 (0.4)	49	49	46	49	50	48	49	49	49	49	49	49	51	49	50	52	50	50	50	50	50	49	49	49	49	49	49	49	49	49
Sweden	49 (0.7)	48	49	46	49	50	48	49	49	49	49	49	48	48	49	50	52	49	49	50	49	49	48	46	48	48	49	49	49	49	48
Lithuania	48 (0.6)	47	48	45	48	49	47	48	48	48	48	48	47	49	48	49	50	49	50	48	49	48	48	47	48	48	48	48	48	48	47
New Zealand	47 (0.6)	47	47	45	47	48	46	47	47	47	47	47	46	48	47	48	50	47	47	48	47	47	46	46	46	47	47	47	47	47	46
Australia	47 (0.5)	46	47	44	47	48	46	46	47	47	47	47	46	48	47	48	50	47	47	47	47	47	46	47	46	47	47	47	47	47	46
Israel	46 (0.7)	47	46	45	47	47	46	47	46	46	46	46	46	47	46	47	49	47	48	47	47	47	46	46	47	46	46	47	47	47	48
Norway (9)	46 (0.5)	44	46	44	45	47	45	46	45	46	46	46	45	46	46	46	49	47	46	47	46	46	45	43	45	45	46	45	46	46	45
Italy	44 (0.4)	42	44	41	44	45	44	43	44	44	44	44	43	45	44	45	47	45	45	45	45	45	43	42	43	44	44	44	44	44	44
Turkey	43 (0.8)	45	43	41	44	44	43	44	43	44	43	43	44	43	43	44	45	44	44	43	44	44	43	44	43	44	43	44	44	43	44
Malta	42 (0.3)	42	42	40	43	42	41	42	42	42	42	42	42	43	42	43	44	43	43	43	42	42	42	43	42	42	42	42	42	42	42
United Arab Emirates	41 (0.4)	42	41	41	42	42	41	42	41	41	41	41	41	42	41	42	43	42	43	42	42	42	41	43	41	41	41	42	42	42	42
Malaysia	40 (0.7)	41	40	38	40	40	40	40	40	40	40	40	39	42	40	40	42	40	40	39	41	40	40	40	40	40	40	40	40	40	40
Bahrain	39 (0.3)	40	39	38	39	40	39	39	39	39	39	39	38	41	39	40	41	40	41	40	40	40	39	40	39	39	39	39	40	39	40
Qatar	38 (0.5)	39	38	37	38	39	38	38	38	38	38	38	37	39	38	39	40	39	39	39	39	39	38	39	38	38	38	38	38	38	39
Iran, Islamic Rep. of	37 (0.7)	37	37	35	36	37	37	37	37	37	37	37	36	38	37	37	39	37	38	36	37	37	37	38	37	37	37	37	37	37	38
Oman	37 (0.4)	37	37	36	38	38	36	37	37	36	37	37	37	38	37	37	39	37	38	38	38	37	36	38	37	37	37	37	37	37	39
Thailand	37 (0.8)	35	37	34	36	38	36	36	36	36	37	36	35	37	36	37	39	37	36	37	38	37	36	36	37	36	37	37	37	37	37
Chile	36 (0.5)	35	36	33	35	37	35	35	35	35	36	36	34	36	36	37	38	36	37	36	37	36	35	34	35	36	36	36	35	36	36
Georgia	35 (0.5)	34	34	31	34	35	35	34	34	34	35	34	33	34	34	35	36	35	36	34	36	35	34	34	35	34	35	35	35	35	34
Jordan	33 (0.4)	33	33	31	32	33	32	32	33	32	33	32	31	33	33	33	34	33	34	33	33	33	32	34	33	33	33	33	33	33	34
Kuwait	31 (0.8)	31	30	29	30	31	31	30	31	30	31	30	29	31	31	31	32	31	32	31	31	31	30	31	30	31	31	31	31	31	32
Lebanon	29 (0.7)	30	29	29	29	29	29	28	29	28	29	29	28	28	29	29	29	29	30	28	29	29	28	30	29	29	29	29	29	29	30
Botswana (9)	28 (0.3)	29	28	27	29	29	28	28	28	28	29	28	28	29	29	29	30	29	29	29	29	29	28	27	29	28	28	29	29	29	30
Saudi Arabia	28 (0.6)	27	28	27	28	29	28	27	28	28	28	28	27	29	28	29	29	28	29	29	29	29	28	27	29	28	28	28	28	29	28
Morocco	27 (0.3)	26	26	25	26	27	26	27	26	26	27	26	26	27	27	27	28	27	28	27	27	27	26	26	26	26	27	26	26	27	27
South Africa (9)	24 (0.7)	24	24	23	24	25	24	24	24	24	24	24	23	24	24	25	25	25	25	24	25	24	24	23	24	24	24	24	24	24	25
International Avg.	44 (0.1)	43	43	42	44	44	43	44	43	43	44	43	43	44	43	44	46	44	44	44	44	44	43	43	43	43	44	44	44	44	44
Benchmarking Participants																															
Dubai, UAE	50 (0.4)	51	50	50	51	51	50	50	50	50	50	50	50	51	50	51	52	51	52	51	51	51	50	51	50	50	50	51	51	50	51
Quebec, Canada	50 (0.9)	49	50	47	49	51	49	50	50	50	50	50	49	52	50	51	52	50	51	51	51	50	49	50	49	50	50	50	50	50	50
Ontario, Canada	49 (0.5)	48	49	45	49	50	48	49	48	49	49	49	48	50	49	50	51	49	49	49	49	49	48	49	48	48	49	49	49	49	48
Florida, US	46 (1.2)	46	46	43	46	47	45	46	46	46	46	46	45	48	46	47	48	47	48	47	47	47	45	47	46	46	46	46	46	47	47
Abu Dhabi, UAE	38 (0.9)	38	37	36	38	38	37	38	37	37	37	37	37	39	38	38	39	38	39	38	38	38	37	39	37	37	38	38	38	38	38
Number of Items (Score Points) Identified*	233	150	225	125	176	204	194	182	217	211	224	230	167	131	224	214	166	206	141	187	194	228	197	64	186	226	233	219	211	212	152

* Of the 220 items in the Science test, some extended response items were scored on a two-point scale, resulting in 239 score points. Following item review, five items were deleted and the point value of one item was reduced, resulting in 215 items and 233 score points.

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit F.2: Average Percent Correct for the Test-Curriculum Matching Analysis, Eighth Grade (Continued)

Based on a subset of items specifically identified by each country as addressing its curriculum

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Georgia	Jordan	Kuwait	Lebanon	Botswana (9)	Saudi Arabia	Morocco	South Africa (9)	Benchmarking Participants	Dubai, UAE	Quebec, Canada	Ontario, Canada	Florida, US	Abu Dhabi, UAE
Singapore	64 (0.7)	64	66	64	63	65	65	65	64		64	64	68	65	65
Chinese Taipei	59 (0.4)	59	62	59	58	59	59	58	59		58	59	59	59	59
Japan	59 (0.4)	58	60	59	59	58	59	58	59		58	59	58	59	58
Korea, Rep. of	56 (0.5)	55	58	56	54	56	56	54	56		54	55	56	56	55
Slovenia	55 (0.5)	55	58	56	54	55	56	55	55		56	56	57	56	55
Russian Federation	54 (0.9)	54	56	54	54	54	54	53	54		55	53	55	54	53
Hong Kong SAR	53 (0.8)	52	55	53	52	53	53	51	53		51	54	54	53	53
Kazakhstan	51 (1.0)	51	52	51	54	51	51	51	51		53	51	50	51	50
England	51 (0.8)	50	53	51	51	50	51	48	51		52	52	51	51	50
United States	50 (0.6)	50	52	50	48	49	50	48	50		52	52	52	50	50
Hungary	50 (0.7)	50	52	50	50	50	50	48	50		52	50	50	50	50
Ireland	50 (0.5)	50	52	50	48	49	50	47	50		50	51	50	50	50
Canada	49 (0.4)	49	51	49	47	48	49	47	49		50	50	50	49	49
Sweden	49 (0.7)	48	50	49	48	47	49	46	49		47	48	47	49	47
Lithuania	48 (0.6)	48	50	48	48	47	48	46	48		48	48	48	48	48
New Zealand	47 (0.6)	46	49	47	44	46	47	45	47		47	47	48	47	46
Australia	47 (0.5)	46	49	46	45	46	47	44	47		48	47	47	47	46
Israel	46 (0.7)	46	48	46	47	46	46	45	46		47	46	47	46	46
Norway (9)	46 (0.5)	45	47	45	45	44	46	43	46		45	46	45	46	45
Italy	44 (0.4)	44	46	44	44	43	44	42	44		44	44	44	44	44
Turkey	43 (0.8)	43	45	43	43	43	44	43	43		45	43	45	43	43
Malta	42 (0.3)	42	44	42	40	41	42	40	42		44	42	43	42	42
United Arab Emirates	41 (0.4)	41	43	41	41	41	41	41	41		44	42	42	41	41
Malaysia	40 (0.7)	40	42	40	39	41	40	38	40		41	40	41	40	39
Bahrain	39 (0.3)	39	41	39	39	39	39	39	39		41	40	41	39	39
Qatar	38 (0.5)	38	40	38	37	38	38	37	38		40	38	39	38	38
Iran, Islamic Rep. of	37 (0.7)	37	39	37	39	37	37	36	37		39	37	38	37	37
Oman	37 (0.4)	37	39	37	36	37	37	37	37		38	37	39	37	37
Thailand	37 (0.8)	36	39	36	35	36	37	35	37		38	36	37	37	36
Chile	36 (0.5)	35	38	36	35	35	36	34	36		35	36	35	36	35
Georgia	35 (0.5)	35	36	34	35	34	35	34	35		35	34	34	35	34
Jordan	33 (0.4)	32	35	33	33	32	33	32	33		35	33	32	33	32
Kuwait	31 (0.8)	30	32	30	31	30	31	30	31		32	31	31	31	30
Lebanon	29 (0.7)	29	30	29	31	29	29	28	29		31	28	28	29	28
Botswana (9)	28 (0.3)	28	30	29	27	29	28	27	28		28	28	29	29	28
Saudi Arabia	28 (0.6)	28	30	28	27	28	28	28	28		30	28	29	28	28
Morocco	27 (0.3)	26	28	27	27	26	27	27	27		27	27	25	27	26
South Africa (9)	24 (0.7)	24	26	24	23	24	24	23	24		24	24	24	24	23
International Avg.	44 (0.1)	43	45	43	43	43	44	42	44		44	44	44	44	43
Benchmarking Participants															
Dubai, UAE	50 (0.4)	50	52	50	50	50	50	50	50		52	50	51	50	50
Quebec, Canada	50 (0.9)	50	52	49	49	48	50	48	50		52	52	50	50	49
Ontario, Canada	49 (0.5)	48	50	48	46	48	49	46	49		50	49	50	49	48
Florida, US	46 (1.2)	46	48	46	45	46	46	45	46		49	47	48	46	47
Abu Dhabi, UAE	38 (0.9)	37	39	37	37	37	38	37	38		40	38	38	37	38
Number of Items (Score Points) Identified*	233	192	213	216	111	197	232	152	233		67	176	108	224	180

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

The column for a country listed at the top shows how each of the other participants performed on the set of items selected as appropriate for that country's students. Using the set of items selected by England at the fourth grade as an example, 69 percent of these items, on average, were answered correctly by students in Singapore, 67 percent by students in Korea, 63 percent by students in Japan, 62 percent by students in the Russian Federation, 59 percent by those in Hong Kong SAR, and so forth. The shaded diagonal element in the exhibit shows how each country performed on the set of items that it selected based on its own curriculum. Thus, students from England averaged 56 percent correct on the set of items identified by England for the analysis.

For each country's selected items, the international averages across participating countries and benchmarking entities are presented in the lower part of the exhibit. These show that the selections of items by the participating countries and benchmarking entities varied somewhat in average difficulty, ranging at the fourth grade from 48 percent correct (the most difficult) for those chosen by Chinese Taipei, the United Arab Emirates, and Saudi Arabia to 53 percent correct (the least difficult) for those chosen by Denmark. At the eighth grade, the average percent correct ranged from 42 percent for Japan and Morocco to 46 percent for those chosen by New Zealand.

Comparing the diagonal element for a country with the overall average percent correct shows the difference between performance on the set of items chosen as appropriate for that country and performance on the test as a whole. In general, countries performed better on their own item sets than on the items overall, although not by much. To illustrate, the average percent correct for Chinese Taipei across all fourth grade mathematics items was 59 percent. The diagonal element shows that students from Chinese Taipei had a slightly greater average percent correct (61 percent) across the set of items selected as appropriate for Chinese Taipei than they did overall. Most participants had a difference of one or two percentage points between the two performance measures, with the largest difference in Singapore (14 percentage points). At the eighth grade, the differences were generally smaller; the largest being in Singapore (4 percentage points).

It is clear that the selection of items does not have a major effect on the relative performance among TIMSS participants. Participants that had relatively high or low performance across all the science items also had relatively high or low performance on each of the various sets of items selected for the TCMA. For example, at the eighth grade, Singapore had the highest average percent correct, not only on the test as a whole, but also on all of the different item selections, with Chinese Taipei, Japan, Korea, and Slovenia next in order of performance (with some ties) on practically all selections of items. Although there are some changes in the ordering of countries based on the items selected for the TCMA, most of these differences are within the boundaries of sampling error.[5]

Even when countries performed better on the items judged by them to be included in their curriculum than they did overall, their performance relative to other participants was changed

5 Small differences in performance between adjacent countries shown in this exhibit usually are not statistically significant. The standard errors for the average percent correct statistics based on the TIMSS 2015 sample are provided in Exhibits F.3 and F.4. For any sample average shown in Exhibits F.1 and F.2, it can be said with 95 percent confidence that the corresponding value in the population falls between the sample estimate plus or minus two standard errors.

little. As an example, consider the 149 score points selected by Denmark at the fourth grade. The students in Denmark did better on these items (58% correct) than on the test as a whole (53% correct). However, most other countries also did better on these particular items, with an international average of 53 percent correct compared with 50 percent correct overall. The countries that performed better than Denmark on the overall test also performed about as well or better on the items selected by Denmark.

The TCMA results provide evidence that the TIMSS 2015 science assessment provides a reasonable basis for comparing achievement of the participating countries and benchmarking entities. This result is not unexpected; making the assessment as fair as possible was a major consideration in test development. The fact that the majority of countries indicated that most items were appropriate for their students means that the different average percent correct estimates were based on many of the same items. Insofar as countries rejected items that would be difficult for their students, these items tended to be difficult for students in other countries as well. The analysis shows that omitting such items tends to improve the results for that country, but also tends to improve the results for all other countries, so that the overall pattern of relative performance is largely unaffected.

Exhibit F.3: Standard Errors for the Test-Curriculum Matching Analysis, Fourth Grade

Based on a subset of items specifically identified by each country as addressing its curriculum

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Singapore	Korea, Rep. of	Japan	Russian Federation	Hong Kong SAR	Chinese Taipei	Finland	Kazakhstan	Poland	United States	Bulgaria	Slovenia	Hungary	Sweden	Norway (5)	England	Czech Republic	Croatia	Ireland	Lithuania	Germany	Denmark	Serbia	Canada	Australia	Slovak Republic	Northern Ireland	Spain	Italy	Netherlands
Singapore	67 (0.8)	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.7	0.7	0.8	0.7	0.8	0.8
Korea, Rep. of	66 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Japan	62 (0.4)	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Russian Federation	62 (0.7)	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Hong Kong SAR	60 (0.6)	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.6	0.7	0.6	0.7	0.6
Chinese Taipei	59 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Finland	58 (0.4)	0.5	0.6	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Kazakhstan	58 (0.9)	1.0	0.9	1.0	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.9	0.9	1.0	0.9	0.9	0.9	1.0	1.0	0.9	0.9	0.9	0.9	1.0	0.9
Poland	57 (0.5)	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
United States	57 (0.4)	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Bulgaria	57 (1.2)	1.2	1.2	1.2	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.2
Slovenia	56 (0.4)	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5
Hungary	56 (0.7)	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Sweden	56 (0.7)	0.7	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Norway (5)	55 (0.5)	0.5	0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5
England	55 (0.5)	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Czech Republic	55 (0.4)	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.5
Croatia	54 (0.4)	0.5	0.5	0.5	0.5	0.4	0.5	0.4	0.5	0.5	0.4	0.5	0.4	0.4	0.5	0.4	0.5	0.5	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.5	0.4	0.4
Ireland	53 (0.5)	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5
Lithuania	53 (0.5)	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5
Germany	53 (0.4)	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5
Denmark	53 (0.4)	0.5	0.6	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Serbia	52 (0.7)	0.8	0.8	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Canada	52 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Australia	52 (0.6)	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6
Slovak Republic	52 (0.6)	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6
Northern Ireland	51 (0.5)	0.6	0.7	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5
Spain	51 (0.5)	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.5	0.5	0.6	0.5	0.5	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.5
Italy	51 (0.5)	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.5
Netherlands	50 (0.5)	0.5	0.6	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Belgium (Flemish)	49 (0.4)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.4	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.4
New Zealand	49 (0.5)	0.4	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4
Portugal	48 (0.3)	0.4	0.4	0.5	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.3	0.3	0.3
Turkey	45 (0.5)	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.5	0.6	0.6	0.5	0.6
France	44 (0.5)	0.5	0.7	0.7	0.5	0.5	0.5	0.6	0.5	0.6	0.5	0.5	0.6	0.5	0.5	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Cyprus	43 (0.5)	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Chile	42 (0.5)	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Bahrain	41 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
United Arab Emirates	41 (0.4)	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.5
Georgia	39 (0.7)	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Oman	38 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Qatar	38 (0.6)	0.5	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.7
Iran, Islamic Rep. of	34 (0.6)	0.6	0.7	0.7	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Indonesia	31 (0.6)	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6
Saudi Arabia	31 (0.6)	0.7	0.6	0.7	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.7	0.6	0.6	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6
Morocco	27 (0.6)	0.7	0.7	0.7	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5
Kuwait	25 (0.7)	0.7	0.6	0.8	0.7	0.7	0.6	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7
International Avg.	50 (0.1)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Benchmarking Participants																															
Florida, US	58 (1.1)	1.1	1.2	1.1	1.0	1.1	1.2	1.0	1.0	1.1	1.1	1.0	1.1	1.1	1.0	1.1	1.1	1.0	1.1	1.1	1.0	1.1	1.0	1.1	1.1	1.1	1.1	1.0	1.0	1.1	1.0
Ontario, Canada	54 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Dubai, UAE	53 (0.3)	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3
Quebec, Canada	52 (0.8)	0.9	1.0	0.9	0.9	0.8	0.9	0.8	0.8	0.9	0.8	0.9	0.8	0.8	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.8	0.8	0.9	0.9	0.9	0.8
Abu Dhabi, UAE	35 (0.9)	0.9	0.8	1.0	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Number of Items (Score Points) Identified*	180	54	61	52	113	146	61	113	125	104	170	140	154	165	107	116	140	141	73	160	148	163	149	152	96	131	128	136	166	129	127

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

* Of the 176 items in the Science test, some extended response items were scored on a two-point scale, resulting in 188 score points. Following item review, eight items were deleted, resulting in 168 items and 180 score points.

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

Exhibit F.3: Standard Errors for the Test-Curriculum Matching Analysis, Fourth Grade (Continued)

Based on a subset of items specifically identified by each country as addressing its curriculum

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Belgium (Flemish)	New Zealand	Portugal	Turkey	France	Cyprus	Chile	Bahrain	United Arab Emirates	Georgia	Oman	Qatar	Iran, Islamic Rep. of	Indonesia	Saudi Arabia	Morocco	Kuwait	**Benchmarking Participants**	Florida, US	Ontario, Canada	Dubai, UAE	Quebec, Canada	Abu Dhabi, UAE
Singapore	67 (0.8)	0.8	0.7	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.8	0.8	0.7		0.8	0.8	0.8	0.8	0.8
Korea, Rep. of	66 (0.4)	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4		0.4	0.4	0.4	0.4	0.4
Japan	62 (0.4)	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.4	0.4
Russian Federation	62 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7		0.7	0.7	0.7	0.7	0.7
Hong Kong SAR	60 (0.6)	0.7	0.6	0.6	0.6	0.7	0.6	0.7	0.6	0.6	0.7	0.7	0.6	0.7	0.7	0.6	0.7	0.6		0.6	0.7	0.6	0.7	0.7
Chinese Taipei	59 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.4	0.4
Finland	58 (0.4)	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4		0.4	0.5	0.5	0.4	0.4
Kazakhstan	58 (0.9)	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		0.9	0.9	0.9	0.9	1.0
Poland	57 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.6	0.5	0.5	0.5
United States	57 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4		0.4	0.5	0.5	0.4	0.4
Bulgaria	57 (1.2)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2		1.2	1.3	1.2	1.2	1.1
Slovenia	56 (0.4)	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.4		0.5	0.5	0.5	0.4	0.5
Hungary	56 (0.7)	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7		0.7	0.8	0.7	0.7	0.7
Sweden	56 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		0.7	0.7	0.7	0.7	0.7
Norway (5)	55 (0.5)	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5		0.5	0.6	0.5	0.5	0.5
England	55 (0.5)	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.6	0.5	0.5	0.5
Czech Republic	55 (0.4)	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.5	0.4	0.5	0.4	0.4		0.4	0.4	0.5	0.4	0.4
Croatia	54 (0.4)	0.5	0.4	0.4	0.4	0.5	0.5	0.4	0.5	0.4	0.5	0.4	0.4	0.5	0.5	0.4	0.4	0.5		0.4	0.6	0.4	0.5	0.5
Ireland	53 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.6	0.5	0.5	0.5
Lithuania	53 (0.5)	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.6	0.6	0.5	0.5		0.5	0.6	0.6	0.5	0.5
Germany	53 (0.4)	0.5	0.5	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.4	0.4	0.5	0.5	0.5	0.4		0.5	0.5	0.5	0.5	0.5
Denmark	53 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.4	0.4		0.4	0.5	0.5	0.4	0.4
Serbia	52 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7		0.7	0.7	0.7	0.7	0.7
Canada	52 (0.5)	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5		0.5	0.6	0.5	0.5	0.5
Australia	52 (0.6)	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.7	0.6	0.6	0.6
Slovak Republic	52 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.6	0.6	0.6	0.6
Northern Ireland	51 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.6	0.5	0.5	0.5
Spain	51 (0.5)	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5		0.5	0.7	0.6	0.5	0.5
Italy	51 (0.5)	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.5		0.5	0.6	0.5	0.5	0.5
Netherlands	50 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.6	0.5	0.5	0.5
Belgium (Flemish)	49 (0.4)	0.5	0.5	0.4	0.4	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4		0.4	0.5	0.5	0.4	0.5
New Zealand	49 (0.5)	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5
Portugal	48 (0.3)	0.4	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.3		0.3	0.4	0.4	0.3	0.4
Turkey	45 (0.5)	0.6	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.5		0.5	0.5	0.6	0.5	0.5
France	44 (0.5)	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5
Cyprus	43 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5		0.5	0.5	0.6	0.5	0.5
Chile	42 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.6	0.5	0.5	0.5
Bahrain	41 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.3	0.4	0.4	0.4	0.5	0.4	0.4		0.3	0.4	0.5	0.3	0.4
United Arab Emirates	41 (0.4)	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.4		0.4	0.5	0.4	0.5	0.4
Georgia	39 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7		0.7	0.8	0.7	0.7	0.7
Oman	38 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5
Qatar	38 (0.6)	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.7	0.6	0.6	0.6
Iran, Islamic Rep. of	34 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.6	0.6	0.6	0.6
Indonesia	31 (0.6)	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.6		0.6	0.7	0.7	0.6	0.6
Saudi Arabia	31 (0.6)	0.7	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.7	0.6	0.6	0.7	0.7	0.6	0.7	0.6		0.6	0.6	0.6	0.6	0.6
Morocco	27 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		0.6	0.6	0.6	0.6	0.6
Kuwait	25 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		0.7	0.8	0.7	0.7	0.7
International Avg.	50 (0.1)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.1
Benchmarking Participants																								
Florida, US	58 (1.1)	1.1	1.0	1.1	1.1	1.0	1.1	1.1	1.1	1.1	1.2	1.0	1.1	1.1	1.1	1.1	1.1	1.1		1.1	1.1	1.1	1.1	1.1
Ontario, Canada	54 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5
Dubai, UAE	53 (0.3)	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.3		0.3	0.3	0.4	0.3	0.3
Quebec, Canada	52 (0.8)	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8		0.8	0.9	0.8	0.8	0.9
Abu Dhabi, UAE	35 (0.9)	1.0	1.0	0.9	0.9	0.9	0.9	1.0	0.9	0.9	1.0	0.9	0.9	0.9	1.0	0.9	1.0	0.9		0.9	0.9	0.9	0.9	0.9
Number of Items (Score Points) Identified*	180	72	113	180	175	150	123	147	172	76	80	155	180	156	82	76	107	163		170	62	81	154	133

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit F.4: Standard Errors for the Test-Curriculum Matching Analysis, Eighth Grade

Based on a subset of items specifically identified by each country as addressing its curriculum

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Singapore	Chinese Taipei	Japan	Korea, Rep. of	Slovenia	Russian Federation	Hong Kong SAR	Kazakhstan	England	United States	Hungary	Ireland	Canada	Sweden	Lithuania	New Zealand	Australia	Israel	Norway (9)	Italy	Turkey	Malta	United Arab Emirates	Malaysia	Bahrain	Qatar	Iran, Islamic Rep. of	Oman	Thailand	Chile
Singapore	64 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Chinese Taipei	59 (0.4)	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Japan	59 (0.4)	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Korea, Rep. of	56 (0.5)	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.5
Slovenia	55 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Russian Federation	54 (0.9)	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	1.0
Hong Kong SAR	53 (0.8)	0.9	0.8	0.9	0.9	0.8	0.8	0.9	0.8	0.9	0.8	0.8	0.9	0.9	0.8	0.8	0.9	0.8	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Kazakhstan	51 (1.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
England	51 (0.8)	0.9	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
United States	50 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Hungary	50 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Ireland	50 (0.5)	0.6	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.5	0.5	0.6	0.5	0.6	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.6	0.6	0.5
Canada	49 (0.4)	0.4	0.4	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Sweden	49 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.6
Lithuania	48 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
New Zealand	47 (0.6)	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6
Australia	47 (0.5)	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5
Israel	46 (0.7)	0.8	0.7	0.8	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.8	0.7	0.8	0.8	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.8	0.7	0.7
Norway (9)	46 (0.5)	0.6	0.5	0.6	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.5	0.5	0.6	0.5	0.6	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5
Italy	44 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Turkey	43 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Malta	42 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3
United Arab Emirates	41 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Malaysia	40 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Bahrain	39 (0.3)	0.4	0.3	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3
Qatar	38 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Iran, Islamic Rep. of	37 (0.7)	0.8	0.7	0.8	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8
Oman	37 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Thailand	37 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Chile	36 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5
Georgia	35 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Jordan	33 (0.4)	0.5	0.4	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4
Kuwait	31 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8
Lebanon	29 (0.7)	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7
Botswana (9)	28 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Saudi Arabia	28 (0.6)	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6
Morocco	27 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
South Africa (9)	24 (0.7)	0.8	0.7	0.8	0.8	0.7	0.7	0.8	0.7	0.8	0.7	0.7	0.8	0.8	0.7	0.8	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7
International Avg.	44 (0.1)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Benchmarking Participants																														
Dubai, UAE	50 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Quebec, Canada	50 (0.9)	0.9	0.9	1.0	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	1.0	0.9	1.0	1.0	0.9	1.0	0.9	0.9	0.9	1.0	1.0	0.9	0.9	0.9	0.9	0.9	1.0
Ontario, Canada	49 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5
Florida, US	46 (1.2)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.2
Abu Dhabi, UAE	38 (0.9)	1.0	1.0	1.0	0.9	1.0	0.9	1.0	0.9	1.0	0.9	0.9	1.0	1.0	0.9	1.0	1.0	0.9	1.0	1.0	1.0	0.9	1.0	1.0	0.9	0.9	0.9	1.0	1.0	1.0
Number of Items (Score Points) Identified*	233	150	225	125	176	204	194	182	217	211	224	230	167	131	224	214	166	206	141	187	194	228	197	64	186	226	233	219	211	212	152

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

* Of the 220 items in the Science test, some extended response items were scored on a two-point scale, resulting in 239 score points. Following item review, five items were deleted and the point value of one item was reduced, resulting in 215 items and 233 score points.

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

Exhibit F.4: Standard Errors for the Test-Curriculum Matching Analysis, Eighth Grade (Continued)

Based on a subset of items specifically identified by each country as addressing its curriculum

Read across the row to compare that country's performance based on the test items included by each of the countries across the top. Read down the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the diagonal to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Georgia	Jordan	Kuwait	Lebanon	Botswana (9)	Saudi Arabia	Morocco	South Africa (9)	**Benchmarking Participants** Dubai, UAE	Quebec, Canada	Ontario, Canada	Florida, US	Abu Dhabi, UAE
Singapore	64 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Chinese Taipei	59 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.5	0.4	0.4
Japan	59 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.4
Korea, Rep. of	56 (0.5)	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5
Slovenia	55 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Russian Federation	54 (0.9)	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	1.0	0.9	1.0	0.9	0.9
Hong Kong SAR	53 (0.8)	0.8	0.8	0.8	0.8	0.9	0.8	0.9	0.8	0.8	0.9	0.9	0.8	0.9
Kazakhstan	51 (1.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0
England	51 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
United States	50 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Hungary	50 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Ireland	50 (0.5)	0.5	0.5	0.6	0.6	0.6	0.5	0.6	0.5	0.6	0.6	0.6	0.5	0.6
Canada	49 (0.4)	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.5	0.4	0.5	0.4	0.4
Sweden	49 (0.7)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.7
Lithuania	48 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
New Zealand	47 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.6	0.6
Australia	47 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.5	0.5
Israel	46 (0.7)	0.7	0.7	0.7	0.8	0.7	0.7	0.8	0.7	0.8	0.7	0.8	0.7	0.8
Norway (9)	46 (0.5)	0.5	0.5	0.5	0.6	0.5	0.5	0.6	0.5	0.6	0.5	0.6	0.5	0.6
Italy	44 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.4
Turkey	43 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Malta	42 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.3
United Arab Emirates	41 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Malaysia	40 (0.7)	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Bahrain	39 (0.3)	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.3	0.3
Qatar	38 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Iran, Islamic Rep. of	37 (0.7)	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7
Oman	37 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Thailand	37 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Chile	36 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5
Georgia	35 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5
Jordan	33 (0.4)	0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4
Kuwait	31 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Lebanon	29 (0.7)	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.7	0.8	0.7	0.7
Botswana (9)	28 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Saudi Arabia	28 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.6	0.6
Morocco	27 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
South Africa (9)	24 (0.7)	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.7	0.7
International Avg.	44 (0.1)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Benchmarking Participants														
Dubai, UAE	50 (0.4)	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4
Quebec, Canada	50 (0.9)	0.9	0.9	1.0	1.0	0.9	0.9	1.0	0.9	1.0	1.0	1.0	0.9	0.9
Ontario, Canada	49 (0.5)	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.5	0.5
Florida, US	46 (1.2)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.2	1.2	1.2	1.2
Abu Dhabi, UAE	38 (0.9)	0.9	1.0	0.9	1.0	1.0	0.9	0.9	0.9	1.0	1.0	1.0	0.9	0.9
Number of Items (Score Points) Identified*	233	192	213	216	111	197	232	152	233	67	176	108	224	180

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Appendix G.2: Percentiles of Science Achievement

Country	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
Australia	369 (5.5)	403 (4.2)	459 (4.1)	516 (2.9)	569 (2.3)	614 (2.9)	639 (3.6)
Bahrain	285 (5.3)	325 (3.7)	394 (4.3)	471 (2.8)	541 (2.2)	597 (4.0)	630 (4.7)
Botswana (9)	194 (5.8)	240 (4.4)	322 (4.6)	403 (3.2)	471 (2.7)	524 (3.1)	553 (3.4)
Canada	407 (5.3)	434 (4.2)	481 (2.9)	529 (2.5)	575 (2.2)	613 (2.6)	635 (3.4)
Chile	317 (6.3)	348 (4.2)	398 (4.5)	455 (3.9)	511 (3.6)	558 (3.0)	584 (5.1)
Chinese Taipei	417 (4.4)	456 (3.4)	519 (3.2)	579 (2.6)	629 (2.6)	668 (3.4)	690 (3.5)
Egypt	176 (6.3)	218 (5.4)	291 (5.5)	375 (5.3)	455 (5.0)	517 (4.4)	551 (5.5)
England	399 (8.2)	428 (5.9)	480 (5.3)	540 (5.3)	595 (4.6)	640 (4.6)	665 (4.5)
Georgia	291 (7.5)	328 (6.5)	386 (4.5)	448 (3.1)	505 (4.2)	550 (3.9)	576 (4.6)
Hong Kong SAR	418 (9.5)	454 (6.8)	504 (4.3)	552 (3.5)	593 (3.3)	631 (4.7)	653 (5.4)
Hungary	377 (10.0)	416 (7.1)	473 (4.5)	532 (3.9)	588 (3.9)	633 (4.2)	658 (5.3)
Iran, Islamic Rep. of	308 (5.2)	341 (4.6)	395 (4.2)	457 (4.5)	519 (5.2)	570 (6.9)	602 (9.2)
Ireland	387 (10.3)	424 (6.3)	482 (3.7)	537 (2.4)	585 (2.5)	627 (2.9)	650 (4.6)
Israel	320 (9.1)	363 (7.9)	440 (6.2)	516 (4.3)	582 (4.1)	634 (3.6)	662 (4.7)
Italy	368 (5.2)	397 (6.4)	450 (3.6)	503 (2.7)	552 (2.5)	593 (3.5)	618 (4.3)
Japan	440 (5.0)	472 (4.1)	523 (3.1)	575 (2.1)	624 (2.2)	663 (2.5)	686 (2.5)
Jordan	246 (9.2)	292 (6.6)	361 (4.3)	435 (3.9)	499 (3.0)	547 (2.9)	577 (6.0)
Kazakhstan	385 (6.6)	418 (6.5)	473 (5.1)	532 (5.2)	593 (4.8)	647 (7.0)	683 (9.3)
Korea, Rep. of	423 (3.9)	453 (3.1)	505 (2.3)	558 (2.5)	609 (2.6)	653 (3.4)	679 (4.3)
Kuwait	224 (10.0)	264 (8.1)	336 (7.8)	415 (6.0)	488 (5.4)	550 (8.8)	585 (9.5)
Lebanon	228 (9.4)	263 (8.3)	326 (7.1)	401 (6.9)	471 (5.6)	530 (5.2)	562 (7.1)
Lithuania	385 (6.5)	416 (5.0)	467 (4.2)	524 (3.2)	574 (3.1)	616 (4.3)	640 (7.0)
Malaysia	303 (9.5)	341 (9.0)	409 (7.5)	479 (4.7)	539 (3.2)	586 (2.8)	612 (3.3)
Malta	284 (6.9)	331 (5.5)	415 (2.8)	492 (2.4)	557 (2.4)	610 (3.2)	640 (4.4)
Morocco	255 (4.2)	284 (3.5)	334 (3.5)	393 (2.7)	452 (2.7)	504 (3.4)	533 (3.5)
New Zealand	357 (6.8)	392 (5.0)	453 (4.2)	518 (3.5)	576 (3.3)	625 (3.9)	652 (5.0)
Norway (9)	374 (5.6)	407 (4.9)	458 (4.1)	513 (2.7)	562 (3.0)	605 (3.3)	631 (4.0)
Oman	281 (6.3)	322 (5.4)	390 (4.3)	461 (2.9)	526 (3.1)	576 (2.7)	604 (2.9)
Qatar	266 (5.6)	307 (4.6)	379 (5.1)	462 (3.9)	538 (3.8)	598 (4.9)	630 (5.2)
Russian Federation	413 (6.7)	442 (6.2)	494 (6.5)	547 (4.2)	596 (3.9)	640 (5.0)	666 (5.6)
Saudi Arabia	231 (7.8)	269 (6.1)	330 (5.3)	398 (4.7)	466 (4.7)	521 (8.2)	555 (9.9)
Singapore	430 (8.6)	475 (8.7)	547 (5.4)	609 (3.5)	657 (2.5)	696 (2.3)	718 (2.8)
Slovenia	419 (7.2)	451 (3.8)	500 (3.3)	554 (3.0)	605 (2.7)	647 (3.1)	672 (4.0)
South Africa (9)	191 (4.8)	224 (4.6)	283 (4.8)	350 (6.0)	426 (8.9)	504 (10.6)	549 (12.5)
Sweden	368 (11.5)	411 (7.1)	471 (4.7)	528 (3.6)	582 (4.0)	626 (3.9)	649 (5.2)
Thailand	323 (4.2)	352 (5.1)	399 (4.5)	456 (4.3)	511 (5.5)	559 (5.6)	590 (9.0)
Turkey	329 (7.3)	366 (4.7)	431 (4.6)	498 (4.7)	560 (4.5)	614 (5.2)	645 (6.4)
United Arab Emirates	293 (6.0)	333 (4.7)	405 (3.8)	484 (2.5)	554 (3.0)	608 (2.5)	639 (3.9)
United States	388 (5.1)	421 (4.2)	475 (3.5)	535 (3.5)	588 (3.1)	631 (2.9)	656 (3.5)
Benchmarking Participants							
Buenos Aires, Argentina	223 (7.8)	256 (7.8)	317 (5.6)	389 (4.6)	458 (5.1)	511 (4.6)	540 (4.6)
Ontario, Canada	401 (6.1)	430 (3.9)	479 (3.8)	527 (3.4)	573 (2.9)	612 (3.1)	635 (4.3)
Quebec, Canada	416 (8.8)	441 (7.6)	485 (6.0)	532 (4.5)	576 (3.6)	615 (4.6)	636 (4.0)
Norway (8)	356 (4.9)	390 (4.8)	441 (3.8)	494 (2.8)	542 (2.3)	583 (2.4)	606 (3.2)
Abu Dhabi, UAE	270 (7.4)	308 (7.8)	378 (7.4)	459 (5.8)	533 (6.7)	591 (7.0)	623 (7.5)
Dubai, UAE	351 (6.0)	394 (4.7)	465 (2.7)	534 (3.0)	592 (3.8)	639 (3.9)	665 (6.0)
Florida, US	352 (7.8)	385 (7.7)	448 (8.5)	513 (8.1)	573 (6.9)	621 (6.5)	646 (7.5)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.
Note: Percentiles are defined in terms of percentages of students at or below a point on the scale.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Appendix G.4: Standard Deviations of Science Achievement

Country	Overall		Girls		Boys	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Australia	512 (2.7)	82 (1.5)	510 (3.4)	80 (1.8)	515 (3.0)	83 (1.7)
Bahrain	466 (2.2)	106 (1.8)	492 (3.2)	90 (1.9)	442 (3.4)	113 (2.1)
Botswana (9)	392 (2.7)	109 (1.4)	403 (3.3)	101 (2.1)	381 (3.1)	115 (1.6)
Canada	526 (2.2)	70 (1.4)	524 (2.2)	67 (1.4)	529 (2.7)	73 (1.9)
Chile	454 (3.1)	81 (1.5)	448 (3.6)	79 (1.6)	460 (4.1)	82 (2.2)
Chinese Taipei	569 (2.1)	83 (1.2)	568 (2.3)	80 (1.3)	571 (2.6)	86 (1.8)
Egypt	371 (4.3)	115 (1.9)	377 (5.9)	113 (2.6)	364 (5.4)	116 (2.6)
England	537 (3.8)	81 (2.3)	537 (4.7)	82 (2.3)	536 (4.5)	81 (3.1)
Georgia	443 (3.1)	87 (1.7)	444 (3.3)	82 (2.0)	443 (3.9)	91 (2.3)
Hong Kong SAR	546 (3.9)	72 (2.2)	540 (4.2)	67 (2.3)	551 (4.9)	75 (3.0)
Hungary	527 (3.4)	85 (2.3)	519 (3.9)	84 (2.4)	535 (3.6)	86 (2.9)
Iran, Islamic Rep. of	456 (4.0)	89 (2.3)	459 (4.4)	86 (2.5)	454 (6.6)	93 (4.1)
Ireland	530 (2.8)	80 (2.5)	531 (2.8)	77 (2.5)	529 (3.9)	83 (3.0)
Israel	507 (3.9)	104 (2.5)	510 (4.1)	98 (2.4)	504 (4.7)	110 (3.1)
Italy	499 (2.4)	76 (1.7)	494 (3.0)	73 (1.9)	504 (2.6)	78 (2.0)
Japan	571 (1.8)	75 (1.3)	571 (2.2)	72 (1.3)	570 (2.5)	78 (2.1)
Jordan	426 (3.4)	101 (2.1)	447 (4.0)	91 (2.2)	405 (5.3)	106 (2.6)
Kazakhstan	533 (4.4)	90 (2.5)	536 (5.2)	88 (2.9)	530 (4.5)	92 (2.6)
Korea, Rep. of	556 (2.2)	78 (1.1)	554 (2.2)	73 (1.5)	557 (2.8)	82 (1.2)
Kuwait	411 (5.2)	110 (3.7)	434 (5.1)	94 (3.7)	387 (8.2)	120 (4.5)
Lebanon	398 (5.3)	102 (2.6)	403 (4.9)	99 (2.6)	393 (6.7)	105 (3.6)
Lithuania	519 (2.8)	78 (1.8)	520 (3.3)	76 (2.1)	519 (3.4)	80 (2.0)
Malaysia	471 (4.1)	94 (2.7)	476 (4.0)	89 (2.7)	466 (4.8)	98 (3.1)
Malta	481 (1.6)	106 (1.5)	485 (2.2)	103 (2.1)	477 (2.2)	110 (1.7)
Morocco	393 (2.5)	84 (1.4)	397 (2.3)	82 (1.4)	390 (3.4)	86 (1.6)
New Zealand	513 (3.1)	90 (1.9)	513 (3.2)	85 (2.0)	512 (4.3)	95 (2.7)
Norway (9)	509 (2.8)	78 (1.6)	507 (3.1)	76 (2.4)	511 (3.2)	80 (1.4)
Oman	455 (2.7)	98 (1.6)	478 (2.9)	88 (1.7)	433 (3.6)	102 (1.8)
Qatar	457 (3.0)	112 (2.0)	471 (3.6)	101 (2.8)	441 (5.2)	119 (2.6)
Russian Federation	544 (4.2)	77 (1.9)	542 (4.6)	77 (2.4)	546 (4.3)	77 (1.9)
Saudi Arabia	396 (4.5)	98 (2.7)	423 (4.9)	85 (2.2)	368 (8.0)	103 (4.4)
Singapore	597 (3.2)	86 (2.3)	596 (3.3)	81 (2.4)	597 (4.0)	91 (2.7)
Slovenia	551 (2.4)	77 (1.5)	553 (2.8)	75 (2.0)	549 (2.7)	79 (1.7)
South Africa (9)	358 (5.6)	108 (3.6)	362 (6.7)	107 (4.1)	353 (5.5)	108 (3.7)
Sweden	522 (3.4)	86 (2.4)	523 (4.2)	84 (3.5)	522 (3.5)	86 (2.1)
Thailand	456 (4.2)	81 (2.3)	465 (4.4)	76 (2.5)	445 (5.2)	85 (2.8)
Turkey	493 (4.0)	96 (2.0)	503 (4.1)	91 (2.3)	484 (4.5)	99 (2.4)
United Arab Emirates	477 (2.3)	105 (1.6)	492 (3.5)	94 (1.6)	461 (4.4)	114 (1.9)
United States	530 (2.8)	82 (1.4)	527 (3.1)	79 (1.5)	533 (3.0)	84 (1.7)
Benchmarking Participants						
Buenos Aires, Argentina	386 (4.2)	98 (2.4)	386 (4.8)	97 (2.8)	386 (6.2)	98 (3.0)
Ontario, Canada	524 (2.5)	71 (1.8)	523 (2.8)	67 (1.6)	524 (3.0)	75 (2.5)
Quebec, Canada	530 (4.4)	68 (2.7)	523 (4.4)	65 (2.7)	537 (5.5)	70 (3.8)
Norway (8)	489 (2.4)	76 (1.8)	490 (3.1)	73 (1.7)	489 (2.7)	79 (2.4)
Abu Dhabi, UAE	454 (5.6)	108 (3.0)	481 (6.6)	93 (2.3)	428 (8.2)	115 (3.7)
Dubai, UAE	525 (2.0)	95 (2.0)	529 (3.6)	90 (2.6)	520 (4.7)	100 (3.1)
Florida, US	508 (6.0)	90 (2.7)	507 (6.8)	85 (2.8)	510 (6.4)	94 (3.8)

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

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Appendix H: Organizations and Individuals Responsible for TIMSS 2015

Introduction

TIMSS 2015 was a collaborative effort involving hundreds of individuals around the world. This appendix acknowledges the individuals and organizations for their contributions. Given that work on TIMSS 2015 has spanned approximately four years and has involved so many people and organizations, this list may not include all who contributed. Any omission is inadvertent. TIMSS 2015 also acknowledges the students, parents, teachers, and school principals who contributed their time and effort to the study. This report would not be possible without them.

Management and Coordination

TIMSS is a major undertaking of IEA, and together with the Progress in International Reading Literacy Study (PIRLS), comprises the core of IEA's regular cycles of studies. The TIMSS assessment at the fourth grade complements PIRLS, which regularly assesses reading achievement at fourth grade.

TIMSS was conducted by IEA's TIMSS & PIRLS International Study Center at Boston College, which has responsibility for the overall direction and management of the TIMSS and PIRLS projects, including design, development, and implementation. Headed by Executive Directors Drs. Ina V.S. Mullis and Michael O. Martin, the study center is located in the Lynch School of Education. In carrying out the project, the TIMSS & PIRLS International Study Center worked closely with the IEA Secretariat in Amsterdam, which managed country participation, was responsible for verification of all translations produced by the participating countries, and coordinated the school visits by International Quality Control Monitors. Staff at the IEA Data Processing and Research Center in Hamburg worked closely with participating countries to organize sampling and data collection operations and to check all data for accuracy and consistency within and across countries; Statistics Canada in Ottawa was responsible for school and student sampling activities; and Educational Testing Service in Princeton, New Jersey consulted on psychometric methodology, provided software for scaling the achievement data, and replicated the achievement scaling for quality assurance.

The Project Management Team, comprising the study directors and representatives from the TIMSS & PIRLS International Study Center, IEA Secretariat and IEA Data Processing and Research

Center, Statistics Canada, and ETS met twice a year throughout the study to discuss the study's progress, procedures, and schedule. In addition, the study directors met with members of IEA's Technical Executive Group twice yearly to review technical issues.

To work with the international team and coordinate within-country activities, each participating country designates an individual to be the TIMSS National Research Coordinator (NRC). The NRCs have the challenging task of implementing TIMSS in their countries in accordance with the TIMSS guidelines and procedures. In addition, the NRCs provide feedback and contributions throughout the development of the TIMSS assessment. The quality of the TIMSS assessment and data depends on the work of the NRCs and their colleagues in carrying out the complex sampling, data collection, and scoring tasks involved. Continuing the tradition of exemplary work established in previous cycles of TIMSS, the TIMSS 2015 NRCs performed their many tasks with dedication, competence, energy, and goodwill, and have been commended by the IEA Secretariat, the TIMSS & PIRLS International Study Center, the IEA Data Processing and Research Center, and Statistics Canada for their commitment to the project and the high quality of their work.

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Boston College also is gratefully acknowledged for its generous financial support and stimulating educational environment.

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