Chapter 5

The Science Curriculum

Chapter 5 begins by presenting information about the science subjects offered by countries through the eighth grade, and the time provided for science instruction at the fourth and eighth grades. Data are presented about the time intended for science instruction as specified in curriculum guidelines, the time teachers report that they actually spend, and changes over time. The remainder of the chapter describes the coverage of the TIMSS science topics in the intended curriculum for each country, as well as teachers' reports about the science topics actually taught to their students, also known as the implemented curriculum.

In comparing achievement across countries, it is important to consider differences in students' curricular experiences, how these differences may affect the science they have studied, and their subsequent achievement. Students' opportunities to learn the science covered by the TIMSS 2007 content and cognitive domains depends initially to some degree on that science being part of each country's guidelines and policies for science education. Thus, participants provided information about various educational policies and the curriculum topics covered in their respective curriculum guidelines (intended curriculum). Inclusion in the country's curriculum, however, does not guarantee students' opportunity to learn. Just as important is what their teachers choose to teach them. The lessons provided by the teachers ultimately determine the science students are taught.

This chapter contains information for each country about whether the TIMSS 2007 science topics were in the intended curriculum, and teachers' reports about whether the topics were taught. As might be anticipated, there is very close agreement between curriculum guidelines and teachers' reports about the topics covered. Also, there is a substantial correspondence between topics in the intended and implemented curricula in various countries and students' achievement.

Which Science Subjects Are Offered Up to and Including Eighth Grade?

One of the major differences among the science curricula of the TIMSS 2007 countries is that some countries teach science as a single, general subject through the eighth grade, while others teach the sciences as separate subjects, usually beginning in the fifth, sixth, or seventh grades. Exhibit 5.1 shows how science instruction is organized in the TIMSS countries, and presents the grades at which individual science subjects are taught, for countries teaching the science subjects separately. By the eighth grade, most of the continental European countries, as well as Algeria, Indonesia, Lebanon, Mongolia, Morocco, and the Syrian Arab Republic, were teaching some or all of biology, chemistry, physics, and earth science, although not necessarily at the same time. In some cases, chemistry and physics or biology and earth science were combined. Also, in some countries, earth science topics were taught as part of geography. In the other TIMSS 2007 countries, the common practice was to integrate the sciences into a general science curriculum.

Exhibit 5.1 Science Subjects Offered Up To and Including Eighth Grade

TIMSS2007 Science 8th Grade

Country	Separate Science Courses Offered	Science Subjects and Grades Taught
Algeria	●	General/Integrated Science 1-5; Biology 6-8; Chemistry 6-8; Physics 6-8
Armenia	●	Geography 6-8; Chemistry 7-8; Physics 7-8; Biology 7-8
Australia	○	General/Integrated Science
Bahrain	○	General/Integrated Science
Bosnia and Herzegovina	●	Biology 5-8; Geography 5-8; Physics 7,8; Chemistry 7,8
Botswana	○	General/Integrated Science
Bulgaria	●	Geography 6-8; Biology 6-8; Chemistry 7-8; Physics 7-8
Chinese Taipei	○	General/Integrated Science
Colombia	○	General/Integrated Science
Cyprus	●	Chemistry 8; Geography 8; Physics 8
Czech Republic	●	Biology 6-8; Geography 6-8; Physics 6-8; Chemistry 8
Egypt	○	General/Integrated Science
El Salvador	○	General/Integrated Science
England	○	General/Integrated Science
Georgia	●	Biology 7,8; Chemistry 7,8; Physics 7,8
Ghana	○	General/Integrated Science
Hong Kong SAR	○	General/Integrated Science
Hungary	●	Biology 7,8; Chemistry 7,8; Geography 7,8; Physics 7,8
Indonesia	●	Biology 7,8; Earth Science 7,8; Physics 7,8
Iran, Islamic Rep. of	○	General/Integrated Science
Israel	○	General/Integrated Science
Italy	○	General/Integrated Science
Japan	○	General/Integrated Science
Jordan	○	General/Integrated Science
Korea, Rep. of	○	General/Integrated Science
Kuwait	○	General/Integrated Science
Lebanon	●	Chemistry 7,8; Life and Earth Science 7,8; Physics 7,8
Lithuania	●	Geography 6-8; Physics 7-8; Biology 7-8; Chemistry 8
Malaysia	○	General/Integrated Science
Malta	●	General/Integrated Science 1-8; Biology 9; Chemistry 9; Earth Science 1-9; Environmental Studies 9; Physics 9
Mongolia	●	Geography 7-8; Physics 7-8; Biology 7-8; Chemistry 8
Morocco	●	Life and Earth Science 7-8; Physics and Chemistry 7-8
Norway	○	General/Integrated Science
Oman	○	General/Integrated Science
Palestinian Nat'l Auth.	○	General/Integrated Science
Qatar	○	General/Integrated Science
Romania	●	Geography 4-8; Biology 5-8; Physics 6-8; Chemistry 7-8
Russian Federation	●	General/Integrated Science 1-5; Biology 6-8; Geography 6-8; Physics 7-8; Chemistry 8
Saudi Arabia	○	General/Integrated Science
Scotland	○	General/Integrated Science
Serbia	●	Nature 1-4; Biology 5-8; Geography 5-8; Physics 6-8; Chemistry 7-8
Singapore	○	General/Integrated Science
Slovenia	●	Environmental Science 1-3; Science and Technology 4,5; Biology 8; Chemistry 8; Physics 8
Sweden	●	General/Integrated Science 1-8; or Biology 1-8; Chemistry 1-8; Physics 1-8, Social Studies/Geography 1-8
Syrian Arab Republic	●	General/Integrated Science 1-6; Biology 7,8; Chemistry 7,8; Earth Science 7,8; Physics 7,8
Thailand	○	General/Integrated Science
Tunisia	○	General/Integrated Science
Turkey	○	General/Integrated Science
Ukraine	●	Geography 6-8; Biology 7-8; Physics 7-8; Chemistry 8
United States	○	General/Integrated Science
Benchmarking Participants		
Basque Country, Spain	○	General/Integrated Science
British Columbia, Canada	○	General/Integrated Science
Dubai, UAE	○	General/Integrated Science
Massachusetts, US	○	General/Integrated Science
Minnesota, US	○	General/Integrated Science
Ontario, Canada	○	General/Integrated Science
Quebec, Canada	○	General/Integrated Science

● Yes ○ No

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators.

How Much Instructional Time Is Spent on Science?

Exhibit 5.2 presents the hours per week for science instruction designated by countries in their curriculum at the fourth and eighth grades, and teachers' reports about the amount of instructional time actually provided. In each case, the total amount of instructional time is given together with the percentage of that time devoted to science. For teachers' reports, changes are provided between 2003 and 2007. At the fourth grade, most of the countries reported that the curriculum prescribed a specific amount of time for instruction in all subjects and for science instruction. There was some variation, but the countries averaged 23 hours of total instruction per week, with less than one-tenth of the time (9%) being prescribed for science instruction. On average, there was very close agreement between the curriculum guidelines and teachers' reports about the implementation. On average internationally, fourth grade teachers reported a total of 24 hours of weekly instruction, with 8 percent being devoted to science. Across countries, teachers reported a decrease (slight but statistically significant) in total instructional time in 10 countries and an increase in 2 countries and 1 benchmarking entity. The teachers reported increases in the percentage of instructional time per week devoted to science (again slight but significant statistically) in 7 countries. In 6 countries teachers reported decreases in total instructional time accompanied with increases in the percentages of time devoted to science instruction.

At the eighth grade for countries teaching general/integrated science, the average total instruction time per week was 27 hours with 12 percent being devoted to science instruction. Teachers' reports of 28 hours per week in total and 11 percent devoted to science instruction corresponded with the instructional time guidelines across the countries' curricula. In these countries, eighth grade teachers reported increases in total instructional time in 8 countries and decreases in 6 countries. They reported increases in the percentages of time devoted to science instruction in 3 countries and decreases in 7 countries. Among separate science countries at the eighth

grade, the total instructional time, on average, was similar to general science countries (28 hours vs. 27), but the percentage of instructional time devoted to science instruction was higher—24 percent (6% for each of four science subjects) compared to 12 percent. In general, teacher reports corresponded with curricular guidelines across the four science subjects.

Exhibit 5.3 presents the total instructional time in science per year at the fourth and eighth grades and changes from 2003 for each TIMSS 2007 country and benchmarking participant. At the fourth grade, those reporting that students averaged more than 100 hours of science instruction per year included Colombia (139 hours), El Salvador (135 hours), and Germany (106 hours), and the benchmarking province of Alberta (122 hours). The average internationally was 67 hours. Slovenia, Singapore, Norway, and the Russian Federation had increases in the yearly hours of science instruction, and Chinese Taipei and New Zealand had decreases. At the eighth grade among general science countries, the international average was 110 hours, and those reporting that students averaged 140 hours of science instruction or more per year included Chinese Taipei (145), Jordan (141), and Singapore (140). Instructional time for science increased since 2003 in 3 countries and decreased in 4 countries and one benchmarking participant. Among separate science countries, average instructional hours for science subjects were in the 52-63 range, giving almost 240 hours per year, on average, for countries teaching all four subjects simultaneously.

Exhibit 5.4 shows teachers' reports about how the instructional time for science is distributed across the TIMSS 2007 content areas. At the fourth grade, on average across countries, teachers reported devoting 40 percent of the science instructional time to life science, 25 percent to physical science, 24 percent to earth science, and 10 percent to other areas. At the eighth grade, on average internationally, teachers reported devoting 28 percent of the science instructional time to biology, 24 percent to chemistry, 27 percent to physics, 16 percent to earth science, and 6 percent to other areas.

Exhibit 5.2 Weekly Intended and Implemented Instructional Time for Science with Trends

TIMSS2007 Science 4th Grade

Country	Intended Time Prescribed in the Curriculum		Time Implemented in Schools						
			Total Hours of Instructional Time per Week			Science Instructional Time as a Percent of Total Instructional Time			
	Total Hours of Instructional Time per Week	Science Instructional Time as a Percent of Total Instructional Time		2007 Hours	Difference from 2003		2007 Percent	Difference from 2003	
Algeria	32	6		30 (0.3)	◊ ◊	r	6 (0.4)	◊ ◊	
Armenia	23	10	s	27 (0.5)	–1 (0.7) ▼		9 (0.4)	– –	
Australia	27	8		25 (0.2)	0 (0.2)	s	5 (0.2)	0 (0.3)	
Austria	21	15		21 (0.1)	◊ ◊		12 (0.1)	◊ ◊	
Chinese Taipei	20	14		23 (0.4)	–1 (0.4) ▼	r	9 (0.2)	0 (0.2)	
Colombia	25	np		27 (0.4)	◊ ◊	r	13 (0.4)	◊ ◊	
Czech Republic	18	8		19 (0.1)	◊ ◊		5 (0.2)	◊ ◊	
Denmark	20	9	r	21 (0.2)	◊ ◊	s	7 (0.1)	◊ ◊	
El Salvador	19	20		24 (0.7)	◊ ◊		15 (0.5)	◊ ◊	
England	24	10	r	25 (0.2)	1 (0.4) ▲		7 (0.2)	– –	
Georgia	23	5	r	19 (0.3)	◊ ◊	s	5 (0.5)	◊ ◊	
Germany	21	18		22 (0.2)	◊ ◊	r	13 (0.2)	◊ ◊	
Hong Kong SAR	23	13	r	27 (0.3)	0 (0.4)	s	7 (0.5)	–1 (0.7)	
Hungary	17	9	r	20 (0.3)	–4 (0.3) ▼	s	8 (0.2)	2 (0.2)	▲
Iran, Islamic Rep. of	21	13	s	21 (0.2)	–3 (0.4) ▼		12 (0.4)	– –	
Italy	30	15	r	30 (0.3)	0 (0.4)	r	6 (0.1)	–1 (0.3)	▼
Japan	20	10		22 (0.2)	–5 (0.3) ▼		9 (0.1)	2 (0.2)	▲
Kazakhstan	20	8		22 (0.2)	◊ ◊		7 (0.2)	◊ ◊	
Kuwait	30	10		26 (0.3)	◊ ◊		x x	◊ ◊	
Latvia	17	8		20 (0.4)	–3 (0.5) ▼	r	7 (0.2)	– –	
Lithuania	18	4		20 (0.2)	–3 (0.3) ▼		8 (0.1)	2 (0.2)	▲
Mongolia	22	5		– –	◊ ◊		– –	◊ ◊	
Morocco	28	5	r	28 (0.4)	0 (0.5)	s	5 (0.3)	– –	
Netherlands	np	np	r	27 (0.1)	0 (0.1)	s	3 (0.1)	0 (0.2)	
New Zealand	np	np		24 (0.1)	0 (0.2)	s	5 (0.3)	–2 (0.5)	▼
Norway	19	7		23 (0.0)	0 (0.0)	r	5 (0.2)	1 (0.3)	▲
Qatar	26	8		31 (0.0)	◊ ◊		x x	◊ ◊	
Russian Federation	15	5	s	19 (0.2)	–4 (0.3) ▼	s	6 (0.2)	2 (0.2)	▲
Scotland	25	5		25 (0.1)	0 (0.2)	r	5 (0.3)	– –	
Singapore	25	8		26 (0.0)	–5 (0.2) ▼		9 (0.1)	2 (0.1)	▲
Slovak Republic	20	10		21 (0.3)	◊ ◊		7 (0.1)	◊ ◊	
Slovenia	18	13		19 (0.1)	–3 (0.2) ▼	r	12 (0.1)	3 (0.3)	▲
Sweden	np	np		24 (0.3)	◊ ◊	r	6 (0.3)	◊ ◊	
Tunisia	25	8	r	29 (0.9)	0 (0.9)	s	8 (0.3)	– –	
Ukraine	16	4		18 (0.2)	◊ ◊		5 (0.2)	◊ ◊	
United States	32	7		30 (0.2)	1 (0.3) ▲	r	8 (0.2)	0 (0.4)	
Yemen	23	9		24 (0.4)	◊ ◊	r	10 (0.5)	◊ ◊	
International Avg.	23	9		24 (0.1)			8 (0.0)		
Benchmarking Participants									
Alberta, Canada	25	15		27 (0.2)	◊ ◊		13 (0.4)	◊ ◊	
British Columbia, Canada	24	np		24 (0.2)	◊ ◊	s	8 (0.3)	◊ ◊	
Dubai, UAE	24	8	r	28 (0.0)	◊ ◊		x x	◊ ◊	
Massachusetts, US	25	np		28 (0.5)	◊ ◊	r	8 (0.5)	◊ ◊	
Minnesota, US	29	3		29 (0.5)	◊ ◊	r	7 (0.8)	◊ ◊	
Ontario, Canada	25	np		26 (0.5)	0 (0.5)	r	9 (0.5)	–1 (0.6)	
Quebec, Canada	25	4		25 (0.1)	1 (0.2) ▲	r	5 (0.2)	–1 (0.4)	

▲ 2007 significantly higher
▼ 2007 significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Intended instructional time provided by National Research Coordinators. Implemented instructional time for science provided by teachers, and total instructional time provided by schools.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

An "np" indicates not prescribed by the curriculum.

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

Note: For Norway, hours of intended instructional time is only an estimate and only prescribed for grades 1–7 and 8–10, not for single grades.

Exhibit 5.2 Weekly Intended and Implemented Instructional Time for Science with Trends (Continued)

TIMSS2007 Science 8th Grade

General/Integrated Science

Country	Intended Time Prescribed in the Curriculum		Time Implemented in Schools						
	Total Hours of Instructional Time per Week	Science Instructional Time as a Percent of Total Instructional Time	Total Hours of Instructional Time per Week			Science Instructional Time as a Percent of Total Instructional Time			
			2007 Hours	Difference from 2003		2007 Percent	Difference from 2003	
Australia	25	7	26 (0.2)	0 (0.3)		s 12 (0.1)	–1 (0.4)	▼
Bahrain	31	13	28 (0.0)	3 (0.0)	▲	r 8 (0.3)	–6 (0.3)	▼
Botswana	30	13	s 30 (0.6)	2 (0.8)	▲	r 13 (0.3)	– –	
Chinese Taipei	25	15	29 (0.3)	– –		12 (0.3)	– –	
Colombia	30	np	31 (0.4)	◊ ◊		r 10 (0.6)	◊ ◊	
Egypt	26	11	32 (0.4)	1 (0.6)	▲	7 (0.4)	– –	
El Salvador	19	20	23 (0.6)	◊ ◊		16 (0.4)	◊ ◊	
England	25	15	s 26 (0.2)	0 (0.2)		14 (0.7)	– –	
Ghana	27	13	r 28 (0.4)	1 (0.6)	▲	11 (0.6)	– –	
Hong Kong SAR	27	13	28 (0.3)	0 (0.4)		s 10 (0.3)	–1 (0.5)	▼
Iran, Islamic Rep. of	31	12	27 (0.2)	–2 (0.4)	▼	s 11 (0.2)	0 (0.4)	
Israel	23	10	32 (0.6)	0 (0.7)		r 10 (0.4)	– –	
Italy	30	7	r 31 (0.4)	0 (0.5)		s 6 (0.1)	0 (0.1)	
Japan	23	11	25 (0.2)	–3 (0.3)	▼	r 10 (0.2)	2 (0.2)	▲
Jordan	26	14	28 (0.3)	3 (0.4)	▲	13 (0.2)	–1 (0.2)	▼
Korea, Rep. of	26	12	29 (0.4)	–7 (0.4)	▼	s 11 (0.2)	3 (0.3)	▲
Kuwait	30	10	r 26 (0.4)	◊ ◊		s 6 (0.5)	◊ ◊	
Malaysia	29	11	30 (0.3)	3 (0.3)	▲	11 (0.2)	–1 (0.2)	▼
Norway	23	10	22 (0.0)	0 (0.0)		10 (0.1)	–1 (0.3)	▼
Oman	27	17	27 (0.4)	◊ ◊		13 (0.5)	◊ ◊	
Palestinian Nat'l Auth.	20	11	r 26 (0.3)	–2 (0.3)	▼	s 10 (0.4)	–1 (0.4)	▼
Qatar	26	8	r 28 (0.0)	◊ ◊		x x	◊ ◊	
Saudi Arabia	–	7	r 27 (0.3)	– –		x x	– –	
Scotland	28	10	s 28 (0.2)	0 (0.2)		r 10 (0.3)	– –	
Singapore	23	15	29 (0.0)	–5 (0.0)	▼	14 (0.2)	4 (0.3)	▲
Sweden	np	np	26 (0.3)	–1 (0.4)	▼	– –	– –	
Thailand	35	8	32 (0.3)	◊ ◊		10 (0.2)	◊ ◊	
Tunisia	32	13	r 39 (0.7)	8 (0.8)	▲	r 5 (0.1)	– –	
Turkey	20	10	27 (0.9)	◊ ◊		8 (0.2)	◊ ◊	
United States	29	13	31 (0.2)	2 (0.3)	▲	s 13 (0.2)	0 (0.3)	
International Avg.	27	12	28 (0.1)			11 (0.1)		
Benchmarking Participants								
Basque Country, Spain	30	8	30 (0.2)	– –		8 (0.2)	– –	
British Columbia, Canada	26	12	26 (0.2)	◊ ◊		s 14 (0.5)	◊ ◊	
Dubai, UAE	28	11	s 29 (0.1)	◊ ◊		x x	◊ ◊	
Massachusetts, US	28	np	29 (0.3)	◊ ◊		13 (0.6)	◊ ◊	
Minnesota, US	29	4	30 (0.5)	◊ ◊		14 (0.6)	◊ ◊	
Ontario, Canada	25	np	26 (0.2)	0 (0.3)		r 10 (0.3)	–1 (0.7)	
Quebec, Canada	25	11	26 (0.2)	0 (0.3)		r 11 (0.3)	–1 (0.8)	

▲ 2007 significantly higher
▼ 2007 significantly lower

Intended instructional time provided by National Research Coordinators. Implemented instructional time for science provided by teachers, and total instructional time provided by schools.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

An "np" indicates not prescribed by the curriculum.

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

Note: Total instructional time for Thailand is only applicable to the majority of schools. For Norway, hours of intended instructional time is only an estimate and only prescribed for grades 1–7 and 8–10, not for single grades.

Exhibit 5.2 Weekly Intended and Implemented Instructional Time for Science with Trends (Continued)

TIMSS2007 Science 8th Grade

Biology

Country	Intended Time Prescribed in the Curriculum		Time Implemented in Schools					
			Total Hours of Instructional Time per Week			Biology Instructional Time as a Percent of Total Instructional Time		
	Total Hours of Instructional Time per Week	Biology Instructional Time as a Percent of Total Instructional Time	2007 Hours	Difference from 2003		2007 Percent	Difference from 2003	
[b] Algeria	30	6	r 36 (0.5)	◊ ◊		s 6 (0.2)	◊ ◊	
Armenia	27	6	r 31 (0.6)	–3 (0.7)	▼	7 (0.4)	– –	
Bosnia and Herzegovina	26	6	29 (0.9)	◊ ◊		r 6 (0.2)	◊ ◊	
Bulgaria	32	6	23 (0.4)	– –		8 (0.4)	– –	
Cyprus	26	–	– –	– –		– –	– –	
Czech Republic	23	6	24 (0.3)	◊ ◊		r 6 (0.1)	◊ ◊	
Georgia	23	4	24 (0.4)	◊ ◊		9 (0.4)	◊ ◊	
Hungary	21	6	r 22 (0.3)	–7 (0.3)	▼	s 6 (0.2)	0 (0.3)	
[c] Indonesia	32	–	r 34 (0.6)	0 (0.8)		s 10 (0.9)	3 (0.9)	▲
Lebanon	35	–	r 30 (0.3)	– –		s 8 (0.4)	– –	
Lithuania	23	–	24 (0.3)	–3 (0.4)	▼	r 3 (0.1)	–1 (0.4)	▼
[d] Malta	27	11	27 (0.0)	◊ ◊		10 (0.1)	◊ ◊	
Mongolia	30	2	– –	◊ ◊		– –	◊ ◊	
Romania	24	3–7	26 (0.3)	–3 (0.5)	▼	r 5 (0.3)	1 (0.4)	
Russian Federation	23	6	26 (0.3)	–1 (0.4)	▼	r 6 (0.1)	0 (0.1)	
Serbia	24	7	r 23 (0.3)	–1 (0.4)		s 7 (0.1)	0 (0.2)	
Slovenia	23	5	23 (0.1)	–5 (0.2)	▼	r 6 (0.1)	0 (0.1)	
[f] Syrian Arab Republic	30	7	25 (0.4)	◊ ◊		6 (0.3)	◊ ◊	
Ukraine	25	–	24 (0.2)	◊ ◊		7 (0.1)	◊ ◊	
[e] ‡ Morocco	28	7	37 (0.9)	– –		r 6 (0.4)	– –	
International Avg.	28	6	27 (0.1)			7 (0.1)		

Earth Science

Country	Intended Time Prescribed in the Curriculum		Time Implemented in Schools					
			Total Hours of Instructional Time per Week			Earth Science Instructional Time as a Percent of Total Instructional Time		
	Total Hours of Instructional Time per Week	Earth Science Instructional Time as a Percent of Total Instructional Time	2007 Hours	Difference from 2003		2007 Percent	Difference from 2003	
[b] Algeria	30	–	– –	◊ ◊		– –	◊ ◊	
Armenia	27	6	r 31 (0.6)	–2 (0.7)	▼	6 (0.3)	– –	
Bosnia and Herzegovina	26	6	29 (0.9)	◊ ◊		r 5 (0.1)	◊ ◊	
Bulgaria	32	6	23 (0.4)	– –		7 (0.4)	– –	
Cyprus	26	5	r 26 (0.0)	–1 (0.1)	▼	s 6 (0.0)	0 (0.3)	
Czech Republic	23	6	24 (0.3)	◊ ◊		r 6 (0.1)	◊ ◊	
Georgia	23	5	24 (0.4)	◊ ◊		r 7 (0.3)	◊ ◊	
Hungary	21	6	r 22 (0.3)	–7 (0.3)	▼	s 6 (0.2)	0 (0.3)	
[c] Indonesia	32	–	– –	– –		– –	– –	
Lebanon	35	–	– –	– –		– –	– –	
Lithuania	23	–	24 (0.3)	–3 (0.4)	▼	r 6 (0.1)	1 (0.1)	▲
[d] Malta	27	3	27 (0.0)	◊ ◊		4 (0.0)	◊ ◊	
Mongolia	30	5	– –	◊ ◊		– –	◊ ◊	
Romania	24	7	26 (0.3)	–3 (0.5)	▼	r 7 (0.2)	1 (0.2)	▲
Russian Federation	23	6	26 (0.3)	–1 (0.4)	▼	r 6 (0.1)	0 (0.1)	
Serbia	24	7	r 23 (0.3)	–1 (0.4)		s 7 (0.1)	0 (0.3)	
Slovenia	23	–	– –	– –		– –	– –	
[f] Syrian Arab Republic	30	–	– –	◊ ◊		– –	◊ ◊	
Ukraine	25	–	24 (0.2)	◊ ◊		7 (0.1)	◊ ◊	
[e] ‡ Morocco	28	–	– –	– –		– –	– –	
International Avg.	28	6	25 (0.1)			6 (0.1)		

▲ 2007 significantly higher
▼ 2007 significantly lower

[a] Algeria: Data reported in biology panel are for biology/earth science teachers and data reported in physics panel are for physics/chemistry teachers.

[b] Indonesia: Data reported in biology and physics panels include data from integrated/general science teachers.

[c] Malta: Data reported in earth science panel include data from environmental studies teachers.

[d] Morocco: Data reported in biology panel are for biology/earth science teachers and data reported in physics panel are for physics/chemistry teachers.

[e] Syrian Arab Republic: Data reported in biology panel are for biology/earth science teachers and data reported in physics panel are for physics/chemistry teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.2 Weekly Intended and Implemented Instructional Time for Science with Trends (Continued)

TIMSS2007 Science 8th Grade

Chemistry

Country	Intended Time Prescribed in the Curriculum		Time Implemented in Schools					
	Total Hours of Instructional Time per Week	Chemistry Instructional Time as a Percent of Total Instructional Time	Total Hours of Instructional Time per Week		Chemistry Instructional Time as a Percent of Total Instructional Time			
			2007 Hours	Difference from 2003	2007 Percent	Difference from 2003		
[b] Algeria	30	–	– –	◊ ◊	– –	◊ ◊		
Armenia	27	6	r 31 (0.6)	–2 (0.7) ▼	8 (0.3)	– –		
Bosnia and Herzegovina	26	6	29 (0.9)	◊ ◊	r 6 (0.2)	◊ ◊		
Bulgaria	32	6	23 (0.4)	– –	r 9 (0.4)	– –		
Cyprus	26	3	r 26 (0.0)	–1 (0.1) ▼	s 3 (0.1)	–1 (0.2)	▼	
Czech Republic	23	6	24 (0.3)	◊ ◊	r 6 (0.1)	◊ ◊		
Georgia	23	4	24 (0.4)	◊ ◊	r 8 (0.5)	◊ ◊		
Hungary	21	6	r 22 (0.3)	–7 (0.3) ▼	s 6 (0.1)	0 (0.2)		
[c] Indonesia	32	–	– –	– –	– –	– –		
Lebanon	35	–	r 30 (0.3)	– –	s 9 (0.4)	– –		
Lithuania	23	–	24 (0.3)	–3 (0.4) ▼	r 6 (0.1)	0 (0.2)		
[d] Malta	27	11	27 (0.0)	◊ ◊	9 (0.0)	◊ ◊		
Mongolia	30	5	– –	◊ ◊	– –	◊ ◊		
Romania	24	7	26 (0.3)	–3 (0.5) ▼	r 7 (0.3)	1 (0.4)		
Russian Federation	23	6	26 (0.3)	–1 (0.4) ▼	r 6 (0.1)	0 (0.2)		
Serbia	24	7	r 23 (0.3)	–1 (0.4)	s 7 (0.1)	–1 (0.5)	▼	
Slovenia	23	7	23 (0.1)	–5 (0.2) ▼	7 (0.1)	1 (0.2)	▲	
[f] Syrian Arab Republic	30	–	– –	◊ ◊	– –	◊ ◊		
Ukraine	25	–	24 (0.2)	◊ ◊	7 (0.1)	◊ ◊		
[e] ‡ Morocco	28	–	– –	– –	– –	– –		
International Avg.	28	6	26 (0.1)		7 (0.1)			

Physics

Country	Intended Time Prescribed in the Curriculum		Time Implemented in Schools					
	Total Hours of Instructional Time per Week	Physics Instructional Time as a Percent of Total Instructional Time	Total Hours of Instructional Time per Week		Physics Instructional Time as a Percent of Total Instructional Time			
			2007 Hours	Difference from 2003	2007 Percent	Difference from 2003		
[b] Algeria	30	6	r 36 (0.5)	◊ ◊	s 6 (0.3)	◊ ◊		
Armenia	27	6	r 31 (0.6)	–2 (0.7) ▼	6 (0.2)	– –		
Bosnia and Herzegovina	26	6	29 (0.9)	◊ ◊	r 6 (0.2)	◊ ◊		
Bulgaria	32	6	23 (0.4)	– –	7 (0.3)	– –		
Cyprus	26	5	r 26 (0.0)	–1 (0.1) ▼	s 6 (0.1)	0 (0.1)		
Czech Republic	23	6	24 (0.3)	◊ ◊	r 6 (0.1)	◊ ◊		
Georgia	23	5	24 (0.4)	◊ ◊	8 (0.5)	◊ ◊		
Hungary	21	6	r 22 (0.3)	–7 (0.3) ▼	s 5 (0.2)	0 (0.3)		
[c] Indonesia	32	–	r 34 (0.6)	0 (0.9)	s 7 (0.4)	0 (0.4)		
Lebanon	35	–	r 30 (0.3)	– –	s 9 (0.4)	– –		
Lithuania	23	–	24 (0.3)	–3 (0.4) ▼	r 6 (0.1)	1 (0.1)	▲	
[d] Malta	27	11	27 (0.0)	◊ ◊	11 (0.0)	◊ ◊		
Mongolia	30	5	– –	◊ ◊	– –	◊ ◊		
Romania	24	7	26 (0.3)	–3 (0.5) ▼	r 8 (0.3)	1 (0.4)		
Russian Federation	23	6	26 (0.3)	–1 (0.4) ▼	r 6 (0.1)	0 (0.1)		
Serbia	24	7	r 23 (0.3)	–1 (0.4)	s 7 (0.1)	0 (0.3)		
Slovenia	23	7	23 (0.1)	–5 (0.2) ▼	r 7 (0.1)	1 (0.1)	▲	
[f] Syrian Arab Republic	30	7	24 (0.4)	◊ ◊	8 (0.4)	◊ ◊		
Ukraine	25	–	24 (0.2)	◊ ◊	6 (0.1)	◊ ◊		
[e] ‡ Morocco	28	7	37 (1.0)	– –	r 6 (0.3)	– –		
International Avg.	28	6	27 (0.1)		7 (0.1)			

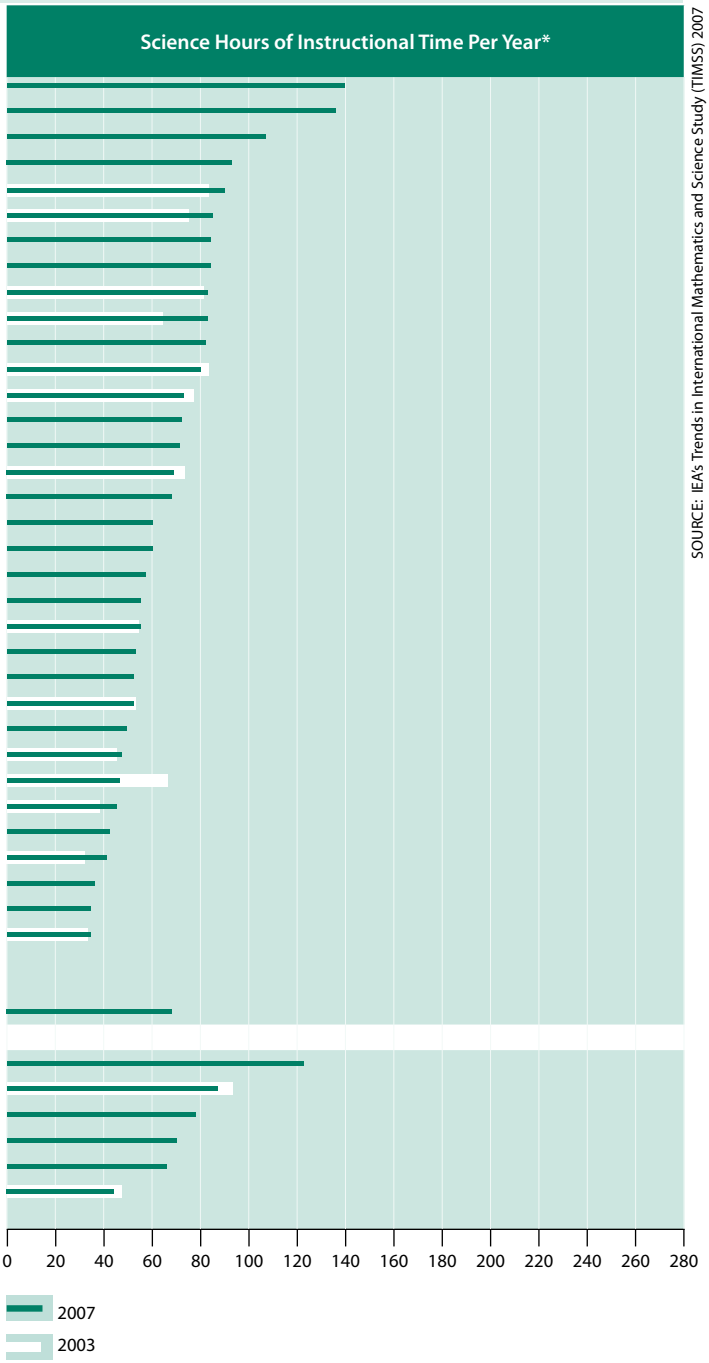
▲ 2007 significantly higher
▼ 2007 significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.3 Yearly Hours of Implemented Instructional Time for Science with Trends

TIMSS2007 Science 4th Grade

Country		2007 Hours	Difference from 2003
Colombia	r	139 (3.9)	◊ ◊
El Salvador		135 (3.5)	◊ ◊
Germany	r	106 (2.1)	◊ ◊
Austria		92 (1.0)	◊ ◊
United States	r	89 (2.5)	6 (3.9)
Slovenia	r	84 (0.8)	9 (2.3) ▲
Yemen	s	83 (5.7)	◊ ◊
Iran, Islamic Rep. of		83 (2.4)	– –
Japan		82 (1.2)	1 (1.7)
Singapore		82 (0.9)	18 (1.1) ▲
Armenia		81 (4.0)	– –
Chinese Taipei	s	79 (1.5)	–4 (1.8) ▼
Hong Kong SAR	s	72 (5.2)	–5 (7.5)
Tunisia	s	71 (2.7)	– –
England	r	70 (1.7)	– –
Italy	r	68 (1.4)	–5 (2.7)
Algeria	s	67 (4.7)	◊ ◊
Denmark	r	59 (0.9)	◊ ◊
Slovak Republic	r	59 (0.7)	◊ ◊
Sweden	r	56 (2.5)	◊ ◊
Morocco	s	54 (4.2)	– –
Hungary	s	54 (1.5)	0 (1.8)
Kazakhstan		52 (1.3)	◊ ◊
Scotland	s	51 (3.1)	– –
Lithuania	r	51 (0.6)	–2 (1.7)
Latvia	r	48 (1.2)	– –
Australia	s	46 (2.2)	1 (3.4)
New Zealand	s	45 (2.5)	–21 (4.3) ▼
Norway	r	44 (1.9)	6 (2.6) ▲
Czech Republic	r	41 (1.3)	◊ ◊
Russian Federation	s	40 (1.1)	8 (1.6) ▲
Georgia	r	35 (2.8)	◊ ◊
Ukraine		33 (1.1)	◊ ◊
Netherlands	s	33 (1.5)	0 (2.4)
Kuwait		x x	◊ ◊
Qatar		x x	◊ ◊
International Avg.		67 (0.4)	
Benchmarking Participants			
Alberta, Canada		122 (2.6)	◊ ◊
Ontario, Canada	r	86 (4.3)	–7 (5.4)
Massachusetts, US	r	77 (4.5)	◊ ◊
British Columbia, Canada	s	69 (2.3)	◊ ◊
Minnesota, US	r	65 (6.6)	◊ ◊
Quebec, Canada	r	43 (1.8)	–4 (3.1)
Dubai, UAE		x x	◊ ◊



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Implemented instructional time for science provided by teachers, and total instructional time provided by schools.

* The yearly hours of instructional time for science are computed by multiplying the number of hours per week that teachers teach science by the number of instructional weeks per year. The number of instructional weeks per year was computed by dividing the number of days per year a school is open for instruction by the number of instructional days in a calendar week.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

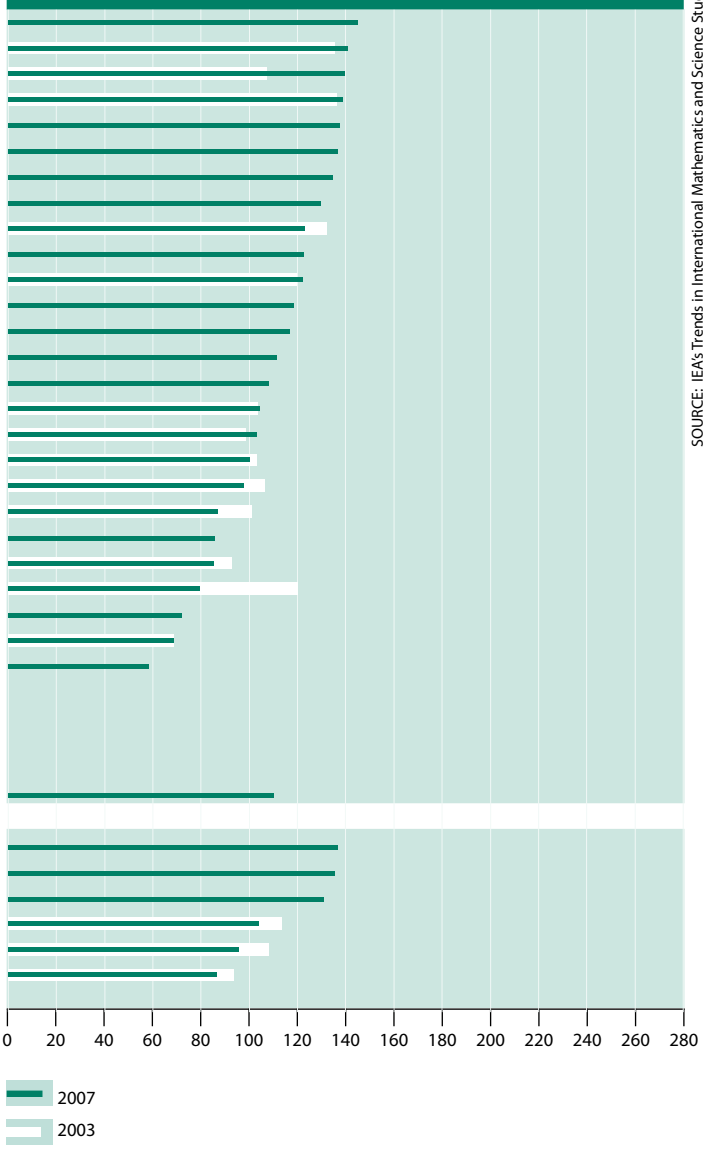
A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 5.3 Yearly Hours of Implemented Instructional Time for Science with Trends (Continued)

TIMSS2007 Science 8th Grade

General/Integrated Science

Country		2007 Hours	Difference from 2003	
Chinese Taipei		145 (3.1)	– –	
Jordan		141 (1.1)	6 (1.4)	▲
Singapore		140 (1.8)	33 (2.6)	▲
United States	s	139 (2.4)	3 (3.3)	
Botswana	r	138 (2.1)	– –	
England	r	137 (6.6)	– –	
El Salvador		135 (2.7)	◊ ◊	
Oman	r	130 (5.7)	◊ ◊	
Australia	s	123 (1.8)	–9 (4.1)	▼
Colombia	r	123 (5.6)	◊ ◊	
Malaysia		122 (1.3)	3 (2.2)	
Thailand		119 (2.2)	◊ ◊	
Ghana	r	117 (6.3)	– –	
Israel	s	111 (5.0)	– –	
Scotland	s	108 (3.1)	– –	
Korea, Rep. of	s	104 (0.7)	1 (2.8)	
Japan	r	103 (1.8)	5 (2.3)	▲
Hong Kong SAR	s	100 (2.9)	–3 (4.9)	
Iran, Islamic Rep. of	s	98 (1.9)	–8 (4.1)	
Palestinian Nat'l Auth.	s	87 (3.5)	–14 (3.9)	▼
Egypt	r	86 (4.1)	– –	
Norway		85 (1.1)	–7 (2.8)	▼
Bahrain	s	80 (3.5)	–40 (3.7)	▼
Turkey		72 (0.5)	◊ ◊	
Italy	s	69 (0.8)	0 (1.4)	
Tunisia	r	58 (1.4)	– –	
Kuwait		x x	◊ ◊	
Qatar		x x	◊ ◊	
Saudi Arabia		x x	– –	
Sweden		– –	– –	
International Avg.		110 (0.7)		
Benchmarking Participants				
Minnesota, US	r	137 (7.5)	◊ ◊	
Massachusetts, US		136 (6.9)	◊ ◊	
British Columbia, Canada	s	131 (4.6)	◊ ◊	
Quebec, Canada	r	104 (2.7)	–9 (7.3)	
Ontario, Canada	r	96 (3.2)	–12 (6.6)	
Basque Country, Spain	r	86 (1.9)	–7 (3.4)	▼
Dubai, UAE		x x	◊ ◊	



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Implemented instructional time for science provided by teachers, and total instructional time provided by schools.

* The yearly hours of instructional time for science are computed by multiplying the number of hours per week that teachers teach science by the number of instructional weeks per year. The number of instructional weeks per year was computed by dividing the number of days per year a school is open for instruction by the number of instructional days in a calendar week.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

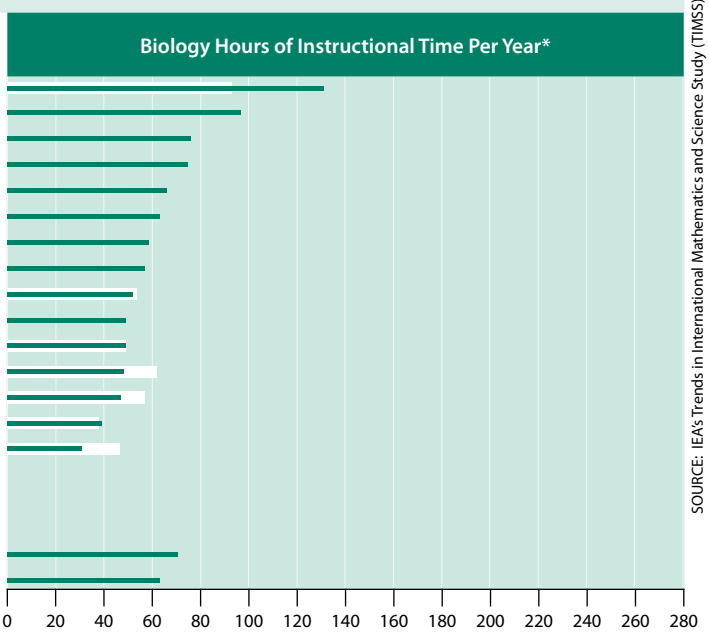
A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 5.3 Yearly Hours of Implemented Instructional Time for Science with Trends (Continued)

TIMSS2007 Science 8th Grade

Biology

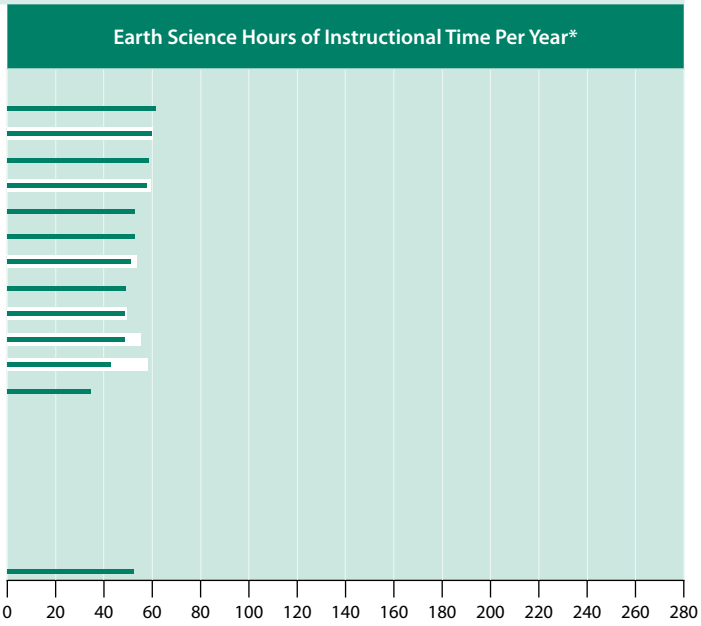
Country		2007 Hours	Difference from 2003
[c] Indonesia	s	130 (13.8)	37 (14.2) ▲
[d] Malta		96 (0.5)	◊ ◊
Armenia		75 (3.4)	– –
Georgia		74 (3.4)	◊ ◊
Bulgaria		66 (4.0)	– –
Ukraine		63 (1.4)	◊ ◊
Bosnia and Herzegovina	r	58 (1.9)	◊ ◊
Czech Republic		57 (0.9)	◊ ◊
Serbia	s	52 (0.5)	–2 (1.1)
[f] Syrian Arab Republic	r	49 (2.8)	◊ ◊
Russian Federation	r	49 (0.4)	0 (0.9)
Hungary	s	48 (1.2)	–14 (3.0) ▼
Slovenia	r	47 (1.3)	–10 (1.4) ▼
Romania	r	39 (2.4)	1 (3.6)
Lithuania	r	30 (0.6)	–16 (3.6) ▼
[b] Algeria		x x	◊ ◊
Lebanon		x x	– –
Cyprus		– –	– –
[e] ‡ Morocco	s	70 (2.4)	– –
International Avg.		63 (1.0)	



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Earth Science

Country		2007 Hours	Difference from 2003
Armenia		62 (2.7)	– –
Georgia		62 (2.8)	◊ ◊
Romania	r	60 (1.5)	0 (1.8)
Ukraine		59 (1.0)	◊ ◊
Lithuania	r	58 (0.6)	–1 (0.7)
Czech Republic		53 (1.2)	◊ ◊
Bulgaria	r	53 (2.7)	– –
Serbia	s	51 (0.4)	–2 (2.2)
Bosnia and Herzegovina	r	49 (0.8)	◊ ◊
Russian Federation	r	49 (0.5)	0 (0.8)
Cyprus	s	49 (0.4)	–6 (3.0) ▼
Hungary	s	43 (1.0)	–15 (2.7) ▼
[d] Malta		35 (0.4)	◊ ◊
[b] Algeria		– –	◊ ◊
[c] Indonesia		– –	– –
Lebanon		– –	– –
Slovenia		– –	– –
[f] Syrian Arab Republic		– –	◊ ◊
[e] ‡ Morocco		– –	– –
International Avg.		52 (0.4)	



▲ 2007 significantly higher
▼ 2007 significantly lower

2007
2003

[a] Algeria: Data reported in biology panel are for biology/earth science teachers and data reported in physics panel are for physics/chemistry teachers.

[b] Indonesia: Data reported in biology and physics panels include data from integrated/general science teachers.

[c] Malta: Data reported in earth science panel include data from environmental studies teachers.

[d] Morocco: Data reported in biology panel are for biology/earth science teachers and data reported in physics panel are for physics/chemistry teachers.

[e] Syrian Arab Republic: Data reported in biology panel are for biology/earth science teachers and data reported in physics panel are for physics/chemistry teachers.

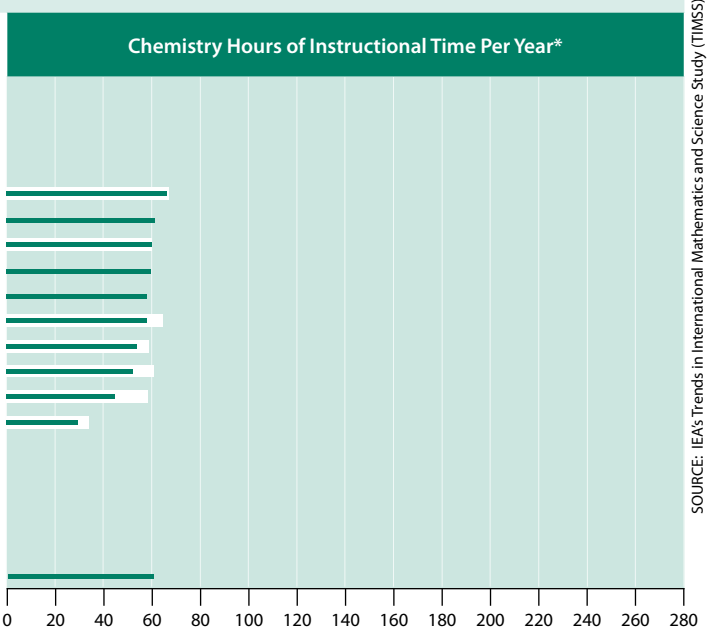
‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

Exhibit 5.3 Yearly Hours of Implemented Instructional Time for Science with Trends (Continued)

TIMSS2007 Science 8th Grade

Chemistry

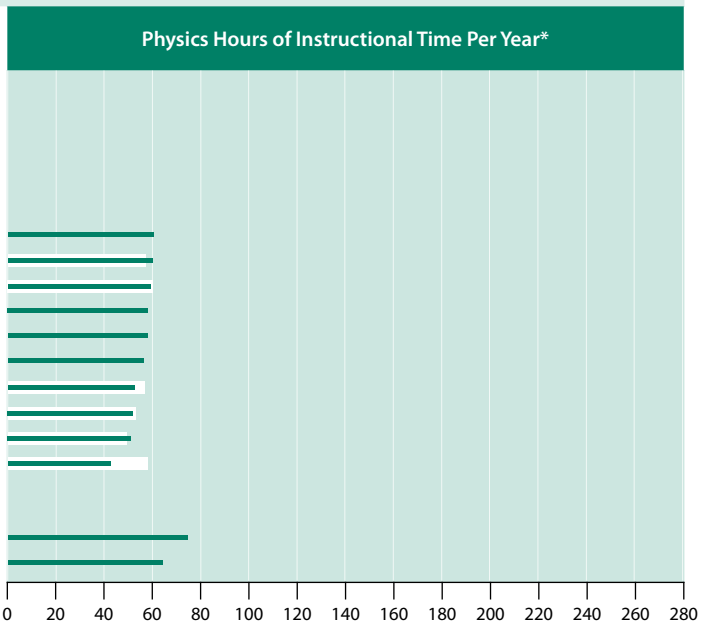
Country		2007 Hours	Difference from 2003
d Malta		90 (0.4)	◊ ◊
Armenia		79 (3.2)	– –
Bulgaria	r	69 (3.5)	– –
Georgia		67 (3.7)	◊ ◊
Romania	r	66 (2.9)	–1 (3.8)
Ukraine		61 (1.2)	◊ ◊
Slovenia		60 (1.0)	0 (1.5)
Czech Republic		59 (1.0)	◊ ◊
Bosnia and Herzegovina	r	58 (1.8)	◊ ◊
Lithuania	r	58 (0.4)	–7 (1.3) ▼
Russian Federation	r	54 (1.0)	–5 (1.5) ▼
Serbia	s	52 (0.5)	–9 (3.8) ▼
Hungary	s	45 (1.0)	–14 (2.3) ▼
Cyprus	s	29 (0.8)	–5 (1.9) ▼
Lebanon		x x	– –
b Algeria		– –	◊ ◊
c Indonesia		– –	– –
f Syrian Arab Republic		– –	◊ ◊
e ‡ Morocco		– –	– –
International Avg.		60 (0.5)	



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Physics

Country		2007 Hours	Difference from 2003
d Malta		106 (0.1)	◊ ◊
c Indonesia	s	92 (6.3)	–1 (7.0)
Georgia		69 (4.6)	◊ ◊
Romania	r	67 (2.9)	0 (3.8)
Armenia		67 (2.5)	– –
f Syrian Arab Republic	r	63 (3.7)	◊ ◊
Bulgaria		59 (3.0)	– –
Slovenia	r	59 (0.8)	2 (0.9) ▲
Lithuania	r	58 (0.6)	–2 (1.0)
Czech Republic		57 (0.8)	◊ ◊
Ukraine		57 (0.4)	◊ ◊
Bosnia and Herzegovina	r	55 (1.3)	◊ ◊
Serbia	s	52 (0.4)	–5 (2.5)
Cyprus	s	51 (0.6)	–2 (1.0) ▼
Russian Federation	r	50 (0.6)	1 (1.0)
Hungary	s	42 (1.0)	–16 (2.7) ▼
b Algeria		x x	◊ ◊
Lebanon		x x	– –
e ‡ Morocco	s	73 (2.3)	– –
International Avg.		63 (0.6)	



2007 significantly higher ▲
2007 significantly lower ▼

2007
2003

Exhibit 5.4 Percentage of Time in Science Class Devoted to TIMSS Content Domains During the School Year

TIMSS2007 Science 4th Grade

Country	Life Science	Physical Science	Earth Science	Other
Algeria	r 41 (1.2)	r 27 (0.8)	r 21 (0.9)	r 12 (1.1)
Armenia	s 30 (2.0)	s 24 (1.4)	s 25 (1.8)	s 22 (3.9)
Australia	r 40 (1.6)	r 25 (1.4)	r 28 (1.2)	r 7 (1.5)
Austria	33 (0.9)	15 (0.5)	40 (1.1)	12 (1.1)
Chinese Taipei	32 (1.0)	43 (1.2)	21 (0.8)	3 (0.6)
Colombia	42 (1.7)	21 (0.9)	23 (1.0)	14 (2.3)
Czech Republic	62 (1.4)	22 (1.0)	10 (0.6)	6 (0.7)
Denmark	r 37 (1.3)	r 26 (1.3)	r 33 (0.9)	r 5 (0.9)
El Salvador	39 (1.0)	21 (1.0)	31 (1.0)	9 (1.1)
England	37 (0.8)	36 (1.0)	24 (0.8)	3 (0.7)
Georgia	r 31 (1.9)	r 13 (0.9)	r 27 (1.5)	r 30 (2.9)
Germany	36 (0.9)	21 (0.7)	32 (0.8)	11 (1.0)
Hong Kong SAR	39 (1.3)	28 (1.0)	24 (1.1)	9 (1.4)
Hungary	58 (1.2)	11 (0.7)	19 (1.0)	r 13 (1.1)
Iran, Islamic Rep. of	32 (0.8)	26 (0.7)	23 (0.7)	19 (1.2)
Italy	52 (1.1)	26 (1.0)	15 (0.8)	8 (0.8)
Japan	36 (0.8)	42 (0.9)	21 (0.7)	1 (0.3)
Kazakhstan	28 (0.8)	18 (0.8)	32 (1.1)	22 (1.0)
Kuwait	x x	x x	x x	x x
Latvia	40 (1.3)	24 (1.1)	25 (0.9)	11 (1.0)
Lithuania	34 (0.8)	17 (0.6)	32 (0.9)	17 (1.1)
Morocco	r 40 (1.2)	r 36 (1.1)	r 12 (1.1)	r 12 (1.1)
Netherlands	56 (2.1)	16 (1.0)	22 (1.5)	7 (1.3)
New Zealand	r 43 (1.2)	r 26 (1.3)	r 28 (1.0)	r 3 (0.7)
Norway	r 42 (1.1)	r 18 (0.8)	r 36 (1.3)	r 4 (0.9)
Qatar	s 42 (0.1)	s 32 (0.1)	s 16 (0.0)	s 10 (0.1)
Russian Federation	33 (1.2)	12 (0.7)	33 (0.8)	23 (1.6)
Scotland	r 41 (1.5)	r 29 (1.7)	r 26 (1.7)	s 4 (1.1)
Singapore	36 (0.9)	48 (0.9)	13 (0.7)	2 (0.4)
Slovak Republic	56 (1.0)	15 (0.5)	24 (0.7)	5 (0.8)
Slovenia	45 (0.9)	36 (0.9)	13 (0.4)	7 (0.7)
Sweden	34 (1.4)	22 (1.3)	39 (1.7)	5 (1.0)
Tunisia	44 (1.1)	41 (0.9)	7 (0.6)	8 (1.2)
Ukraine	32 (1.3)	16 (0.9)	29 (1.2)	23 (1.6)
United States	r 34 (0.7)	r 28 (0.7)	r 31 (0.7)	r 7 (0.7)
Yemen	r 34 (1.3)	r 30 (1.2)	r 22 (1.0)	r 14 (1.2)
International Avg.	40 (0.2)	25 (0.2)	24 (0.2)	10 (0.2)
Benchmarking Participants				
Alberta, Canada	38 (1.1)	33 (1.8)	19 (1.2)	10 (1.4)
British Columbia, Canada	r 38 (0.9)	r 27 (1.1)	r 28 (0.9)	r 7 (1.0)
Dubai, UAE	x x	x x	x x	x x
Massachusetts, US	r 34 (2.0)	r 27 (2.5)	r 33 (2.2)	r 6 (1.8)
Minnesota, US	r 36 (1.9)	r 29 (2.1)	r 30 (2.1)	r 6 (2.0)
Ontario, Canada	r 31 (1.0)	r 34 (1.3)	r 27 (0.8)	r 8 (1.4)
Quebec, Canada	r 40 (1.8)	r 24 (1.5)	r 27 (1.3)	r 9 (1.6)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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 the students.

Exhibit 5.4 Percentage of Time in Science Class Devoted to TIMSS Content Domains During the School Year (Continued)

TIMSS2007 Science 8th Grade

Country	Biology	Chemistry	Physics	Earth Science	Other
Algeria	r 32 (1.6)	r 19 (0.8)	r 29 (1.3)	r 5 (0.7)	r 16 (1.6)
Armenia	r 19 (1.0)	r 22 (1.0)	r 24 (2.1)	r 20 (0.9)	r 14 (1.2)
Australia	29 (0.7)	25 (0.6)	25 (0.6)	17 (0.7)	5 (0.7)
Bahrain	r 24 (0.7)	r 25 (0.4)	r 27 (0.4)	r 19 (0.5)	r 5 (0.6)
Bosnia and Herzegovina	– –	– –	– –	– –	– –
Botswana	40 (1.6)	19 (0.9)	26 (0.9)	7 (0.7)	r 7 (1.4)
Bulgaria	r 25 (0.9)	r 25 (0.8)	r 24 (1.0)	r 22 (0.9)	r 4 (0.8)
Chinese Taipei	6 (1.0)	49 (1.0)	43 (1.0)	2 (0.4)	1 (0.4)
Colombia	43 (1.9)	23 (1.5)	14 (0.7)	13 (1.2)	6 (0.8)
Cyprus	s 4 (0.3)	r 34 (0.6)	r 34 (0.6)	r 24 (0.6)	s 2 (0.3)
Czech Republic	r 27 (0.8)	r 23 (0.8)	r 24 (0.7)	r 18 (1.0)	r 8 (0.8)
Egypt	26 (0.8)	24 (0.7)	23 (0.6)	19 (0.6)	9 (0.6)
El Salvador	27 (0.6)	24 (0.6)	26 (0.6)	18 (0.6)	6 (0.8)
England	29 (0.8)	r 29 (0.8)	r 28 (0.9)	r 10 (0.4)	r 4 (0.7)
Georgia	s 25 (0.8)	s 22 (1.2)	s 23 (1.1)	s 20 (1.1)	s 10 (1.9)
Ghana	27 (0.6)	24 (0.4)	25 (0.5)	15 (0.6)	8 (0.6)
Hong Kong SAR	29 (1.2)	26 (0.8)	33 (1.0)	9 (0.9)	3 (1.2)
Hungary	– –	– –	– –	– –	– –
Indonesia	x x	x x	x x	x x	x x
Iran, Islamic Rep. of	26 (0.7)	21 (0.5)	30 (0.6)	18 (0.4)	6 (0.6)
Israel	r 53 (2.7)	r 24 (2.3)	r 15 (1.4)	r 5 (0.8)	s 3 (0.7)
Italy	35 (1.0)	12 (0.7)	23 (1.0)	28 (0.9)	2 (0.4)
Japan	24 (0.4)	27 (0.5)	28 (0.5)	21 (0.7)	1 (0.4)
Jordan	23 (0.6)	25 (0.5)	30 (0.8)	17 (0.4)	6 (0.6)
Korea, Rep. of	26 (0.8)	25 (0.8)	24 (0.4)	22 (0.5)	2 (0.5)
Kuwait	s 23 (1.2)	s 27 (1.0)	s 33 (1.4)	s 14 (1.0)	s 3 (0.7)
Lebanon	s 23 (1.6)	s 28 (1.3)	s 29 (1.4)	s 14 (1.2)	s 7 (1.3)
Lithuania	– –	– –	– –	– –	– –
Malaysia	33 (0.9)	23 (0.6)	27 (0.6)	13 (0.9)	3 (0.5)
Malta	15 (0.3)	7 (0.1)	47 (0.2)	30 (0.2)	2 (0.0)
Norway	26 (0.7)	24 (0.6)	20 (0.8)	24 (0.7)	6 (0.9)
Oman	26 (0.8)	25 (0.6)	29 (0.7)	16 (0.6)	5 (0.7)
Palestinian Nat'l Auth.	24 (0.7)	25 (0.6)	31 (0.9)	14 (0.6)	6 (0.8)
Qatar	r 25 (0.0)	r 28 (0.0)	r 33 (0.0)	r 10 (0.0)	r 6 (0.0)
Romania	– –	– –	– –	– –	– –
Russian Federation	– –	– –	– –	– –	– –
Saudi Arabia	r 36 (1.6)	r 10 (1.1)	r 19 (1.0)	r 24 (1.0)	r 11 (1.5)
Scotland	r 32 (0.9)	r 30 (0.8)	r 31 (0.9)	r 6 (0.5)	s 1 (0.3)
Serbia	s 24 (1.5)	s 20 (1.4)	s 22 (1.4)	s 16 (1.4)	s 21 (2.2)
Singapore	32 (1.0)	26 (0.7)	38 (0.9)	2 (0.4)	2 (0.5)
Slovenia	– –	– –	– –	– –	– –
Sweden	r 35 (1.0)	r 27 (0.7)	r 31 (1.0)	r 3 (0.4)	s 6 (0.8)
Syrian Arab Republic	r 30 (1.4)	r 23 (0.8)	r 25 (1.0)	r 13 (0.7)	r 10 (0.8)
Thailand	27 (0.7)	22 (0.6)	23 (0.7)	23 (0.7)	5 (0.6)
Tunisia	60 (1.8)	3 (0.5)	2 (0.4)	23 (1.0)	r 13 (1.8)
Turkey	42 (1.3)	25 (0.7)	22 (0.8)	7 (0.6)	5 (0.8)
Ukraine	– –	– –	– –	– –	– –
United States	15 (1.3)	23 (1.2)	26 (1.2)	32 (2.0)	r 4 (0.6)
‡ Morocco	r 24 (0.8)	r 21 (0.9)	r 23 (0.9)	r 28 (1.1)	r 5 (0.9)
International Avg.	28 (0.2)	24 (0.1)	27 (0.1)	16 (0.1)	6 (0.1)
Benchmarking Participants					
Basque Country, Spain	27 (1.6)	19 (1.2)	31 (1.4)	20 (1.4)	4 (1.0)
British Columbia, Canada	r 31 (0.9)	r 20 (0.9)	r 27 (0.6)	r 18 (0.7)	r 4 (0.6)
Dubai, UAE	s 26 (2.1)	s 26 (0.7)	s 29 (1.6)	s 14 (0.7)	x x
Massachusetts, US	17 (3.1)	24 (2.7)	23 (2.7)	30 (4.1)	7 (1.3)
Minnesota, US	10 (2.5)	10 (1.8)	12 (2.5)	66 (4.3)	r 4 (1.4)
Ontario, Canada	27 (0.6)	20 (0.7)	29 (1.2)	19 (0.9)	5 (1.1)
Quebec, Canada	23 (1.1)	23 (0.9)	23 (0.8)	23 (0.9)	9 (1.1)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

Are the TIMSS Science Topics Included in the Intended Curriculum Taught in School?

The science content and topic areas assessed in TIMSS 2007 are elaborated in the Science Framework, with each topic area for fourth and eighth grade presented as a comprehensive list of objectives. The aim was to cover goals of science education that a significant number of countries regarded as important to assess. Because the topics do not represent the "least common denominator" but rather a forward-looking conception of science instruction, not all TIMSS topics are in all countries' curriculum.

National Research Coordinators were asked to indicate whether each of the TIMSS 2007 science topics was included in their countries' intended curriculum through fourth or eighth grade, and if so, whether the topics were intended to be taught to "all or almost all students" or "only the more able students." At the fourth grade, countries were asked about a total of 35 topics, 11 in life science, 14 in physical science, and 10 in earth science. At the eighth grade, countries were asked about 46 topics in total, with 14 in biology, 8 in chemistry, 10 in physics, and 14 in earth science. The responses for the countries are summarized in this section and the topic-by-topic data follows in the next sections.

Exhibit 5.5 shows that, for most countries, much of the science content assessed by TIMSS is included in their intended curricula. On average across countries at the fourth grade, the majority of the assessment topics (23 out of 35) were intended for all or almost all students. There was variation among participants, with most of the topics (32-35) included in the curriculum for all or almost all students in Armenia, Austria, Denmark, Italy, Mongolia, Qatar, and the Slovak Republic, and less than half of the topics included for El Salvador, Georgia, Hong Kong SAR, Iran, Kuwait, Morocco, Norway, Singapore, Sweden, and Tunisia. On average across countries, 8 out of 11 of topics were included in the life science domain, 9 out of 14 in the physical science domain, and 6 out of 10 in the earth science domain.

On average across countries at the eighth grade, most of the science assessment topics (34 out of 46) were intended for all or almost all students.

Five countries included all 46 topics in their curricula for all students—Bosnia and Herzegovina, the Czech Republic, Italy, Jordan, and Serbia—and Hungary, the Palestinian National Authority, Turkey, and the United States had almost all (43-45 topics). Across content domains, coverage of science topics resembled overall coverage. The inclusion for biology topics was 11 out of 14, for chemistry 6 out of 8 topics, for physics 7 out of 10 topics, and for earth science 10 out of 14 topics.

In addition to asking national coordinators about the science topics in the intended curriculum, TIMSS asked science teachers about the topics actually taught in the science classroom. Teachers of the students assessed in TIMSS were asked to indicate whether each of the TIMSS 2007 science topics was *mostly taught before this year, mostly taught this year,* or *not yet taught or just introduced*. Exhibit 5.6 presents, for fourth and eighth grades, teachers' reports on students having been taught the TIMSS science topics either prior to or during the year of the assessment. The exhibit shows, for each TIMSS participant, averaged across science content domains, the percentage of students whose teachers reported that the students had been taught each topic.

At fourth grade, according to their teachers, 61 percent of students, on average across countries, had been taught the science topics, with more than 80 percent in Latvia, the Slovak Republic, and the Ukraine. Across content domains, relatively more students were taught the life science topics (70%, on average), relatively fewer the physical science topics (53%), and about the same as overall for the earth science topics (60%). At eighth grade, an average of 66 percent of students had been taught the science topics overall, and the same or similar percentage in biology (66%) and physics (68%). Seventy-two percent of students were taught the chemistry topics and 57 percent the earth science topics. According to their science teachers, 80 percent, or more, of the students had been taught the TIMSS science topics in Bosnia and Herzegovina, Bulgaria, Egypt, England, Hungary, Romania, Serbia, Turkey, and the Ukraine.

Exhibit 5.5 Summary of TIMSS Science Topics in the Intended Curriculum*

TIMSS2007 Science 4th Grade

Country	Number of TIMSS Science Topics Intended to Be Taught Up to and Including Fourth Grade								
	All Science (35 topics)			Life Science (11 topics)			Physical Science (14 topics)		
	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 4	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 4	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 4
Algeria	28	0	7	10	0	1	10	0	4
Armenia	35	0	0	11	0	0	14	0	0
Australia	24	5	6	8	2	1	9	3	2
Austria	32	0	3	11	0	0	12	0	2
Chinese Taipei	19	0	16	5	0	6	8	0	6
Colombia	27	0	8	9	0	2	14	0	0
Czech Republic	27	0	8	10	0	1	8	0	6
Denmark	34	0	1	11	0	0	13	0	1
El Salvador	15	0	20	11	0	0	2	0	12
England	27	0	8	8	0	3	12	0	2
Georgia	3	0	32	0	0	11	1	0	13
Germany	30	0	5	11	0	0	13	0	1
Hong Kong SAR	17	0	18	5	0	6	6	0	8
Hungary	24	0	11	11	0	0	10	0	4
Iran, Islamic Rep. of	17	0	18	3	0	8	10	0	4
Italy	33	0	2	9	0	2	14	0	0
Japan	19	0	16	4	0	7	11	0	3
Kazakhstan	26	0	9	10	0	1	6	0	8
Kuwait	15	0	19	2	0	8	8	0	6
Latvia	31	0	4	11	0	0	12	0	2
Lithuania	21	0	14	8	0	3	7	0	7
Mongolia	35	0	0	11	0	0	14	0	0
Morocco	10	0	24	3	0	7	7	0	7
Netherlands	np	np	np	np	np	np	np	np	np
New Zealand	22	8	5	7	1	3	9	4	1
Norway	15	0	20	5	0	6	4	0	10
Qatar	32	0	3	11	0	0	13	0	1
Russian Federation	20	0	15	6	0	5	5	0	9
Scotland	18	0	17	5	0	6	11	0	3
Singapore	13	0	22	4	0	7	8	0	6
Slovak Republic	32	0	3	11	0	0	12	0	2
Slovenia	28	0	7	9	0	2	13	0	1
Sweden	17	0	18	5	0	6	8	0	6
Tunisia	15	0	20	5	0	6	7	0	7
Ukraine	19	4	12	6	3	2	3	1	10
United States	30	0	5	10	0	1	11	0	3
Yemen	27	0	8	10	0	1	10	0	4
International Avg.	23	0	11	8	0	3	9	0	4
Benchmarking Participants									
Alberta, Canada	24	0	11	8	0	3	12	0	2
British Columbia, Canada	22	0	13	7	0	4	9	0	5
Dubai, UAE	27	0	8	9	0	2	9	0	5
Massachusetts, US	24	0	11	9	0	2	8	0	6
Minnesota, US	28	0	7	9	0	2	11	0	3
Ontario, Canada	19	0	16	7	0	4	8	0	6
Quebec, Canada	11	7	17	6	2	3	1	3	10

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators.

* See Exhibits 5.7 through 5.9 for data on individual topics.

An "np" indicates not prescribed by the curriculum.

Note: For Sweden number of science topics intended to be taught up to and including fifth grade.

Exhibit 5.5 Summary of TIMSS Science Topics in the Intended Curriculum* (Continued)

TIMSS2007 Science 4th Grade

Country	Number of TIMSS Science Topics Intended to Be Taught Up to and Including Fourth Grade		
	Earth Science (10 topics)		
	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 4
Algeria	8	0	2
Armenia	10	0	0
Australia	7	0	3
Austria	9	0	1
Chinese Taipei	6	0	4
Colombia	4	0	6
Czech Republic	9	0	1
Denmark	10	0	0
El Salvador	2	0	8
England	7	0	3
Georgia	2	0	8
Germany	6	0	4
Hong Kong SAR	6	0	4
Hungary	3	0	7
Iran, Islamic Rep. of	4	0	6
Italy	10	0	0
Japan	4	0	6
Kazakhstan	10	0	0
Kuwait	5	0	5
Latvia	8	0	2
Lithuania	6	0	4
Mongolia	10	0	0
Morocco	0	0	10
Netherlands	np	np	np
New Zealand	6	3	1
Norway	6	0	4
Qatar	8	0	2
Russian Federation	9	0	1
Scotland	2	0	8
Singapore	1	0	9
Slovak Republic	9	0	1
Slovenia	6	0	4
Sweden	4	0	6
Tunisia	3	0	7
Ukraine	10	0	0
United States	9	0	1
Yemen	7	0	3
International Avg.	6	0	4
Benchmarking Participants			
Alberta, Canada	4	0	6
British Columbia, Canada	6	0	4
Dubai, UAE	9	0	1
Massachusetts, US	7	0	3
Minnesota, US	8	0	2
Ontario, Canada	4	0	6
Quebec, Canada	4	2	4

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.5 Summary of TIMSS Science Topics in the Intended Curriculum* (Continued)

TIMSS2007 Science 8th Grade

Country	Number of TIMSS Science Topics Intended to Be Taught Up to and Including Eighth Grade								
	All Science (46 topics)			Biology (14 topics)			Chemistry (8 topics)		
	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 8	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 8	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 8
Algeria	24	0	22	9	0	5	6	0	2
Armenia	40	0	6	14	0	0	5	0	3
Australia	25	11	10	10	1	3	5	0	3
Bahrain	40	0	6	14	0	0	7	0	1
Bosnia and Herzegovina	46	0	0	14	0	0	8	0	0
Botswana	16	0	30	7	0	7	1	0	7
Bulgaria	38	0	8	10	0	4	6	0	2
Chinese Taipei	41	0	5	14	0	0	8	0	0
Colombia	38	0	7	12	0	1	5	0	3
Cyprus	23	2	21	0	0	14	5	0	3
Czech Republic	46	0	0	14	0	0	8	0	0
Egypt	17	26	3	5	7	2	2	5	1
El Salvador	35	0	11	14	0	0	8	0	0
England	40	0	6	13	0	1	7	0	1
Georgia	28	0	18	8	0	6	7	0	1
Ghana	35	0	11	13	0	1	7	0	1
Hong Kong SAR	32	0	14	11	0	3	4	0	4
Hungary	43	0	3	14	0	0	8	0	0
Indonesia	17	0	29	6	0	8	1	0	7
Iran, Islamic Rep. of	34	0	12	12	0	2	8	0	0
Israel	35	3	8	13	0	1	8	0	0
Italy	46	0	0	14	0	0	8	0	0
Japan	33	0	13	8	0	6	7	0	1
Jordan	46	0	0	14	0	0	8	0	0
Korea, Rep. of	27	0	19	7	0	7	4	0	4
Kuwait	25	0	21	11	0	3	6	0	2
Lebanon	28	1	17	11	0	3	2	1	5
Lithuania	35	0	11	11	0	3	6	0	2
Malaysia	38	0	8	12	0	2	7	0	1
Malta	29	1	16	10	0	4	7	0	1
Mongolia	36	5	5	14	0	0	8	0	0
Morocco	29	0	17	10	0	4	4	0	4
Norway	29	0	17	10	0	4	5	0	3
Oman	24	7	15	8	2	4	3	1	4
Palestinian Nat'l Auth.	45	0	1	14	0	0	7	0	1
Qatar	25	0	21	12	0	2	4	0	4
Romania	36	0	10	12	0	2	8	0	0
Russian Federation	40	0	6	12	0	2	7	0	1
Saudi Arabia	31	0	14	12	0	1	3	0	5
Scotland	35	2	9	11	0	3	8	0	0
Serbia	46	0	0	14	0	0	8	0	0
Singapore	33	0	13	9	0	5	7	0	1
Slovenia	38	0	8	10	0	4	6	0	2
Sweden	40	0	6	11	0	3	7	0	1
Syrian Arab Republic	35	10	1	14	0	0	8	0	0
Thailand	32	0	14	10	0	4	6	0	2
Tunisia	14	0	32	4	0	10	4	0	4
Turkey	43	0	3	13	0	1	6	0	2
Ukraine	39	0	7	9	0	5	7	0	1
United States	43	1	1	14	0	0	6	1	1
International Avg.	34	1	11	11	0	3	6	0	2
Benchmarking Participants									
Basque Country, Spain	30	0	16	12	0	2	2	0	6
British Columbia, Canada	40	0	6	12	0	2	5	0	3
Dubai, UAE	41	0	5	14	0	0	7	0	1
Massachusetts, US	23	0	23	8	0	6	3	0	5
Minnesota, US	41	0	5	12	0	2	7	0	1
Ontario, Canada	35	0	11	10	0	4	4	0	4
Quebec, Canada	22	2	22	6	0	8	4	2	2

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators.

* See Exhibits 5.10 through 5.13 for data on individual topics.

Note: For Sweden number of science topics intended to be taught up to and including ninth grade.

Exhibit 5.5 Summary of TIMSS Science Topics in the Intended Curriculum* (Continued)

TIMSS2007 Science 8th Grade

Country	Number of TIMSS Science Topics Intended to Be Taught Up to and Including Eighth Grade					
	Physics (10 topics)			Earth Science (14 topics)		
	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 8	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 8
Algeria	7	0	3	2	0	12
Armenia	7	0	3	14	0	0
Australia	5	1	4	5	9	0
Bahrain	9	0	1	10	0	4
Bosnia and Herzegovina	10	0	0	14	0	0
Botswana	4	0	6	4	0	10
Bulgaria	10	0	0	12	0	2
Chinese Taipei	9	0	1	10	0	4
Colombia	7	0	3	14	0	0
Cyprus	7	2	1	11	0	3
Czech Republic	10	0	0	14	0	0
Egypt	4	6	0	6	8	0
El Salvador	10	0	0	3	0	11
England	10	0	0	10	0	4
Georgia	5	0	5	8	0	6
Ghana	7	0	3	8	0	6
Hong Kong SAR	8	0	2	9	0	5
Hungary	9	0	1	12	0	2
Indonesia	5	0	5	5	0	9
Iran, Islamic Rep. of	9	0	1	5	0	9
Israel	7	2	1	7	1	6
Italy	10	0	0	14	0	0
Japan	8	0	2	10	0	4
Jordan	10	0	0	14	0	0
Korea, Rep. of	9	0	1	7	0	7
Kuwait	8	0	2	0	0	14
Lebanon	4	0	6	11	0	3
Lithuania	5	0	5	13	0	1
Malaysia	8	0	2	11	0	3
Malta	8	0	2	4	1	9
Mongolia	0	5	5	14	0	0
Morocco	5	0	5	10	0	4
Norway	6	0	4	8	0	6
Oman	5	2	3	8	2	4
Palestinian Nat'l Auth.	10	0	0	14	0	0
Qatar	4	0	6	5	0	9
Romania	9	0	1	7	0	7
Russian Federation	9	0	1	12	0	2
Saudi Arabia	8	0	2	8	0	6
Scotland	6	1	3	10	1	3
Serbia	10	0	0	14	0	0
Singapore	10	0	0	7	0	7
Slovenia	8	0	2	14	0	0
Sweden	9	0	1	13	0	1
Syrian Arab Republic	0	10	0	13	0	1
Thailand	7	0	3	9	0	5
Tunisia	5	0	5	1	0	13
Turkey	10	0	0	14	0	0
Ukraine	9	0	1	14	0	0
United States	10	0	0	13	0	0
International Avg.	7	1	2	10	0	4
Benchmarking Participants						
Basque Country, Spain	4	0	6	12	0	2
British Columbia, Canada	9	0	1	14	0	0
Dubai, UAE	7	0	3	13	0	1
Massachusetts, US	6	0	4	6	0	8
Minnesota, US	10	0	0	12	0	2
Ontario, Canada	10	0	0	11	0	3
Quebec, Canada	2	0	8	10	0	4

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.6 Summary of Students Taught the TIMSS Science Topics*

TIMSS2007 Science 4th Grade

Country	Average Percentage of Students Taught** the TIMSS Science Topic			
	All Science (35 topics)	Life Science (11 topics)	Physical Science (14 topics)	Earth Science (10 topics)
Algeria	63 (1.9)	68 (2.3)	54 (2.5)	67 (1.8)
Armenia	x x	x x	x x	x x
Australia	53 (1.6)	66 (1.8)	39 (2.1)	53 (2.1)
Austria	68 (1.2)	77 (1.2)	56 (1.6)	70 (1.2)
Chinese Taipei	55 (2.0)	59 (2.1)	60 (2.0)	46 (2.6)
Colombia	76 (1.4)	92 (1.3)	62 (2.6)	75 (1.8)
Czech Republic	62 (1.4)	76 (1.8)	41 (1.3)	68 (1.8)
Denmark	r 55 (1.7)	r 59 (2.1)	r 49 (2.2)	r 57 (2.3)
El Salvador	72 (1.3)	92 (0.9)	50 (2.3)	74 (1.7)
England	72 (1.3)	72 (1.6)	74 (1.5)	70 (2.0)
Georgia	47 (2.3)	49 (2.9)	27 (2.3)	64 (3.1)
Germany	55 (1.4)	61 (1.8)	50 (1.6)	55 (1.6)
Hong Kong SAR	59 (1.5)	69 (2.0)	53 (1.9)	55 (1.8)
Hungary	67 (1.3)	83 (1.4)	53 (1.7)	65 (1.9)
Iran, Islamic Rep. of	68 (1.4)	71 (1.8)	69 (1.5)	64 (2.0)
Italy	64 (1.1)	76 (1.1)	50 (1.5)	66 (1.5)
Japan	36 (1.1)	32 (1.5)	48 (1.1)	27 (1.5)
Kazakhstan	– –	– –	– –	– –
Kuwait	r 66 (2.1)	r 74 (2.3)	r 61 (2.1)	r 66 (2.2)
Latvia	81 (1.1)	85 (1.6)	71 (1.6)	88 (1.0)
Lithuania	79 (1.0)	95 (0.6)	61 (1.7)	81 (1.3)
Morocco	47 (1.4)	62 (1.8)	49 (1.3)	31 (1.8)
Netherlands	49 (1.3)	r 61 (1.7)	r 34 (1.7)	50 (1.7)
New Zealand	53 (1.3)	65 (1.3)	43 (1.9)	52 (1.7)
Norway	55 (1.3)	65 (1.7)	37 (1.6)	62 (1.4)
Qatar	r 51 (0.1)	r 60 (0.1)	r 51 (0.1)	r 41 (0.1)
Russian Federation	– –	– –	– –	– –
Scotland	r 52 (1.2)	r 59 (1.9)	r 51 (1.9)	r 45 (1.7)
Singapore	55 (0.8)	68 (1.1)	63 (0.7)	36 (1.1)
Slovak Republic	82 (1.0)	90 (1.0)	72 (1.4)	85 (1.2)
Slovenia	61 (1.2)	65 (1.5)	67 (1.7)	51 (1.5)
Sweden	49 (1.5)	56 (1.6)	32 (1.8)	59 (1.9)
Tunisia	51 (1.6)	67 (1.8)	50 (1.7)	37 (2.1)
Ukraine	83 (0.9)	94 (1.0)	59 (1.6)	95 (0.6)
United States	70 (1.1)	73 (1.3)	62 (1.7)	77 (1.3)
Yemen	55 (2.1)	61 (2.2)	58 (2.3)	47 (2.8)
International Avg.	61 (0.2)	70 (0.3)	53 (0.3)	60 (0.3)
Benchmarking Participants				
Alberta, Canada	51 (1.6)	57 (2.2)	45 (1.9)	51 (1.9)
British Columbia, Canada	r 51 (1.5)	r 55 (2.1)	r 40 (1.9)	r 57 (2.1)
Dubai, UAE	s 54 (0.9)	x x	s 46 (1.8)	x x
Massachusetts, US	r 64 (2.3)	r 65 (3.0)	r 54 (4.1)	r 74 (3.5)
Minnesota, US	60 (3.1)	r 64 (4.0)	53 (3.9)	63 (3.6)
Ontario, Canada	50 (1.6)	61 (2.4)	42 (2.4)	46 (2.4)
Quebec, Canada	r 52 (1.4)	r 62 (2.0)	r 37 (1.7)	r 57 (2.5)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers at the time of testing.

* See Exhibits 5.7 through 5.9 for data on individual topics.

** Includes the TIMSS topics mostly taught during or before the year of the assessment.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

Exhibit 5.6 Summary of Students Taught the TIMSS Science Topics* (Continued)

TIMSS2007 Science 8th Grade

Country	Average Percentage of Students Taught** the TIMSS Science Topic									
	All Science (46 topics)		Biology (14 topics)		Chemistry (8 topics)		Physics (10 topics)		Earth Science (14 topics)	
Algeria		47 (1.2)		62 (1.8)		57 (2.1)		51 (1.9)	r	15 (1.3)
Armenia		68 (1.4)		71 (2.1)		61 (3.1)		79 (2.2)		61 (3.0)
Australia		51 (1.1)		48 (1.4)		61 (1.5)		52 (1.3)		43 (2.1)
Bahrain		63 (0.7)		64 (0.9)		70 (0.9)		74 (0.9)		43 (0.8)
Bosnia and Herzegovina		92 (0.5)		91 (1.0)		96 (0.9)		95 (0.8)		85 (1.7)
Botswana		28 (1.6)		33 (1.5)		17 (2.5)		41 (1.8)		21 (1.4)
Bulgaria		80 (0.9)		70 (1.7)		77 (1.8)		89 (1.3)		85 (1.3)
Chinese Taipei		65 (1.5)		70 (3.8)		99 (0.6)		67 (1.5)		17 (2.7)
Colombia		65 (1.8)		79 (1.5)		60 (2.6)		46 (2.6)		76 (2.4)
Cyprus	r	56 (0.3)		– –	r	50 (0.5)	r	49 (0.4)	r	72 (0.6)
Czech Republic		78 (0.6)		76 (1.2)		74 (1.4)		80 (1.0)		81 (1.4)
Egypt		85 (1.1)		81 (1.4)		87 (1.4)		85 (1.6)		88 (1.2)
El Salvador		71 (1.5)		72 (1.9)		82 (2.0)		79 (1.4)		54 (2.8)
England		84 (0.9)	r	85 (1.1)	r	90 (1.0)	r	94 (0.9)	r	67 (1.7)
Georgia		71 (1.3)		55 (2.6)		88 (1.2)		63 (1.5)		84 (2.2)
Ghana		60 (1.5)		65 (1.9)		78 (1.4)		57 (1.9)		41 (2.3)
Hong Kong SAR		50 (1.6)		56 (2.1)		55 (2.2)		60 (2.5)		28 (1.6)
Hungary		84 (0.8)		80 (1.2)		98 (0.6)		84 (0.8)		75 (2.0)
Indonesia		70 (1.1)		69 (1.6)		59 (5.6)		73 (1.3)	r	56 (6.3)
Iran, Islamic Rep. of		79 (1.0)		64 (1.8)		93 (0.8)		90 (1.2)		67 (1.6)
Israel		54 (1.4)	r	43 (2.0)	r	74 (1.9)	r	55 (1.5)	s	36 (2.5)
Italy		78 (0.9)		89 (0.7)		82 (1.6)		69 (1.5)		71 (1.7)
Japan		56 (0.9)		32 (1.1)		81 (1.2)		67 (1.1)		44 (1.3)
Jordan		78 (1.3)		79 (1.7)		78 (1.5)		83 (1.6)		74 (1.9)
Korea, Rep. of		54 (1.2)		42 (1.6)		47 (1.6)		73 (1.4)		56 (1.3)
Kuwait	r	66 (2.0)	r	64 (2.8)	r	69 (2.5)	r	81 (1.8)	r	50 (3.0)
Lebanon		77 (1.2)		63 (1.9)		90 (1.3)		79 (2.0)		– –
Lithuania		65 (0.8)		62 (1.7)		64 (1.5)		51 (1.5)		81 (1.3)
Malaysia		61 (1.1)		66 (1.5)		73 (1.6)		71 (1.2)		36 (1.5)
Malta		51 (0.1)		40 (0.3)		67 (0.3)		46 (0.1)		59 (0.1)
Norway		41 (1.0)		37 (1.5)		44 (1.7)		32 (1.3)		53 (1.8)
Oman		69 (1.3)		73 (1.6)		67 (1.6)		77 (1.7)		58 (2.3)
Palestinian Nat'l Auth.		71 (1.4)		68 (1.8)		79 (1.5)		75 (1.9)		64 (1.8)
Qatar		56 (0.1)		53 (0.1)		70 (0.1)		70 (0.1)		32 (0.1)
Romania		91 (0.5)		89 (1.2)		93 (1.1)		94 (0.9)		88 (1.1)
Russian Federation		– –		– –		– –		– –		– –
Saudi Arabia		59 (1.1)		79 (1.1)		35 (2.5)		57 (1.9)		63 (1.8)
Scotland	r	60 (1.0)	r	58 (1.5)	r	75 (1.5)	r	70 (1.4)	s	36 (1.9)
Serbia		94 (0.6)		90 (1.2)		95 (0.9)		94 (1.3)		98 (0.7)
Singapore		53 (0.9)		54 (1.2)		67 (1.3)		66 (1.2)	r	17 (1.5)
Slovenia		62 (0.8)		61 (1.2)		74 (1.0)		53 (1.5)		– –
Sweden		64 (0.8)		61 (1.4)		65 (1.3)	r	67 (1.6)	r	43 (3.1)
Syrian Arab Republic		69 (1.3)		67 (2.2)		80 (1.4)		68 (1.8)		50 (2.7)
Thailand		67 (1.5)		70 (2.1)		84 (1.9)		52 (2.2)		64 (2.6)
Tunisia		32 (1.3)		53 (1.3)	s	20 (2.7)	s	24 (3.4)		21 (1.5)
Turkey		80 (1.3)		84 (1.6)		93 (1.1)		79 (1.4)		66 (2.6)
Ukraine		82 (0.6)		69 (1.3)		80 (1.2)		85 (0.7)		95 (0.8)
United States		77 (1.3)		84 (1.6)		74 (1.9)		71 (1.7)		81 (1.7)
‡ Morocco	r	57 (1.3)	r	59 (2.2)	r	67 (1.9)	r	58 (1.8)	r	47 (2.5)
International Avg.		66 (0.2)		66 (0.2)		72 (0.3)		68 (0.2)		57 (0.3)
Benchmarking Participants										
Basque Country, Spain		59 (1.6)		54 (2.1)		48 (2.8)		60 (2.6)		73 (1.9)
British Columbia, Canada	r	48 (1.4)	r	53 (1.8)	r	44 (2.4)	r	53 (2.0)	r	42 (2.4)
Dubai, UAE	s	64 (1.9)	s	61 (1.6)		x x	s	70 (2.3)		x x
Massachusetts, US		76 (2.6)		83 (4.0)		71 (3.9)		70 (4.4)		82 (2.7)
Minnesota, US		60 (3.6)		79 (4.7)		39 (4.8)		47 (5.7)		74 (4.2)
Ontario, Canada		67 (1.5)		69 (3.1)		57 (2.7)		68 (1.8)		73 (2.9)
Quebec, Canada		58 (1.6)		59 (2.5)		65 (2.5)		39 (2.0)		70 (2.3)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers at the time of testing.

For countries that teach science as separate subjects at Grade 8, data are based on teachers who teach the relevant science subject.

* See Exhibits 5.10 through 5.13 for data on individual topics.

** Includes the TIMSS topics mostly taught during or before the year of the assessment.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

Fourth Grade: Which TIMSS Science Topics Are in the Intended and Implemented Curriculum?

For the fourth grade, Exhibit 5.7 provides detailed information about each topic within the life science domain, including the student population to be taught the topic, the grades within which the topics are intended to be taught, and the teachers' reports about the percent of students taught the topics. As shown in the exhibit, all 11 topics were included in the intended curriculum of the majority of TIMSS 2007 participants and were taught to the majority of fourth grade students. On average across countries, teachers reported that 77 percent of students had been taught about types, characteristics, and classification of living things; 79 percent had been taught about major body structures and their function in humans and other organisms; and 74 percent about general steps in the life cycle of familiar organisms.

Not quite so well covered at the fourth grade were plant and animal reproduction (58% of students taught); physical features, behavior, and survival of plants and animals (66%); bodily actions in response to outside conditions and activities (66%); energy requirements of plants and animals (63%); and ways that communicable diseases are transmitted (58%). Students generally were taught about relationships in a living community (70%), changes in environments (76%), and ways of maintaining good health through diet and exercise (81%).

Exhibit 5.8 contains the topic-by-topic results for the fourth grade content domain of physical science. There was considerable variation in the coverage of these topics in the intended curriculum and consequently in the extent to which they were taught. Within the general area of classification and properties of matter, every country included properties and uses of water at fourth grade, and a high percentage of students (82%, on average) were taught the topic. Classification of objects and materials based on physical properties also was in the curriculum of most countries and taught to the majority of students (59%). However, properties and uses of metals and forming and separating mixtures were included in only about half the countries' curricula, and taught to only about one-third of fourth grade students (37% and 31%,

respectively). In the area of physical states and changes of matter, there was good coverage of states of matter and differences in physical properties and changes in state by heating and cooling—in the curricula of most countries and taught to about three-fourths of the students—but less of changes in familiar materials to produce other materials (burning, rusting, cooking, etc.), which were in the curricula of about half the participants and taught to less than half the students (45%).

Topics in energy sources and heat and temperature were covered in about two-thirds of the countries and taught to the majority of students (65% in the case of energy sources and their uses, and 57% for heat flow and temperature). Light and sound topics were covered by about half the countries and taught to less than half the students—45 percent of students were taught about common sources of light, 33 percent about sound as the result of vibrations. Similarly, about half the countries covered topics in electricity and magnetism, with 46 percent of students taught about simple electrical circuits and 54 percent about properties of magnets, and about one-third of countries covered topics in forces and motion, with 40 percent of students taught about forces causing objects to move (gravity, push-pull forces, etc.)

Exhibit 5.7 Intended and Taught* TIMSS Life Science Topics

TIMSS2007 Science 4th Grade

Life Science (11 topics)	Types, characteristics, and classification of living things			Major body structures and their function in humans and other organisms			General steps in the life cycle of familiar organisms		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	1	77 (3.9)	●	1	89 (3.1)	●	4	54 (5.0)
Armenia	●	4	x x	●	4	x x	●	4	x x
Australia	●	3–6	77 (3.6)	●	3–6	67 (3.5)	●	3–4	88 (2.0)
Austria	●	3	61 (3.3)	●	3	92 (1.6)	●	3	88 (2.1)
Chinese Taipei	●	3–5	79 (3.0)	●	3–6	81 (2.9)	●	3–4	85 (2.9)
Colombia	●	4–5	100 (0.0)	●	4–5	95 (2.1)	●	1–3	85 (3.8)
Czech Republic	●	1–3, 5–6	92 (2.4)	●	1–4, 6–9	83 (3.0)	●	1–3, 6–9	68 (3.6)
Denmark	●	3–4	r 60 (4.5)	●	3–4	r 68 (4.4)	●	3–4	r 57 (4.5)
El Salvador	●	3–11	99 (0.6)	●	1–11	99 (0.9)	●	1–9	91 (2.5)
England	●	1,3,5	88 (2.3)	●	K,2–4	79 (3.0)	●	4	87 (2.9)
Georgia	○	5	40 (4.6)	○	6	40 (4.6)	○	8	23 (3.7)
Germany	●	1–4	55 (3.2)	●	3–4	70 (3.1)	●	3–4	70 (2.8)
Hong Kong SAR	●	3	74 (4.0)	●	4	94 (2.2)	○	5	56 (4.0)
Hungary	●	1–3	88 (3.2)	●	4	91 (3.1)	●	4	92 (2.4)
Iran, Islamic Rep. of	○	6	93 (1.5)	●	3	77 (3.5)	●	4	76 (4.1)
Italy	●	3–6	99 (0.5)	●	4–7	72 (2.9)	●	4–7	94 (1.6)
Japan	●	3–12	49 (4.0)	●	3–12	24 (3.4)	●	3–12	87 (3.1)
Kazakhstan	●	1	– –	●	1–3	– –	●	1	– –
Kuwait	●	2,3,5	r 82 (3.7)	–	1,5	r 83 (3.2)	○	5	s 43 (4.9)
Latvia	●	1	92 (2.3)	●	1–2	94 (1.9)	●	2,4–5	86 (2.8)
Lithuania	●	4	84 (2.9)	●	4	98 (1.2)	○	5	96 (1.5)
Mongolia	●	3–5	– –	●	3–5	– –	●	3–5	– –
Morocco	○	7	94 (2.2)	○	9	84 (3.3)	●	4,8	94 (2.1)
Netherlands	np	np	52 (4.0)	np	np	63 (4.4)	np	np	r 72 (3.6)
New Zealand	●	K–4	73 (2.6)	●	K–6	61 (3.0)	●	2–4	77 (2.5)
Norway	●	3–7	59 (4.3)	●	1–7	77 (3.8)	●	3–4	61 (4.1)
Qatar	●	1–6	r 75 (0.2)	●	1–6	r 77 (0.1)	●	2–6	r 61 (0.2)
Russian Federation	●	3–4	– –	●	3, 6–8	– –	○	6–8	– –
Scotland	●	3	r 70 (3.8)	●	4	r 64 (3.9)	○	1–2,5,10	r 73 (3.3)
Singapore	●	3	99 (0.7)	●	3–5	97 (1.1)	●	3	94 (1.5)
Slovak Republic	●	1–7,9	96 (1.6)	●	2–6,7,9	100 (0.1)	●	3–7,9	97 (1.3)
Slovenia	●	3–4	64 (3.6)	●	3–4	92 (1.8)	●	4	44 (3.7)
Sweden	○	–	35 (3.7)	●	1–5	53 (3.4)	●	1–5	62 (3.7)
Tunisia	○	7	86 (3.2)	●	–	78 (3.1)	○	6	48 (4.0)
Ukraine	○	6–8,10	91 (2.3)	●	4,8–9	93 (2.2)	●	4,6–7,9,11	87 (2.6)
United States	●	K–4	83 (1.8)	●	K–4, 5–8	70 (2.7)	●	K–4	83 (2.1)
Yemen	●	1,2,5–10	62 (4.7)	●	1,5,10,12	92 (2.3)	●	3,6–8,10–12	62 (4.7)
International Avg.			77 (0.5)			79 (0.5)			74 (0.6)
Benchmarking Participants									
Alberta, Canada	●	1–7,9–11	47 (4.1)	●	4–7,10–12	38 (4.2)	●	3,5,9,12	71 (3.6)
British Columbia, Canada	●	K–2	r 54 (4.6)	○	5	r 38 (3.7)	●	2	r 60 (4.3)
Dubai, UAE	●	1	x x	●	3	x x	●	4	x x
Massachusetts, US	●	K–5	r 75 (4.4)	●	3–8	r 55 (7.3)	●	3–5	r 83 (4.8)
Minnesota, US	●	3	r 57 (7.6)	●	4	r 65 (7.6)	●	2	r 87 (5.4)
Ontario, Canada	●	1–2	68 (4.5)	●	1–2	34 (4.4)	●	2	71 (4.3)
Quebec, Canada	●	3–4	r 77 (3.7)	●	3–4	r 53 (4.2)	●	3–4	r 68 (4.3)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

* Includes the TIMSS topics mostly taught during or before the year of the assessment.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

An "np" indicates not prescribed by the curriculum.

Exhibit 5.7 Intended and Taught* TIMSS Life Science Topics (Continued)

TIMSS2007 Science 4th Grade

Life Science (11 topics)	Plant and animal reproduction			Physical features, behavior, and survival of plants and animals			Bodily actions in response to outside conditions and activities		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	1	72 (4.1)	●	4	48 (5.1)	●	3	49 (4.6)
Armenia	●	4	x x	●	4	x x	●	4	x x
Australia	●	3–6	35 (4.0)	●	3–6	64 (3.8)	●	3–6	63 (3.3)
Austria	●	3	48 (3.0)	●	1	79 (2.5)	●	1–4	77 (2.8)
Chinese Taipei	○	5–6	38 (4.1)	○	5–6	78 (3.3)	○	5–6	43 (4.3)
Colombia	○	6–7	89 (3.9)	●	4–5	94 (2.9)	●	4–5	91 (2.7)
Czech Republic	○	6–7	42 (4.0)	●	1–4, 6–8	83 (3.4)	●	1–4, 8, 9	72 (3.6)
Denmark	●	3–4	r 21 (4.2)	●	3–4	r 68 (4.9)	●	3–4	r 72 (3.9)
El Salvador	●	K–11	84 (2.8)	●	1–11	88 (2.7)	●	1–11	79 (3.1)
England	○	–	67 (4.2)	●	K–2,5	66 (4.2)	●	3–4	74 (3.7)
Georgia	○	6	45 (5.2)	○	8	49 (5.0)	○	6	44 (4.5)
Germany	●	5–6	42 (3.5)	●	4	65 (3.3)	●	7–9	61 (3.5)
Hong Kong SAR	○	5	48 (4.4)	○	6	57 (4.0)	●	3–6	84 (3.3)
Hungary	●	4	73 (2.8)	●	1–2	76 (3.4)	●	3	70 (3.7)
Iran, Islamic Rep. of	○	8	58 (3.9)	○	9	64 (3.8)	○	9	61 (4.2)
Italy	●	4–7	92 (1.7)	●	4–7	88 (2.2)	●	4–7	53 (3.0)
Japan	○	5,9–12	27 (3.7)	○	9–12	44 (3.8)	●	4,6,8–12	24 (3.5)
Kazakhstan	●	1	– –	●	1	– –	●	1	– –
Kuwait	○	9,12	r 84 (3.6)	○	9	r 60 (4.5)	○	5,7,9	r 73 (3.8)
Latvia	●	3,5	71 (3.3)	●	4–5	84 (2.9)	●	1–4	71 (3.3)
Lithuania	●	4	94 (1.3)	●	4	95 (1.4)	●	4	95 (1.1)
Mongolia	●	4–5	– –	●	3–6	– –	●	3–6	– –
Morocco	●	3–4,8	72 (3.8)	–	–	40 (4.7)	○	9	50 (3.9)
Netherlands	np	np	r 48 (4.6)	np	np	r 59 (4.5)	np	np	58 (4.7)
New Zealand	○	6–11	33 (3.0)	●	4–6	72 (2.3)	●	2–4	59 (2.8)
Norway	○	5–10	37 (4.5)	○	8–10	39 (3.9)	●	3–10	74 (3.5)
Qatar	●	1–6	r 75 (0.2)	●	1–6	r 49 (0.2)	●	1–6	r 46 (0.2)
Russian Federation	○	6–7	– –	○	6–7	– –	○	8	– –
Scotland	○	5	r 26 (4.0)	○	5	r 56 (4.4)	○	11	r 60 (4.4)
Singapore	○	5	47 (2.7)	○	6	50 (2.9)	○	6	74 (2.4)
Slovak Republic	●	3–7,9	85 (2.4)	●	3–6,9	96 (1.5)	●	1,4,7,9	80 (3.0)
Slovenia	●	3–4	42 (3.2)	●	4–5	48 (3.2)	○	6	86 (2.5)
Sweden	●	1–5	51 (3.4)	○	6–9	53 (3.9)	○	6–9	58 (3.7)
Tunisia	●	–	75 (3.4)	○	8	47 (3.9)	○	6	68 (3.3)
Ukraine	○	6–8	89 (2.2)	●	6–7,11	89 (2.5)	●	6–8	96 (1.6)
United States	●	K–4	54 (3.2)	●	K–4	84 (2.1)	○	5–8	62 (2.7)
Yemen	●	2,3,9	54 (4.3)	●	2	33 (4.2)	●	4,7	70 (4.2)
International Avg.			58 (0.6)			66 (0.6)			66 (0.6)
Benchmarking Participants									
Alberta, Canada	●	4,6,9,12	41 (4.3)	●	1–9, 11–12	52 (4.4)	○	8,12	46 (4.0)
British Columbia, Canada	○	9–11	r 26 (3.5)	●	4,6,7	r 71 (3.5)	●	4	r 42 (4.1)
Dubai, UAE	●	3	x x	●	4	x x	●	3	x x
Massachusetts, US	●	K–8	r 52 (6.2)	●	3–8	r 70 (6.7)	●	K–2	r 50 (5.3)
Minnesota, US	●	3	r 44 (8.0)	●	3	r 65 (6.8)	●	2	r 56 (7.3)
Ontario, Canada	○	9–12	36 (4.5)	●	2–3	78 (3.9)	○	5	44 (4.1)
Quebec, Canada	⦿	3–6	r 46 (4.6)	●	3–4	r 59 (4.4)	●	1–2	r 51 (4.2)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.7 Intended and Taught* TIMSS Life Science Topics (Continued)

TIMSS2007 Science 4th Grade

Life Science (11 topics)	Energy requirements of plants and animals			Relationships in a living community			Changes in environments		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	1	52 (5.0)	●	4	85 (4.6)	●	4	89 (2.7)
Armenia	●	4	x x	●	4	x x	●	4	x x
Australia	●	3–6	61 (4.0)	⦿	4–6	73 (3.9)	●	3–6	75 (3.4)
Austria	●	2	53 (3.3)	●	2	74 (2.5)	●	3	91 (1.7)
Chinese Taipei	○	7–9	36 (4.0)	○	7–9	41 (4.2)	●	3–4	74 (3.5)
Colombia	●	4–5	95 (2.7)	●	4–5	98 (1.2)	●	4–5	93 (3.3)
Czech Republic	●	4,6–7	77 (3.8)	●	4,6,8,9	86 (2.9)	●	1–4, 8–9	83 (3.0)
Denmark	●	3–4	r 69 (4.3)	●	3–4	r 72 (4.4)	●	3–4	r 58 (4.7)
El Salvador	●	3–11	86 (3.2)	●	3–11	97 (1.5)	●	3–11	93 (1.7)
England	○	–	72 (3.7)	●	5	67 (3.9)	●	3,5	57 (4.3)
Georgia	○	8	64 (4.8)	○	8	45 (4.8)	○	6	78 (4.4)
Germany	●	5–6	28 (3.3)	●	3–4	64 (3.3)	●	3–4	77 (2.6)
Hong Kong SAR	○	5–6	61 (4.5)	○	6	26 (3.8)	○	6	77 (4.0)
Hungary	●	4	51 (3.8)	●	4	96 (1.5)	●	4	96 (1.4)
Iran, Islamic Rep. of	○	6	91 (2.3)	○	8	58 (3.8)	○	8	72 (3.8)
Italy	●	4–6	87 (1.8)	●	3–8	89 (2.0)	●	3–8	83 (2.5)
Japan	○	6–8,10–12	14 (2.7)	○	9–12	10 (2.3)	○	9–12	12 (2.5)
Kazakhstan	●	1	– –	●	1	– –	●	1	– –
Kuwait	○	7,9	r 68 (4.8)	○	6	r 93 (2.6)	○	6	r 81 (3.9)
Latvia	●	3	81 (3.2)	●	3	90 (2.3)	●	3,6	91 (2.4)
Lithuania	○	5	99 (1.0)	●	4	99 (0.5)	●	4	96 (1.3)
Mongolia	●	4–5	– –	●	3–5	– –	●	3–5	– –
Morocco	○	7	21 (4.1)	○	5,7	82 (3.8)	●	4,7,9	62 (5.0)
Netherlands	np	np	47 (4.6)	np	np	r 68 (3.9)	np	np	r 66 (4.2)
New Zealand	○	6–8	55 (2.8)	○	6–9	70 (2.4)	⦿	4–6	71 (2.4)
Norway	○	8–10	58 (4.1)	○	8–10	72 (3.7)	○	8–10	67 (4.1)
Qatar	●	2–6	r 39 (0.2)	●	2–6	r 53 (0.2)	●	2–6	r 60 (0.2)
Russian Federation	○	6–7	– –	●	3	– –	●	3–4	– –
Scotland	●	3	r 57 (4.2)	●	3	r 57 (4.0)	○	5	r 56 (4.4)
Singapore	○	5	91 (1.7)	○	6	52 (3.1)	○	6	74 (2.2)
Slovak Republic	●	3–7,9	84 (2.9)	●	3–7,9	99 (0.4)	●	1–9	84 (2.6)
Slovenia	●	4–5	41 (3.1)	○	5	41 (3.1)	●	3	89 (2.0)
Sweden	○	6–9	54 (3.4)	○	6–9	75 (3.0)	●	1–5	57 (4.0)
Tunisia	○	6	48 (4.0)	○	6	35 (3.9)	●	–	88 (2.5)
Ukraine	⦿	6–7	94 (1.8)	⦿	6–7	98 (1.0)	⦿	9,11	98 (1.2)
United States	●	K–4	83 (2.0)	●	K–4	87 (1.9)	●	3–4	r 75 (2.7)
Yemen	●	4–5	53 (4.5)	○	5	46 (4.6)	●	2,5,9	68 (4.4)
International Avg.			63 (0.6)			70 (0.5)			76 (0.6)
Benchmarking Participants									
Alberta, Canada	●	1–2,4–8,10,12	55 (4.1)	●	1,2,4–9,12	65 (3.9)	●	4–12	90 (2.3)
British Columbia, Canada	●	1	r 60 (4.0)	●	4	r 73 (4.2)	●	4	r 68 (4.6)
Dubai, UAE	●	3	x x	●	4	x x	○	5	x x
Massachusetts, US	●	3–8	r 77 (5.8)	●	3–5	r 85 (4.1)	●	3–5	r 61 (7.2)
Minnesota, US	○	–	r 65 (7.9)	●	2	r 64 (8.6)	●	4	r 59 (6.3)
Ontario, Canada	●	2	77 (4.6)	●	4	83 (3.4)	●	4	66 (4.7)
Quebec, Canada	○	5–6	r 66 (4.6)	●	3–4	r 65 (3.8)	⦿	3–6	r 81 (3.1)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.7 Intended and Taught* TIMSS Life Science Topics (Continued)

TIMSS2007 Science 4th Grade

Life Science (11 topics)	Ways that common communicable diseases are transmitted			Ways of maintaining good health, including diet and exercise		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	5	49 (5.2)	●	3	79 (3.6)
Armenia	●	4	x x	●	4	x x
Australia	○	4–12	30 (3.5)	⦿	3–4	89 (2.1)
Austria	●	1–4	81 (2.2)	●	1	96 (1.1)
Chinese Taipei	○	7–9	33 (3.9)	●	4–6	56 (4.2)
Colombia	○	6–7	77 (4.7)	●	4–5	93 (2.2)
Czech Republic	●	4–5,8–9	67 (3.6)	●	4–5,8–9	80 (2.9)
Denmark	●	3–4	r 26 (4.3)	●	3–4	r 78 (3.8)
El Salvador	●	1–9	97 (1.5)	●	1–9	98 (1.4)
England	○	–	42 (4.2)	●	1–5	90 (2.2)
Georgia	○	9	56 (4.5)	○	6	58 (4.7)
Germany	●	7–9	48 (3.7)	●	6	89 (1.8)
Hong Kong SAR	●	4	89 (3.0)	●	4	98 (1.2)
Hungary	●	4	89 (2.5)	●	3–4	94 (2.0)
Iran, Islamic Rep. of	○	8	51 (4.1)	●	1–4	74 (3.1)
Italy	○	5–8	24 (3.1)	○	5–8	57 (3.4)
Japan	○	–	19 (3.3)	○	–	41 (4.2)
Kazakhstan	○	–	– –	●	1	– –
Kuwait	●	3,7	r 68 (4.5)	○	7	r 82 (3.9)
Latvia	●	4	77 (3.5)	●	1,3–4	95 (2.0)
Lithuania	○	6	90 (1.9)	●	4	97 (1.1)
Mongolia	●	1–5	– –	●	1–5	– –
Morocco	○	7	19 (3.5)	○	9	62 (4.7)
Netherlands	np	np	50 (4.3)	np	np	90 (2.4)
New Zealand	●	K–12	49 (2.8)	●	K–12	90 (1.8)
Norway	●	3–10	86 (2.7)	○	5–10	87 (2.5)
Qatar	●	3–6	r 52 (0.2)	●	3–6	r 72 (0.2)
Russian Federation	●	3–4	– –	●	3–4	– –
Scotland	○	11	r 39 (4.6)	●	–	r 93 (2.3)
Singapore	○	6	22 (1.9)	●	1–6	47 (3.0)
Slovak Republic	●	1–4,7,9	88 (2.5)	●	1–4,7	85 (2.9)
Slovenia	●	3	71 (2.8)	●	2,3,6	96 (1.4)
Sweden	○	–	40 (3.6)	●	1–5	78 (3.2)
Tunisia	●	–	92 (2.0)	●	–	79 (3.5)
Ukraine	●	7–8,10	100 (0.4)	●	7–10	99 (0.6)
United States	●	K–4	48 (3.4)	●	K–4	68 (2.9)
Yemen	●	2,6–8	54 (4.4)	●	3,5	74 (3.4)
International Avg.			58 (0.6)			81 (0.5)
Benchmarking Participants						
Alberta, Canada	○	–	46 (4.2)	○	–	77 (3.8)
British Columbia, Canada	○	11	r 30 (4.1)	○	5	r 81 (3.0)
Dubai, UAE	○	7	x x	●	1	x x
Massachusetts, US	○	–	r 39 (7.2)	○	–	r 64 (7.4)
Minnesota, US	●	4	r 63 (7.7)	○	–	r 83 (5.7)
Ontario, Canada	○	–	34 (4.6)	○	5	85 (3.1)
Quebec, Canada	○	9	r 43 (4.3)	○	5–6	r 75 (3.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

Exhibit 5.8 Intended and Taught* TIMSS Physical Science Topics

TIMSS2007 Science 4th Grade

Physical Science (14 topics)	Classification of objects and materials based on physical properties			Properties and uses of metals			Forming and separating mixtures		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	1	66 (5.4)	●	4	40 (4.9)	●	2	41 (4.3)
Armenia	●	4	x x	●	4	x x	●	4	x x
Australia	●	3–4	44 (3.8)	⦿	4–6	14 (3.0)	○	7–8	20 (3.4)
Austria	●	2	57 (3.5)	●	varies	45 (2.9)	●	3	24 (2.9)
Chinese Taipei	●	3–4	40 (4.3)	○	7–9	30 (3.9)	●	3–4	25 (3.9)
Colombia	●	1–3	73 (4.6)	●	–	51 (4.2)	●	4–5	78 (4.2)
Czech Republic	●	1–4, 6–7	68 (3.8)	●	4,7	20 (2.7)	○	8–9	11 (2.3)
Denmark	●	3–4	r 46 (4.7)	○	5–6	r 27 (3.3)	●	3–4	r 24 (4.3)
El Salvador	○	5–11	53 (4.0)	○	6–11	26 (3.4)	○	6–11	29 (3.7)
England	●	K–4	94 (1.8)	○	–	75 (3.4)	●	3	67 (4.1)
Georgia	○	6	17 (3.5)	○	7	6 (2.1)	○	6	4 (1.9)
Germany	●	1–2	51 (3.3)	●	1–2	27 (3.3)	●	3–4	24 (3.2)
Hong Kong SAR	●	2	41 (4.6)	○	5	37 (4.3)	○	7	15 (3.2)
Hungary	●	2	74 (3.5)	●	2	36 (3.5)	●	1–4	33 (4.0)
Iran, Islamic Rep. of	○	6	59 (3.9)	○	6	36 (3.9)	●	4	97 (1.3)
Italy	●	3–6	79 (2.9)	●	3–6	47 (3.5)	●	3,6,8	62 (3.4)
Japan	●	3–12	30 (4.0)	●	3–4,6–12	58 (3.7)	○	5–7,10–12	2 (1.1)
Kazakhstan	○	5	– –	●	4	– –	○	5	– –
Kuwait	○	5–8	r 62 (4.7)	○	6,8,10	r 20 (3.8)	○	6–7	r 28 (4.3)
Latvia	●	1	88 (2.8)	●	1	63 (4.2)	○	–	43 (3.9)
Lithuania	●	4	53 (4.3)	○	9	48 (3.7)	○	5	13 (2.6)
Mongolia	●	5	– –	●	5	– –	●	5	– –
Morocco	○	9	68 (4.2)	○	9	r 21 (3.6)	○	5,7	r 10 (2.4)
Netherlands	np	np	r 17 (3.9)	np	np	r 12 (3.0)	np	np	r 6 (2.0)
New Zealand	●	K–6	56 (3.0)	⦿	4–6	23 (2.3)	●	2–6	38 (2.7)
Norway	●	1–10	16 (2.4)	○	–	12 (2.7)	○	8–10	3 (1.3)
Qatar	●	1–4	r 59 (0.2)	●	4–6	r 41 (0.2)	●	4–6	r 15 (0.1)
Russian Federation	●	3–4	– –	○	8	– –	○	8	– –
Scotland	●	1	r 63 (4.2)	○	8	r 25 (3.4)	●	5	r 43 (4.6)
Singapore	●	3,4,6	95 (1.1)	●	3,6	63 (2.7)	○	7	16 (2.4)
Slovak Republic	●	3–4,6	84 (3.0)	●	3,6,8	55 (3.3)	●	3	35 (3.5)
Slovenia	●	4–5	79 (2.5)	●	4	51 (3.1)	●	4	84 (2.8)
Sweden	○	–	29 (3.9)	○	6–9	20 (3.2)	○	–	25 (3.4)
Tunisia	○	7	91 (2.2)	●	4–6	61 (4.1)	○	8	22 (3.5)
Ukraine	○	7	69 (3.6)	○	8–9	42 (3.7)	○	8–9	24 (3.3)
United States	●	K–4	74 (2.5)	○	5–8	39 (3.0)	●	K–4	37 (2.8)
Yemen	●	4,7,9	44 (5.0)	●	4–7	39 (4.5)	○	7–9	24 (4.4)
International Avg.			59 (0.6)			37 (0.6)			31 (0.6)
Benchmarking Participants									
Alberta, Canada	●	1–7, 9–10	48 (4.0)	●	2,5,11–12	17 (2.8)	●	1–2,5,7,10	10 (2.4)
British Columbia, Canada	●	K,2	r 41 (4.7)	○	5	r 12 (2.5)	○	7	r 16 (3.4)
Dubai, UAE	●	4	s 59 (4.3)	○	6	x x	●	4	s 28 (4.6)
Massachusetts, US	●	K–5	r 80 (4.1)	●	3–5	r 35 (6.1)	○	6–8	r 27 (6.4)
Minnesota, US	●	1–2	r 56 (8.9)	○	–	16 (5.3)	○	–	30 (7.9)
Ontario, Canada	●	1	50 (5.0)	●	1	23 (4.5)	○	7	15 (3.6)
Quebec, Canada	○	5–6	r 40 (4.7)	○	5–6	r 17 (3.1)	○	7–8	r 37 (4.7)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

* Includes the TIMSS topics mostly taught during or before the year of the assessment.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

An "np" indicates not prescribed by the curriculum.

Exhibit 5.8 Intended and Taught* TIMSS Physical Science Topics (Continued)

TIMSS2007 Science 4th Grade

Physical Science (14 topics)	Properties and uses of water			States of matter and differences in their physical properties			Changes in state of matter by heating and cooling		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	4	90 (2.6)	●	1–5	96 (1.6)	●	1	95 (1.9)
Armenia	●	4	x x	●	4	x x	●	4	x x
Australia	●	4–8	60 (4.6)	●	3–6	45 (4.0)	●	3–6	59 (4.2)
Austria	●	3	91 (2.0)	●	3	69 (2.8)	●	3	76 (2.9)
Chinese Taipei	●	3–4	85 (2.9)	●	3–4	70 (3.3)	●	3–4	68 (3.6)
Colombia	●	1–3	94 (2.3)	●	1–3	90 (3.3)	●	4–5	78 (3.9)
Czech Republic	●	1–4	89 (2.5)	●	1–3, 6–7	83 (2.9)	●	4,6–7	84 (2.7)
Denmark	●	1–2	r 79 (4.2)	●	3–4	r 50 (4.8)	●	1–2	r 67 (4.5)
El Salvador	●	1–11	93 (2.2)	○	4–11	86 (3.1)	○	6–11	67 (4.5)
England	●	K–5	78 (3.4)	●	K–5	90 (2.6)	●	4	91 (2.2)
Georgia	●	2–3	68 (4.9)	○	7	38 (4.4)	○	6	51 (4.4)
Germany	●	3–4	86 (2.4)	●	3–4	75 (3.1)	●	3–4	83 (2.8)
Hong Kong SAR	●	4	95 (1.8)	○	7	84 (3.1)	○	7	82 (3.2)
Hungary	●	1,3	90 (3.0)	●	3	92 (3.0)	●	3	92 (2.3)
Iran, Islamic Rep. of	●	3	75 (3.9)	●	2	86 (2.9)	●	3	65 (3.5)
Italy	●	3–4,6,8	95 (1.3)	●	3–4,6,8	94 (1.6)	●	3–4,6,8	93 (1.5)
Japan	●	4,7,10–12	74 (3.6)	●	4,7,10–12	85 (3.1)	●	4,7,10–12	86 (2.9)
Kazakhstan	●	2	– –	●	4	– –	●	3	– –
Kuwait	●	3–4	r 95 (2.0)	○	5,7	r 78 (4.2)	○	5,7,9	r 93 (2.6)
Latvia	●	2	98 (1.3)	●	2	96 (1.5)	●	2,4	58 (3.9)
Lithuania	●	4	96 (1.5)	●	4	59 (3.8)	○	6	84 (2.5)
Mongolia	●	3–5	– –	●	5	– –	●	5–6	– –
Morocco	●	1,4,7	91 (2.0)	●	2–3,7	97 (1.2)	●	4,7	97 (1.4)
Netherlands	np	np	r 73 (4.2)	np	np	r 28 (4.5)	np	np	r 53 (4.3)
New Zealand	●	2–6	58 (3.0)	⦿	2–6	50 (3.4)	●	2–4	58 (3.1)
Norway	●	1–10	75 (3.7)	○	5–10	34 (4.1)	○	5–10	79 (3.1)
Qatar	●	1–6	r 59 (0.2)	●	1–6	r 87 (0.1)	●	2–6	r 86 (0.2)
Russian Federation	●	3–4	– –	●	3	– –	●	3	– –
Scotland	●	3	r 72 (3.8)	●	4	r 58 (4.5)	●	3	r 70 (4.1)
Singapore	●	4	95 (1.1)	●	4	100 (0.1)	●	4	99 (0.5)
Slovak Republic	●	3–4,6–7	94 (2.0)	●	3,8	93 (1.7)	●	3,8	85 (2.8)
Slovenia	●	2,5	92 (1.9)	●	2,4	77 (2.9)	●	4	75 (3.0)
Sweden	●	1–5	76 (3.5)	●	1–5	49 (3.6)	●	1–5	55 (3.9)
Tunisia	●	4–6	46 (3.9)	●	4–6	89 (2.4)	●	4–6	86 (2.7)
Ukraine	●	4–7	99 (0.8)	●	4–5,7	97 (1.4)	⦿	2–3,8	88 (2.5)
United States	●	K–4	72 (2.6)	●	K–4	81 (2.4)	●	K–4	81 (2.4)
Yemen	●	2,3, 8	67 (4.4)	●	3,6–7	94 (2.4)	●	3,6–7	92 (2.6)
International Avg.			82 (0.5)			76 (0.5)			78 (0.5)
Benchmarking Participants									
Alberta, Canada	●	2,5,7,10–11	47 (4.5)	●	1–2,5,11	34 (3.5)	●	2,5,7,10	39 (4.2)
British Columbia, Canada	●	2	r 60 (3.8)	●	2	r 56 (3.9)	●	2	r 62 (4.1)
Dubai, UAE	○	6	s 58 (5.9)	●	4	s 84 (2.4)	●	3	s 75 (3.7)
Massachusetts, US	○	9–10	r 57 (7.2)	●	K–5	r 58 (7.2)	●	3–5	r 68 (7.2)
Minnesota, US	●	3	69 (7.2)	●	2	82 (5.5)	●	4	79 (5.5)
Ontario, Canada	●	2	38 (4.8)	●	2	43 (5.0)	○	5	38 (4.6)
Quebec, Canada	⦿	7–8	r 85 (2.9)	●	3–4	r 62 (4.3)	○	9	r 70 (4.3)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.8 Intended and Taught* TIMSS Physical Science Topics (Continued)

TIMSS2007 Science 4th Grade

Physical Science (14 topics)	Familiar changes in materials			Common energy sources/forms and their practical uses			Heat flow and temperature		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	5	32 (4.0)	○	5	47 (4.7)	●	4	42 (4.7)
Armenia	●	4	x x	●	4	x x	●	4	x x
Australia	●	4–8	41 (4.8)	●	3–8	61 (3.4)	●	3–6	34 (3.5)
Austria	●	2	40 (3.2)	●	4	82 (2.4)	●	2	72 (2.7)
Chinese Taipei	○	5–6	48 (3.6)	●	3–4	85 (3.1)	○	5–6	60 (4.1)
Colombia	●	4–5	62 (5.3)	●	4–5	52 (5.3)	●	4–5	63 (4.5)
Czech Republic	●	4,6–7	51 (3.5)	○	5,8–9	48 (4.2)	●	4,8–9	39 (3.9)
Denmark	●	3–4	r 43 (5.4)	●	3–4	r 68 (4.3)	●	1–2	r 58 (4.7)
El Salvador	○	6–11	55 (4.2)	●	1–11	60 (3.7)	○	4–11	56 (4.2)
England	●	1,4	58 (3.5)	○	–	46 (4.0)	●	1,3–5	56 (4.1)
Georgia	○	7	34 (4.2)	○	9	38 (4.8)	○	9	45 (4.7)
Germany	●	3–4	30 (3.2)	●	3–4	62 (3.3)	●	1–4	70 (3.7)
Hong Kong SAR	○	7	67 (3.7)	●	4	56 (4.7)	●	3	55 (4.4)
Hungary	●	3	58 (3.8)	○	5–6	67 (4.3)	●	3–5	67 (3.7)
Iran, Islamic Rep. of	○	5	24 (3.4)	●	3	70 (3.8)	●	3	67 (4.1)
Italy	●	3–8	60 (3.1)	●	4–8	46 (3.3)	●	4–8	44 (3.7)
Japan	●	4–12	5 (1.9)	○	9–12	32 (3.7)	●	4,9–12	81 (3.2)
Kazakhstan	○	8	– –	●	3	– –	●	3	– –
Kuwait	○	6–7	r 45 (4.7)	●	2–4,8	r 76 (4.1)	●	2,5,7	r 43 (4.3)
Latvia	○	5	68 (4.2)	●	3,6	93 (2.3)	●	1	82 (2.9)
Lithuania	●	4	76 (3.0)	●	4	97 (1.1)	○	5–6	87 (2.5)
Mongolia	●	5–6	– –	●	5–6	– –	●	5–6	– –
Morocco	○	9	r 14 (2.9)	○	6,9	42 (4.2)	●	3–4,7	47 (4.1)
Netherlands	np	np	r 35 (4.5)	np	np	r 72 (3.6)	np	np	61 (4.2)
New Zealand	●	K–11	42 (3.0)	○	6–8	52 (3.3)	⦿	4–8	33 (2.6)
Norway	○	5–10	42 (4.5)	○	5–10	59 (4.4)	○	5–10	51 (4.1)
Qatar	●	4–6	r 20 (0.1)	●	2–6	r 51 (0.2)	●	2–6	r 24 (0.2)
Russian Federation	○	6–7	– –	○	6–7	– –	●	3–4	– –
Scotland	○	5	r 37 (4.2)	●	2,5	r 57 (4.1)	○	7	r 21 (3.1)
Singapore	○	8	35 (2.5)	○	6	74 (2.6)	●	4	98 (0.7)
Slovak Republic	●	3–4,8–9	77 (3.2)	●	3–4,6,8	92 (2.1)	●	3,6,8–9	66 (3.9)
Slovenia	●	3,5	46 (3.2)	●	4	81 (2.4)	○	5	49 (3.3)
Sweden	●	1–5	33 (3.7)	○	6–9	43 (4.2)	○	6–9	61 (3.7)
Tunisia	○	8	28 (4.3)	●	4–6	84 (3.0)	●	4–6	66 (4.1)
Ukraine	○	7–9	86 (2.7)	○	7–8	88 (2.4)	●	4,8	79 (3.1)
United States	○	5–8	60 (3.1)	●	K–4	73 (2.8)	●	K–4	52 (3.3)
Yemen	○	6–7	44 (4.1)	●	2,4–7,9	76 (4.0)	○	5–7,9	64 (4.4)
International Avg.			45 (0.7)			65 (0.6)			57 (0.6)
Benchmarking Participants									
Alberta, Canada	●	4–5	60 (4.2)	○	5, 9–12	69 (3.8)	●	2,5,7,10–12	31 (4.2)
British Columbia, Canada	●	2	r 28 (3.4)	●	3–5	r 38 (4.6)	○	8	r 45 (4.7)
Dubai, UAE	○	6	x x	●	3	s 48 (4.0)	○	7	s 18 (2.4)
Massachusetts, US	○	6–10	r 49 (7.8)	○	–	r 58 (8.0)	○	6–10	r 29 (6.1)
Minnesota, US	●	4	40 (7.9)	○	–	44 (7.4)	●	4	44 (8.7)
Ontario, Canada	○	5	41 (5.1)	●	1	40 (4.8)	○	7	20 (3.9)
Quebec, Canada	○	5–6	r 22 (3.5)	○	5–6	r 48 (5.1)	⦿	7–8	r 23 (4.2)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.8 Intended and Taught* TIMSS Physical Science Topics (Continued)

TIMSS2007 Science 4th Grade

Physical Science (14 topics)	Common sources of light and related phenomena			Production of sound by vibrations			Electrical circuits		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	4	30 (4.5)	○	–	17 (3.7)	●	1	93 (2.2)
Armenia	●	4	x x	●	4	x x	●	4	x x
Australia	●	3–8	22 (3.4)	⦿	5–8	39 (4.1)	⦿	6–8	25 (3.1)
Austria	○	–	41 (2.7)	○	–	23 (2.4)	●	3	58 (3.2)
Chinese Taipei	●	3–4	88 (2.5)	○	5–6	27 (3.8)	●	3–4	80 (3.4)
Colombia	●	1–3	46 (5.6)	●	1–3	53 (5.3)	●	4–5	21 (4.2)
Czech Republic	○	6–7	8 (2.7)	○	8–9	2 (1.7)	○	8–9	2 (1.3)
Denmark	●	3–4	r 32 (5.1)	●	3–4	r 31 (4.5)	●	3–4	r 63 (4.4)
El Salvador	○	4–11	50 (4.4)	○	6–11	36 (3.7)	○	7–11	23 (3.4)
England	●	K,2	69 (3.6)	●	K,4–5	81 (3.2)	●	1,3,5	81 (3.2)
Georgia	○	9	34 (4.2)	○	9	11 (2.6)	○	9	1 (0.9)
Germany	●	1–2	37 (3.3)	●	3–4	28 (3.1)	●	3–4	54 (3.6)
Hong Kong SAR	●	4	54 (5.0)	●	4	51 (4.6)	○	5	33 (4.1)
Hungary	●	1–4	41 (4.1)	○	11	9 (2.3)	○	7–8	5 (1.5)
Iran, Islamic Rep. of	○	5	73 (3.4)	●	2	58 (3.5)	●	4	98 (0.9)
Italy	●	5–8	24 (2.7)	●	5–8	22 (3.0)	●	5–8	9 (2.0)
Japan	●	3,7,10–12	28 (4.1)	●	3,7,10–12	6 (1.8)	●	3–4,8,10–12	87 (2.7)
Kazakhstan	○	5	– –	○	5	– –	○	8	– –
Kuwait	●	2,5,8,12	r 49 (4.2)	●	2,7,12	r 31 (4.4)	●	3,7,12	r 52 (4.8)
Latvia	●	3–4	80 (3.4)	●	4	73 (3.3)	●	3	26 (4.0)
Lithuania	○	6	58 (4.2)	○	5	45 (3.7)	●	4	82 (2.6)
Mongolia	●	5–6	– –	●	4–6	– –	●	6	– –
Morocco	●	1,3,5,7–8	32 (4.0)	●	2,12	38 (4.0)	●	3–4,6–8	92 (2.7)
Netherlands	np	np	r 29 (4.3)	np	np	r 29 (3.4)	np	np	r 11 (2.8)
New Zealand	●	2–6	38 (3.1)	●	2–6	38 (3.4)	●	2– 6	44 (3.0)
Norway	●	1–10	54 (4.7)	●	3–7	24 (3.3)	○	8–10	2 (0.8)
Qatar	●	2–6	r 45 (0.2)	●	2–6	r 45 (0.2)	●	3–6	r 69 (0.2)
Russian Federation	○	8	– –	○	9	– –	○	8	– –
Scotland	●	4	r 56 (3.5)	●	4	r 60 (4.1)	●	3,5	r 52 (4.1)
Singapore	●	4	77 (2.6)	○	8	8 (1.7)	○	5	10 (1.7)
Slovak Republic	○	8	35 (3.7)	○	9	9 (2.3)	●	4,6,8	95 (1.7)
Slovenia	●	3	47 (3.4)	●	3	25 (3.1)	●	4	84 (2.8)
Sweden	●	1–5	10 (2.3)	●	1–5	12 (2.6)	●	1–5	19 (3.5)
Tunisia	○	5	19 (3.2)	○	8	16 (2.8)	○	5	23 (3.2)
Ukraine	○	8,11	57 (3.8)	○	8	16 (2.8)	○	8	13 (2.7)
United States	●	K–4	42 (3.0)	●	K–4	49 (2.8)	○	5–8	67 (3.0)
Yemen	●	2,4,6–8	65 (4.7)	●	4,7	71 (4.6)	○	8–9	30 (4.4)
International Avg.			45 (0.7)			33 (0.6)			46 (0.5)
Benchmarking Participants									
Alberta, Canada	●	4,8,12	81 (3.3)	●	3,11	75 (3.3)	○	5,9,12	7 (2.1)
British Columbia, Canada	●	4	r 64 (4.5)	●	4	r 67 (4.1)	○	6	r 10 (2.5)
Dubai, UAE	●	4	s 39 (3.1)	○	8	s 23 (2.7)	●	4	s 33 (2.7)
Massachusetts, US	●	3–5	r 31 (6.9)	●	3–5	r 54 (8.0)	●	3–5	r 73 (6.5)
Minnesota, US	●	3	33 (8.8)	●	3	r 44 (6.9)	●	4	71 (7.3)
Ontario, Canada	●	4	74 (4.0)	○	6	76 (4.3)	○	6	12 (3.2)
Quebec, Canada	○	–	r 22 (3.9)	⦿	3–4	r 30 (4.6)	○	5–6	r 8 (2.2)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.8 Intended and Taught* TIMSS Physical Science Topics (Continued)

TIMSS2007 Science 4th Grade

Physical Science (14 topics)	Magnets			Forces that cause objects to move		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	4	39 (5.1)	○	–	31 (4.7)
Armenia	●	4	x x	●	4	x x
Australia	○	4	36 (3.3)	●	3–4	54 (3.8)
Austria	●	3	79 (2.6)	●	3	32 (3.1)
Chinese Taipei	○	5–6	73 (3.6)	○	5–6	59 (4.1)
Colombia	●	1–3	38 (5.2)	●	4–5	65 (4.9)
Czech Republic	●	4–5,8–9	56 (4.4)	○	6–7	17 (2.6)
Denmark	●	3–4	r 61 (4.1)	●	1–2	r 43 (4.0)
El Salvador	○	7–11	25 (3.9)	○	6–11	40 (3.9)
England	●	2	80 (2.9)	●	K–5	71 (3.9)
Georgia	○	8	21 (4.3)	○	8	9 (2.6)
Germany	●	1–2	53 (3.7)	○	9	20 (2.9)
Hong Kong SAR	○	8	44 (5.1)	○	6	27 (4.1)
Hungary	●	3	70 (4.3)	○	7–8	12 (2.5)
Iran, Islamic Rep. of	●	4	98 (1.2)	●	2	65 (3.8)
Italy	●	5–8	11 (2.3)	●	6–8	21 (2.8)
Japan	●	3	93 (1.9)	○	5,7,9–12	5 (1.6)
Kazakhstan	○	5	– –	○	7	– –
Kuwait	●	3,5,7,12	r 93 (2.6)	●	2,7–8	r 93 (2.6)
Latvia	●	3–4	88 (2.9)	●	3	33 (3.7)
Lithuania	●	4	32 (3.5)	○	5	19 (2.9)
Mongolia	●	5–6	– –	●	5–6	– –
Morocco	○	8	20 (3.2)	○	9	7 (2.4)
Netherlands	np	np	r 26 (4.3)	np	np	r 25 (3.8)
New Zealand	●	K–6	33 (2.7)	⦿	2–6	43 (2.9)
Norway	○	5–10	19 (3.2)	○	8–10	49 (4.2)
Qatar	●	3–6	r 71 (0.2)	○	1–3	r 48 (0.2)
Russian Federation	○	8	– –	○	7	– –
Scotland	●	3	r 52 (4.8)	●	2,6	r 55 (4.4)
Singapore	●	3	92 (1.6)	○	6	14 (1.8)
Slovak Republic	●	4,6,8	91 (2.2)	●	4,6–8	94 (1.5)
Slovenia	●	4	83 (2.8)	●	4	68 (3.0)
Sweden	●	1–5	16 (3.1)	○	–	9 (2.3)
Tunisia	○	6	21 (3.4)	●	4–6	54 (3.9)
Ukraine	○	8	41 (3.8)	○	7	27 (3.6)
United States	●	K–4	71 (3.0)	●	K–4	68 (2.9)
Yemen	●	3,9	54 (4.4)	●	3,6,8	43 (4.7)
International Avg.			54 (0.6)			40 (0.6)
Benchmarking Participants						
Alberta, Canada	●	2,5,9,12	52 (4.3)	●	2,7–8,10–12	63 (4.4)
British Columbia, Canada	●	2,6	r 36 (4.1)	○	5	r 26 (3.4)
Dubai, UAE	●	3	s 43 (3.3)	●	3	s 56 (4.2)
Massachusetts, US	●	3–5	r 74 (5.8)	○	6–8	r 59 (5.6)
Minnesota, US	●	1	74 (7.3)	●	1,4	61 (8.6)
Ontario, Canada	●	3	68 (3.7)	●	3	52 (4.3)
Quebec, Canada	○	5–6	r 25 (4.1)	○	5–6	r 37 (3.9)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

In earth science at the fourth grade (Exhibit 5.9), about two-thirds of the countries included topics on Earth's structure, physical characteristics, and resources, and within this area, 45 percent of students were taught about rocks, minerals, and soil; 66 percent about water on earth; 68 percent about air; 60 percent about common features of Earth's landscape; and 58 percent about the use and conservation of Earth's natural resources. Topics on Earth's processes and cycles were covered by about three-fourths of the countries, with 79 percent of students taught about the water cycle and 73 percent about weather conditions from day to day or over the seasons. Earth's history was less well covered—animal and plant fossils were in the curriculum of only about one-fourth of the countries and taught to 24 percent of students. About two-thirds of the countries included topics on Earth in the solar system and Earth's rotation on its axis, and these topics were taught to 59 percent and 67 percent of students, respectively.

Exhibit 5.9 Intended and Taught* TIMSS Earth Science Topics

TIMSS2007 Science 4th Grade

Earth Science (10 topics)	Rocks, minerals, sand, and soil			Water on earth			Air		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	3	76 (3.9)	●	4	80 (3.8)	●	4	85 (3.2)
Armenia	●	4	x x	●	4	x x	●	4	x x
Australia	●	3–5	31 (4.6)	●	3–5	61 (4.4)	○	5–6	33 (4.3)
Austria	●	4	43 (3.2)	●	varies	92 (1.6)	●	3	71 (2.6)
Chinese Taipei	○	5–6	16 (3.5)	○	5–6	47 (4.3)	●	3–6	59 (4.3)
Colombia	○	6–7	67 (4.7)	○	6–7	64 (4.7)	○	6–7	76 (4.5)
Czech Republic	●	1–4,8,9	86 (2.6)	●	1–4, 8, 9	91 (2.3)	●	1–4, 8–9	90 (2.0)
Denmark	●	3–4	r 35 (4.3)	●	1–2	r 66 (4.3)	●	3–4	r 62 (4.9)
El Salvador	○	6–9	73 (4.0)	○	–	61 (4.5)	○	–	70 (3.7)
England	●	2	77 (3.6)	●	2,4	66 (3.9)	●	4	68 (3.5)
Georgia	○	6	60 (5.0)	○	6	78 (4.5)	○	7	74 (4.4)
Germany	○	10	28 (3.1)	●	1–2	78 (3.1)	●	1–4	70 (3.4)
Hong Kong SAR	●	4	28 (4.3)	●	4	50 (4.7)	○	5	91 (2.2)
Hungary	○	5	46 (3.9)	●	4–6	71 (4.1)	○	5	62 (4.3)
Iran, Islamic Rep. of	●	4	84 (3.1)	○	6	58 (4.3)	○	6	62 (4.1)
Italy	●	4–8	51 (3.0)	●	3–6	84 (2.5)	●	4–6,7	81 (2.4)
Japan	○	6,7,10–12	1 (0.7)	○	5,8,10–12	36 (3.5)	●	4,7,10–12	19 (3.1)
Kazakhstan	●	3	– –	●	2	– –	●	4	– –
Kuwait	○	5–6,9,11	r 28 (4.1)	○	11	r 83 (3.5)	●	1,7	r 86 (3.4)
Latvia	●	1	95 (2.1)	●	1	93 (2.2)	●	3	92 (2.3)
Lithuania	○	8	48 (3.7)	●	4	91 (2.0)	○	6	84 (3.2)
Mongolia	●	3–4,6	– –	●	5–6	– –	●	5–6	– –
Morocco	○	7–8	10 (2.2)	○	7	57 (4.5)	○	6	r 75 (4.1)
Netherlands	np	np	32 (4.4)	np	np	69 (4.1)	np	np	43 (4.6)
New Zealand	⦿	2–6	31 (2.8)	●	2–6	52 (3.4)	⦿	4–9	31 (2.6)
Norway	○	5–10	17 (2.6)	○	–	49 (4.0)	●	3–7	53 (3.7)
Qatar	○	5–6	r 15 (0.1)	●	1,2,6	r 49 (0.2)	●	1,2,4	r 59 (0.2)
Russian Federation	●	2–4	– –	●	2–4	– –	●	3,6	– –
Scotland	○	6	r 16 (2.9)	○	–	r 46 (3.9)	○	8	r 28 (3.4)
Singapore	○	7	3 (1.0)	○	7,9	48 (2.9)	○	7	88 (1.9)
Slovak Republic	●	3–4,6,8–9	91 (2.3)	●	3–4,5–9	91 (2.5)	●	4,6,9	99 (0.8)
Slovenia	○	6	40 (3.7)	●	4–5	63 (3.0)	●	3,5	67 (2.9)
Sweden	○	6–9	24 (2.9)	○	6–9	68 (3.9)	○	6–9	56 (4.1)
Tunisia	○	7	17 (2.8)	○	7	28 (3.4)	●	–	84 (3.1)
Ukraine	●	4–7	99 (0.7)	●	4–7	99 (0.8)	●	4–7	95 (1.5)
United States	●	K–4	79 (2.2)	●	K–4	83 (1.9)	○	5–8	63 (2.7)
Yemen	●	3,5–6,11	50 (4.4)	○	5,8	38 (4.8)	●	4,7	79 (3.7)
International Avg.			45 (0.6)			66 (0.6)			68 (0.6)
Benchmarking Participants									
Alberta, Canada	●	3,7,11	78 (3.3)	○	8,10	38 (3.6)	○	5–6,11–12	28 (3.4)
British Columbia, Canada	●	K, 2	r 38 (4.4)	●	K,2	r 60 (4.7)	●	2	r 54 (4.2)
Dubai, UAE	●	4	x x	●	3	s 55 (5.0)	●	1	s 47 (4.9)
Massachusetts, US	●	3–5	r 81 (6.5)	●	3–5	r 75 (4.5)	○	–	r 42 (7.0)
Minnesota, US	●	2	62 (7.1)	●	3	67 (8.4)	○	–	50 (9.4)
Ontario, Canada	●	4	69 (4.6)	○	8	40 (4.9)	●	4,6	35 (4.4)
Quebec, Canada	○	5–6	r 39 (4.7)	●	3–4	r 50 (4.8)	⦿	3–4	r 49 (4.3)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

* Includes the TIMSS topics mostly taught during or before the year of the assessment.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

An "np" indicates not prescribed by the curriculum.

Exhibit 5.9 Intended and Taught* TIMSS Earth Science Topics (Continued)

TIMSS2007 Science 4th Grade

Earth Science (10 topics)	Common features of Earth's landscape and relationship to human use			Use and conservation of Earth's natural resources			Earth's water cycle		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	3–4	79 (3.7)	○	5	62 (4.5)	●	2	89 (2.7)
Armenia	●	4	x x	●	4	x x	●	4	x x
Australia	●	3–4	57 (3.8)	●	3–6	56 (4.2)	○	5–6	73 (3.7)
Austria	●	3	61 (3.1)	○	–	57 (3.1)	●	3	95 (1.3)
Chinese Taipei	●	3–4	34 (4.4)	●	3–6	71 (3.1)	●	3–4	58 (3.6)
Colombia	●	4–5	81 (4.4)	○	6–7	93 (2.3)	○	6–7	88 (3.4)
Czech Republic	●	1–4, 8–9	65 (3.9)	●	4–5,8–9	69 (3.8)	●	4,8–9	81 (2.9)
Denmark	●	3–4	r 53 (5.5)	●	3–4	r 50 (5.1)	●	1–2	r 71 (3.9)
El Salvador	○	–	86 (2.9)	●	1–11	99 (1.0)	○	6–9	73 (3.8)
England	○	–	55 (4.1)	●	1,5	42 (4.1)	●	2,4	88 (2.6)
Georgia	●	2–3	77 (4.3)	○	6	56 (5.0)	○	6	75 (4.5)
Germany	●	3–4	53 (3.5)	●	3–4	28 (3.3)	●	3–4	88 (2.2)
Hong Kong SAR	●	4	77 (3.7)	●	4	64 (4.0)	●	4	89 (2.9)
Hungary	●	4–6	90 (2.9)	○	5–6	55 (3.9)	○	5	97 (1.3)
Iran, Islamic Rep. of	○	6	81 (3.2)	●	4	72 (3.9)	○	6	78 (3.1)
Italy	●	4–8	79 (2.9)	●	4,7–8	71 (3.3)	●	3–6	97 (1.0)
Japan	●	4,7,10–12	11 (2.6)	○	9–12	4 (1.5)	○	5,8,10–12	41 (4.0)
Kazakhstan	●	4	– –	●	4	– –	●	4	– –
Kuwait	○	9	r 49 (4.9)	○	5–6,11	r 60 (4.4)	●	4,9	r 89 (3.2)
Latvia	○	7–9	87 (3.0)	●	3–4	87 (2.8)	●	1–2	97 (1.5)
Lithuania	●	4	85 (2.9)	●	4	74 (3.2)	●	4	97 (1.2)
Mongolia	●	3–4	– –	●	5–6	– –	●	4–5	– –
Morocco	○	7	17 (3.2)	○	7	r 41 (4.2)	○	7	r 52 (4.8)
Netherlands	np	np	62 (3.9)	np	np	34 (4.4)	np	np	84 (3.3)
New Zealand	●	2–4	55 (3.0)	○	8–10	61 (2.9)	●	4–6	64 (2.7)
Norway	○	5–10	66 (3.7)	○	8–10	51 (4.2)	●	3–7	78 (3.3)
Qatar	●	2,5	r 23 (0.1)	●	2,4–6	r 33 (0.2)	●	4	r 63 (0.2)
Russian Federation	●	3–4	– –	●	3–4	– –	●	3–4	– –
Scotland	○	–	r 51 (4.3)	○	6	r 51 (4.2)	○	8	r 69 (3.6)
Singapore	○	7–10	11 (1.6)	○	6	49 (3.2)	●	4	95 (1.2)
Slovak Republic	●	4,5–7	85 (3.2)	●	3,8	74 (3.2)	●	3–5,7–9	96 (1.7)
Slovenia	●	3,5	27 (3.0)	○	5	39 (3.2)	○	5	72 (2.9)
Sweden	●	1–5	50 (4.2)	○	6–9	40 (4.2)	○	6–9	83 (3.2)
Tunisia	○	7	30 (3.2)	●	–	43 (4.2)	●	–	53 (4.0)
Ukraine	●	4–8	97 (1.2)	●	4–8	95 (1.7)	●	4–6	100 (0.4)
United States	●	K–4	82 (2.6)	●	K–4	79 (2.2)	●	K–4	85 (2.2)
Yemen	●	3,6	49 (4.4)	●	3–7	43 (4.7)	●	3–4	52 (5.1)
International Avg.			60 (0.6)			58 (0.6)			79 (0.5)
Benchmarking Participants									
Alberta, Canada	○	5–8,10	68 (4.0)	●	2,4,7–12	92 (2.0)	●	2,5,8,10	48 (4.1)
British Columbia, Canada	○	7	r 53 (3.9)	○	5	r 57 (4.3)	○	8	r 77 (4.1)
Dubai, UAE	●	2	x x	●	4	x x	●	2	x x
Massachusetts, US	○	–	r 88 (4.9)	○	–	r 75 (7.2)	●	3–5	r 81 (6.2)
Minnesota, US	○	–	r 65 (8.6)	●	4	62 (7.8)	●	1,3,4	78 (6.5)
Ontario, Canada	○	7	68 (4.5)	○	5	60 (5.0)	○	5	48 (5.3)
Quebec, Canada	○	5–6	r 62 (4.4)	⦿	3–4	r 67 (3.8)	●	3–4	r 80 (3.7)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.9 Intended and Taught* TIMSS Earth Science Topics (Continued)

TIMSS2007 Science 4th Grade

Earth Science (10 topics)	Weather conditions from day to day or over the seasons			Fossils of animals and plants			Earth in the solar system		
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	5	75 (5.0)	○	–	11 (2.6)	●	4	25 (4.1)
Armenia	●	4	x x	●	4	x x	●	4	x x
Australia	●	1–2	72 (3.3)	○	5–6	21 (3.7)	●	3–5	66 (3.3)
Austria	●	2	90 (2.1)	●	3	29 (2.7)	●	2	76 (2.9)
Chinese Taipei	●	3–4	59 (3.8)	○	7–9	17 (3.2)	○	7–9	54 (4.3)
Colombia	●	4–5	85 (3.8)	○	6–7	26 (3.8)	●	4–5	85 (4.1)
Czech Republic	●	1–4, 8–9	68 (3.7)	○	6–7	20 (3.4)	●	4, 8–9	47 (3.8)
Denmark	●	3–4	r 80 (3.7)	●	3–4	r 16 (3.1)	●	3–4	r 60 (4.5)
El Salvador	○	–	87 (3.0)	○	6–11	29 (3.7)	○	7–9	79 (3.5)
England	○	–	80 (3.2)	○	–	45 (4.0)	●	4	91 (2.5)
Georgia	●	2–3	55 (4.8)	○	7	17 (3.3)	○	6	70 (4.6)
Germany	●	3–4	90 (2.2)	○	9	18 (2.8)	○	6	40 (3.4)
Hong Kong SAR	●	4	92 (2.2)	○	7	8 (2.2)	○	6	21 (3.9)
Hungary	●	1	95 (1.6)	○	9	12 (2.8)	○	8	53 (4.4)
Iran, Islamic Rep. of	○	6	63 (4.1)	○	5	20 (3.0)	●	4	60 (3.7)
Italy	●	3–5	82 (2.7)	●	3–5	59 (3.2)	●	5–8	23 (2.8)
Japan	○	5,8,10–12	46 (4.3)	○	6–7,10–12	2 (1.1)	●	4,9–12	64 (4.0)
Kazakhstan	●	1	– –	●	4	– –	●	4	– –
Kuwait	●	3,6	r 85 (3.7)	○	11	r 11 (2.9)	●	4,8	r 80 (3.8)
Latvia	●	1	95 (1.6)	○	7–9	39 (3.5)	●	1–3	99 (1.0)
Lithuania	●	2	95 (1.5)	○	6	49 (3.8)	●	4	94 (1.7)
Mongolia	●	3–5	– –	●	4–5	– –	●	5–6	– –
Morocco	○	7	35 (4.3)	○	–	9 (2.2)	○	6	4 (1.5)
Netherlands	np	np	80 (3.2)	np	np	24 (3.8)	np	np	24 (3.5)
New Zealand	●	2–6	64 (2.8)	●	2–8	31 (2.5)	●	K–6	70 (2.5)
Norway	●	3–7	94 (1.6)	●	3–10	19 (3.0)	●	1–10	98 (0.9)
Qatar	●	2–4	r 42 (0.2)	○	9	r 11 (0.1)	●	3–6	r 52 (0.2)
Russian Federation	●	2–3	– –	●	3–4	– –	●	3–4	– –
Scotland	●	1	r 75 (3.6)	○	6	r 14 (2.6)	○	2,5	r 45 (4.7)
Singapore	○	7,9	21 (2.5)	○	8	6 (1.3)	○	5	16 (2.1)
Slovak Republic	●	1–5,7	85 (2.7)	○	8	31 (3.1)	●	4–5,8–9	100 (0.0)
Slovenia	●	3	68 (3.1)	○	6	10 (1.9)	●	3,6	43 (3.3)
Sweden	●	1–5	72 (3.1)	○	–	48 (4.3)	●	1–5	81 (2.6)
Tunisia	○	7	41 (3.7)	○	–	14 (2.6)	○	7	20 (3.0)
Ukraine	●	3–6	99 (0.9)	●	4–7	63 (3.8)	●	4–6,10	99 (0.8)
United States	●	K–4	83 (2.1)	●	K–4	62 (2.8)	●	K–4	74 (2.8)
Yemen	○	5	50 (4.8)	○	12	16 (3.3)	●	3,5,7	36 (4.2)
International Avg.			73 (0.6)			24 (0.5)			59 (0.6)
Benchmarking Participants									
Alberta, Canada	●	1–2,5,10	34 (4.1)	○	7,11	64 (4.4)	○	6,9,11	14 (2.8)
British Columbia, Canada	●	4	r 78 (3.6)	○	7	r 26 (3.7)	●	3	r 58 (4.0)
Dubai, UAE	●	4	x x	○	7	x x	●	4	x x
Massachusetts, US	●	3–5	r 72 (7.6)	●	6–8	r 61 (6.2)	●	3–5	r 80 (5.6)
Minnesota, US	●	1,3,4	78 (6.5)	●	2	41 (8.5)	●	4	62 (8.2)
Ontario, Canada	○	5	45 (5.0)	●	4	60 (4.8)	○	6	11 (2.3)
Quebec, Canada	○	5–6	r 68 (4.7)	●	3–4	r 30 (4.4)	●	3–4	r 66 (4.7)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.9 **Intended and Taught* TIMSS Earth Science Topics (Continued)**

TIMSS2007 Science 4th Grade

Earth Science (10 topics)	Earth's rotation on its axis			
Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught		Percent of students taught the topic
Algeria	●	4		93 (2.1)
Armenia	●	4		x x
Australia	●	3–6		60 (3.6)
Austria	●	2		87 (2.2)
Chinese Taipei	●	3–6		43 (4.1)
Colombia	●	4–5		84 (4.5)
Czech Republic	●	4,8–9		62 (3.7)
Denmark	●	1–2	r	72 (4.0)
El Salvador	●	3–9		89 (2.8)
England	●	4		90 (2.6)
Georgia	○	6		76 (4.4)
Germany	○	6		61 (3.6)
Hong Kong SAR	○	6		29 (4.3)
Hungary	○	5–6		71 (3.5)
Iran, Islamic Rep. of	●	4		58 (4.1)
Italy	●	5–8		31 (3.0)
Japan	●	3,4,9–12		48 (4.3)
Kazakhstan	●	4		– –
Kuwait	●	2,6,8	r	90 (3.1)
Latvia	●	2		97 (1.3)
Lithuania	○	6		96 (1.4)
Mongolia	●	3–6		– –
Morocco	○	6		13 (3.3)
Netherlands	np	np	r	50 (4.1)
New Zealand	◉	2–8		58 (2.7)
Norway	●	1–10		96 (1.4)
Qatar	●	3–6	r	60 (0.2)
Russian Federation	○	6–8		– –
Scotland	●	2,5	r	55 (5.2)
Singapore	○	5		25 (2.3)
Slovak Republic	●	4–5,9		99 (0.6)
Slovenia	●	4		79 (2.9)
Sweden	●	1–5		75 (3.3)
Tunisia	○	5		36 (3.5)
Ukraine	●	4–6,10		100 (0.0)
United States	●	K–4		76 (2.6)
Yemen	●	2–3		53 (4.9)
International Avg.				67 (0.6)
Benchmarking Participants				
Alberta, Canada	○	6		42 (4.3)
British Columbia, Canada	●	3	r	65 (4.1)
Dubai, UAE	●	4		x x
Massachusetts, US	●	3–5	r	83 (3.9)
Minnesota, US	●	4		61 (8.4)
Ontario, Canada	●	1		23 (3.8)
Quebec, Canada	○	5–6	r	58 (4.8)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● All or almost all students ◉ Only the more able students ○ Not included in the curriculum through fourth grade

Eighth Grade: Which TIMSS Science Topics Are in the Intended and Implemented Curriculum?

For the eighth grade, Exhibit 5.10 provides detailed information about each topic within the biology domain, including the student population to be taught the topic, the grades within which the topics are intended to be taught, and the teachers' reports about the percent of students taught the topics. Almost all of the TIMSS participants included topics on characteristics, classification, and life processes of organisms in their eighth grade biology curricula, and taught these topics to the majority of students, including classification of organisms (79% of students), major organ systems in human and other organisms (79%), and how organ systems maintain stable bodily conditions (sweating, shivering, etc., 67%). Topics on cell structure and function and on photosynthesis and respiration also were included in the curricula of almost all participants and taught to more than 80 percent of students. There was widespread coverage of life cycles of organisms (taught to 68% of students), reproduction and heredity (57%), and the role of variation and adaptation in the survival of species (53%). Some aspects of ecosystems, including interaction of living things and the cycling of materials in nature, were covered in almost all curricula and taught to the majority of students (70% and 63%, respectively), but others such as trends in human populations and the impact of natural hazards (earthquakes, landslides, floods, etc.) on humans and the environment were less commonly covered and taught to fewer students (48% and 51%, respectively). Topics on human health were in most curricula and taught to the majority of students, including common infectious diseases (taught to 60% of students) and preventive medicine methods (57% of students).

Exhibit 5.11 contains the information about the chemistry topics in the intended and implemented curricula at the eighth grade. Of the eight chemistry topics, topics in classification and composition of matter and properties of matter were widely covered in the intended curriculum and widely taught to eighth grade students—classification and composition of matter (taught to 88% of students), particulate structure of matter (83%),

solutions (77%), properties and uses of water (78%), and properties and uses of common acids and bases (68%). Within the general area of chemical change, the nature of chemical change and common oxidation reactions were widely covered and taught to the majority of students (70% and 61%, respectively), whereas the classification of familiar chemical transformations was in the curriculum of about half the participants and taught to just 47 percent of students.

Exhibit 5.10 Intended and Taught* TIMSS Biology Topics

TIMSS2007 Science 8th Grade

Biology (14 topics)	Classification of organisms			Major organ systems in humans and other organisms			How organ systems maintain stable bodily conditions		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	8	87 (2.7)	●	7	67 (4.1)	●	7,9	60 (4.4)
Armenia	●	7	70 (4.2)	●	8	90 (3.2)	●	8	87 (2.8)
Australia	●	3–9	84 (2.3)	●	4–9	62 (3.2)	●	4–12	46 (3.6)
Bahrain	●	7	80 (2.4)	●	5	92 (1.9)	●	5	88 (2.0)
Bosnia and Herzegovina	●	5–7	95 (1.6)	●	6–9	97 (1.4)	●	8–9	94 (1.7)
Botswana	●	5–8	83 (3.4)	●	5–12	65 (4.0)	●	9	29 (4.0)
Bulgaria	●	7	73 (3.9)	●	5,7–8	100 (0.0)	●	5,8	97 (1.9)
Chinese Taipei	●	5–6	72 (3.9)	●	5–9	73 (4.0)	●	5–9	72 (4.1)
Colombia	●	8–9	69 (4.7)	●	8–9	96 (1.6)	●	8–9	91 (2.5)
Cyprus	○	9	– –	○	9	– –	○	9–12	– –
Czech Republic	●	5–8,10–12	97 (1.3)	●	6–9	99 (0.7)	●	1–4,8–9	95 (2.2)
Egypt	●	1–6	73 (3.9)	⦿	2–6	92 (2.2)	⦿	4–6	84 (2.9)
El Salvador	●	3–11	63 (3.9)	●	3–11	85 (3.1)	●	3–11	75 (3.8)
England	●	6	r 95 (1.1)	●	6–7	r 95 (1.5)	●	6–7	r 69 (3.1)
Georgia	●	5	87 (2.8)	○	9	61 (5.3)	○	9	65 (5.1)
Ghana	●	7–9	62 (3.8)	●	6–9	79 (3.7)	●	7–9	60 (4.8)
Hong Kong SAR	●	7	76 (4.4)	●	K–12	73 (4.1)	○	10–12	40 (4.6)
Hungary	●	7	r 87 (3.2)	●	7–8	97 (1.4)	●	7–8	91 (2.5)
Indonesia	●	7	92 (3.0)	●	8	100 (0.4)	●	8	81 (4.1)
Iran, Islamic Rep. of	●	3–5	86 (2.5)	●	3–5	85 (3.0)	●	4	72 (3.7)
Israel	●	1–6	r 47 (4.4)	●	1–6	r 53 (3.9)	●	7–9	r 47 (4.4)
Italy	●	3–6	98 (0.9)	●	4–7	99 (0.7)	●	6–7	95 (1.2)
Japan	●	3–12	99 (0.9)	●	6,8,10–12	98 (1.1)	●	8,10–12	71 (3.7)
Jordan	●	4–10	83 (3.0)	●	5–9	80 (3.1)	●	5–10	67 (3.8)
Korea, Rep. of	●	6	35 (3.7)	●	6–7	88 (2.4)	●	8	86 (2.5)
Kuwait	●	7,10	r 57 (5.0)	●	5,10–11	r 77 (4.0)	●	7,9,12	r 66 (4.9)
Lebanon	●	4	59 (4.4)	●	5	75 (4.3)	●	5	52 (4.9)
Lithuania	●	6	91 (2.6)	●	6	75 (3.5)	●	8	63 (3.7)
Malaysia	●	8	95 (1.7)	●	7	81 (3.2)	●	7	70 (3.7)
Malta	●	7	98 (0.1)	○	10	26 (0.8)	○	10	10 (0.6)
Mongolia	●	7–11	– –	●	7–11	– –	●	7–11	– –
Norway	●	5–10	27 (3.3)	●	3–10	19 (2.8)	●	8–10	11 (2.2)
Oman	●	3,6–7	78 (3.4)	○	9	93 (2.3)	●	7	75 (3.8)
Palestinian Nat'l Auth.	●	4,6,11–12	94 (2.3)	●	4–7,9–11	74 (4.1)	●	7,10–11	64 (4.2)
Qatar	●	7	r 49 (0.2)	●	7	r 79 (0.1)	●	7–8	r 59 (0.2)
Romania	●	1–5,9	94 (2.1)	●	3,7,10	98 (1.1)	●	7,11	97 (1.3)
Russian Federation	●	6–7	– –	●	7–8	– –	●	8	– –
Saudi Arabia	●	8	90 (2.7)	●	8	97 (1.4)	●	8	93 (2.8)
Scotland	●	7	r 80 (2.5)	●	6–7	r 76 (2.7)	○	10	s 40 (3.0)
Serbia	●	5–6	89 (2.4)	●	5–6,8	98 (1.2)	●	8	95 (1.8)
Singapore	●	7–8	61 (2.7)	●	7–8	84 (1.9)	○	9–10	59 (3.2)
Slovenia	●	7–8	81 (3.1)	○	9	11 (2.1)	●	7–8	22 (3.3)
Sweden	○	–	80 (3.2)	●	6–9	82 (3.0)	●	6–9	64 (3.7)
Syrian Arab Republic	●	5–8,10	87 (3.5)	●	3–12	68 (4.7)	●	4–12	56 (5.0)
Thailand	●	4–6	73 (4.3)	●	7–9	95 (1.6)	○	10–12	92 (2.2)
Tunisia	●	7	85 (3.0)	○	9	35 (3.9)	○	9	8 (2.3)
Turkey	●	4–5	74 (4.0)	●	6,11–12	88 (2.5)	●	6	87 (2.7)
Ukraine	●	6–7,10	93 (2.3)	●	8–9	99 (0.7)	●	8–9	99 (1.1)
United States	●	5–8	88 (1.9)	●	5–8	85 (1.9)	●	5–8	84 (2.0)
‡ Morocco	●	7	r 82 (4.6)	●	9	r 55 (4.1)	●	9	r 32 (6.0)
International Avg.			79 (0.5)			79 (0.4)			67 (0.5)
Benchmarking Participants									
Basque Country, Spain	●	7	79 (4.0)	●	8	66 (4.9)	●	8	51 (4.4)
British Columbia, Canada	●	6,11	r 43 (3.7)	●	5–7,10,12	r 88 (2.7)	●	5,8,11–12	r 80 (3.7)
Dubai, UAE	●	8	s 57 (2.8)	●	7	s 85 (3.5)	●	7	x x
Massachusetts, US	●	3–8	91 (3.8)	●	6–8	85 (4.8)	○	9–10	83 (4.6)
Minnesota, US	●	7	81 (6.1)	●	7	79 (6.2)	●	7	80 (6.0)
Ontario, Canada	●	4,6	72 (4.9)	●	5	77 (4.6)	●	5	71 (4.7)
Quebec, Canada	●	7–8	59 (5.1)	○	9	34 (5.0)	○	9	20 (3.1)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

For countries that teach science as separate subjects at Grade 8, data are based on biology teachers only.

* Includes the TIMSS topics mostly taught during or before the year of the assessment.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.10 Intended and Taught* TIMSS Biology Topics (Continued)

TIMSS2007 Science 8th Grade

Biology (14 topics)	Cell structures and functions			Photosynthesis and respiration			Life cycles of organisms, including humans, plants, birds, insects		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7,9	52 (4.5)	●	7–9	83 (3.5)	○	–	84 (2.9)
Armenia	●	8	73 (4.2)	●	8	60 (4.3)	●	7	59 (4.8)
Australia	●	7–12	80 (3.2)	●	7–12	70 (3.3)	●	3–8	48 (3.2)
Bahrain	●	7	89 (1.8)	●	7	89 (2.3)	●	5	57 (2.8)
Bosnia and Herzegovina	●	5–6	99 (0.6)	●	5–6	98 (1.1)	●	6–7	95 (1.8)
Botswana	●	8	97 (1.4)	●	8	25 (4.0)	○	9	10 (3.4)
Bulgaria	●	5	91 (2.4)	○	9	75 (3.7)	●	6–8	81 (3.8)
Chinese Taipei	●	7–9	72 (4.1)	●	7–9	74 (4.0)	●	3–4	68 (4.1)
Colombia	●	6–7	99 (0.5)	○	10–11	97 (1.4)	●	8–9	72 (5.8)
Cyprus	○	9,11	– –	○	9,11–12	– –	○	9	– –
Czech Republic	●	6–9	98 (1.1)	●	6–7,10–11	98 (1.3)	●	6–12	89 (2.7)
Egypt	●	4–6	95 (1.9)	●	4–6	77 (3.4)	●	7–9	61 (4.4)
El Salvador	●	4–11	91 (2.6)	●	4–6,9–10	85 (3.2)	●	3–6	78 (3.7)
England	●	6	r 97 (0.9)	●	8	r 96 (1.0)	●	6	r 81 (2.6)
Georgia	●	8	68 (5.4)	○	10	83 (3.5)	●	4,8	79 (4.3)
Ghana	●	7–10	97 (1.4)	●	6–9	93 (1.9)	●	6–10	52 (4.6)
Hong Kong SAR	●	7–12	74 (4.0)	●	8	95 (2.1)	●	5–12	32 (4.2)
Hungary	●	8	86 (3.0)	●	8	78 (3.1)	●	8	81 (3.3)
Indonesia	●	7	95 (2.4)	●	7	97 (1.7)	○	9	75 (4.0)
Iran, Islamic Rep. of	●	4	91 (2.3)	●	4	75 (3.8)	●	4	54 (3.7)
Israel	●	7–9	r 67 (4.5)	●	7–9	r 38 (3.8)	●	1–9	r 46 (4.4)
Italy	●	6	99 (0.6)	●	4–7	100 (0.2)	●	4–7	96 (1.3)
Japan	○	9–12	15 (3.1)	●	6–8,10–12	80 (3.2)	●	3–12	36 (3.6)
Jordan	●	5–10	77 (3.4)	●	5–10	88 (2.9)	●	3–12	79 (3.4)
Korea, Rep. of	●	7	86 (2.8)	●	8	95 (1.5)	●	3–4	26 (2.8)
Kuwait	●	8–9,12	r 75 (4.0)	○	9–10,12	r 57 (4.9)	●	5–6	r 64 (4.9)
Lebanon	○	–	68 (4.8)	●	5	83 (3.0)	●	–	73 (4.0)
Lithuania	●	8	82 (3.1)	●	8	82 (3.0)	●	8	83 (3.3)
Malaysia	●	7	95 (1.8)	●	8	93 (2.3)	●	5	48 (4.2)
Malta	●	7	100 (0.0)	●	8	43 (1.3)	●	7	56 (0.9)
Mongolia	●	7–11	– –	●	7–11	– –	●	7–11	– –
Norway	○	8–10	55 (4.4)	○	8–10	66 (3.8)	●	3–10	37 (3.8)
Oman	●	7	86 (3.1)	●	6–8	89 (2.0)	●	5,7	75 (3.8)
Palestinian Nat'l Auth.	●	5,11–12	93 (2.4)	●	5–7,9,12	96 (1.6)	●	3,5,7,9–12	63 (4.1)
Qatar	●	7	81 (0.1)	●	8	r 62 (0.2)	●	7	r 51 (0.2)
Romania	●	5,9	97 (1.4)	●	5,10–11	97 (1.3)	●	4–5,8–9,12	95 (2.1)
Russian Federation	●	6–8	– –	●	6,9–10	– –	●	6–8	– –
Saudi Arabia	●	8	90 (3.3)	●	8	97 (1.4)	●	8	78 (3.5)
Scotland	●	7	r 93 (1.6)	●	8	r 84 (2.5)	●	7	r 56 (3.6)
Serbia	●	5–6	99 (0.5)	●	5	93 (1.8)	●	5–6,8	95 (1.7)
Singapore	●	7–8	79 (2.0)	●	7–8	80 (1.8)	●	3–6	46 (2.6)
Slovenia	○	9	63 (4.2)	●	5–8	99 (0.6)	●	6–7	81 (3.3)
Sweden	●	6–9	76 (3.3)	●	6–9	88 (2.9)	●	1–5	74 (3.3)
Syrian Arab Republic	●	6–7,10–11	93 (2.6)	●	6–7,9–10	94 (2.5)	●	6–7,9–10,12	82 (4.2)
Thailand	●	7–9	87 (2.6)	●	7–9	80 (3.1)	●	7–9	72 (3.3)
Tunisia	○	11	71 (4.0)	●	7	99 (0.6)	●	7	93 (2.3)
Turkey	●	6,8	92 (2.4)	●	8	99 (1.0)	●	6–7	87 (2.9)
Ukraine	○	10	95 (1.7)	●	6–8,10	81 (3.1)	●	6–7,9,11	87 (2.8)
United States	●	5–8	93 (1.5)	●	5–8	91 (1.7)	●	5–8	87 (2.4)
‡ Morocco	●	7,9	r 49 (6.5)	●	7,9	r 82 (4.2)	●	4,8	r 87 (3.5)
International Avg.			83 (0.4)			83 (0.4)			68 (0.5)
Benchmarking Participants									
Basque Country, Spain	○	9–10	63 (4.8)	○	9–10	83 (3.1)	●	8	51 (5.3)
British Columbia, Canada	●	8,11–12	r 91 (2.6)	●	3,8,12	r 62 (4.4)	●	7,10	r 35 (4.1)
Dubai, UAE	●	5	s 91 (1.7)	●	7	s 74 (3.8)	●	8	s 44 (3.3)
Massachusetts, US	●	6–10	95 (3.5)	○	9–10	93 (3.9)	○	–	85 (4.2)
Minnesota, US	●	7	84 (6.6)	●	7	80 (6.8)	●	7	84 (5.6)
Ontario, Canada	●	8	83 (4.2)	○	9–12	75 (4.8)	●	2–3	74 (4.5)
Quebec, Canada	○	9	72 (4.8)	○	10	74 (4.8)	●	7–8	66 (4.7)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.10 Intended and Taught* TIMSS Biology Topics (Continued)

TIMSS2007 Science 8th Grade

Biology (14 topics)	Reproduction and heredity			Role of variation and adaptation in survival/extinction of species			Interaction of living organisms in an ecosystem		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7,9	40 (4.5)	●	8	90 (2.5)	●	8	89 (2.7)
Armenia	●	7	70 (4.1)	●	8	59 (4.6)	●	8	55 (4.2)
Australia	⦿	8–12	27 (2.8)	●	4–12	36 (3.4)	●	6–12	63 (3.4)
Bahrain	●	8	30 (2.4)	●	6	22 (2.8)	●	6	73 (2.5)
Bosnia and Herzegovina	●	8–9	86 (3.0)	●	6–7	78 (3.3)	●	6–7	97 (1.3)
Botswana	●	8,11–12	38 (4.0)	○	9,11–12	4 (1.2)	○	9	10 (2.9)
Bulgaria	●	6,8	59 (5.0)	○	9	35 (4.7)	●	6,8	51 (4.5)
Chinese Taipei	●	7–9	73 (4.0)	●	7–9	72 (4.1)	●	7–9	74 (3.9)
Colombia	●	6–7	81 (3.2)	●	6–7	70 (3.9)	●	8–9	97 (1.6)
Cyprus	○	9–12	– –	○	9,11	– –	○	9,11	– –
Czech Republic	●	8–12	50 (3.5)	●	8–12	66 (3.4)	●	6, 8–12	77 (3.6)
Egypt	⦿	7–12	81 (3.2)	●	4–9	61 (3.6)	⦿	7–9	95 (2.0)
El Salvador	●	6–8	56 (4.4)	●	6–10	57 (4.4)	●	6–11	87 (3.0)
England	●	6,8	r 93 (1.8)	●	8	r 89 (2.1)	●	6	r 96 (0.7)
Georgia	○	9	48 (5.0)	●	4–5,7–8	28 (4.0)	●	6–8	35 (4.6)
Ghana	●	7–12	89 (2.4)	○	10–12	34 (4.1)	●	7–12	32 (3.5)
Hong Kong SAR	●	7	67 (4.2)	●	6–12	46 (4.7)	●	7–12	79 (3.8)
Hungary	●	7–8	37 (3.6)	●	3,7	66 (3.7)	●	7	99 (0.7)
Indonesia	○	9	25 (4.1)	○	9	37 (4.6)	○	10	96 (1.5)
Iran, Islamic Rep. of	○	9	48 (4.2)	○	9	67 (3.3)	●	6	53 (3.7)
Israel	●	1–9	r 73 (3.6)	●	5–9	r 43 (4.7)	●	5–9	r 32 (3.7)
Italy	●	8	87 (2.2)	●	7–8	74 (2.8)	●	4–7	88 (1.9)
Japan	●	5,9–12	4 (1.4)	○	9–12	5 (1.7)	○	9–12	5 (1.8)
Jordan	●	7–12	92 (2.3)	●	8–12	90 (2.4)	●	7–12	98 (1.1)
Korea, Rep. of	○	9	12 (2.4)	○	9	13 (2.5)	●	6	24 (3.0)
Kuwait	●	8–10	r 68 (4.8)	○	9	r 50 (5.2)	●	6	r 74 (4.5)
Lebanon	●	6,9	55 (4.4)	●	–	45 (4.2)	●	5,7	64 (4.3)
Lithuania	●	8	68 (3.7)	○	10	27 (3.7)	●	8	75 (3.8)
Malaysia	○	9	10 (2.4)	○	10	54 (4.2)	●	8	99 (1.0)
Malta	●	7	11 (0.6)	●	8	36 (0.8)	●	8	33 (1.0)
Mongolia	●	7–11	– –	●	7–11	– –	●	7–11	– –
Norway	○	8–10	12 (2.4)	●	8–10	57 (4.0)	●	8–10	41 (4.2)
Oman	○	9	56 (4.4)	⦿	6	64 (3.9)	●	7–8	83 (3.0)
Palestinian Nat'l Auth.	●	3,7,10–12	66 (4.2)	●	3–5,7	47 (4.4)	●	4	65 (3.9)
Qatar	●	7	51 (0.2)	●	7	r 36 (0.2)	●	7	r 60 (0.1)
Romania	●	5–12	78 (3.6)	●	2–10,12	76 (4.1)	●	4,8,12	98 (1.1)
Russian Federation	○	9	– –	●	6–9	– –	●	6–9	– –
Saudi Arabia	●	8	46 (3.9)	●	8	88 (2.9)	●	8	96 (1.3)
Scotland	●	8,10	r 80 (3.0)	●	8	r 57 (3.4)	●	7	r 78 (2.6)
Serbia	●	5–8	84 (3.2)	●	7	85 (2.9)	●	7	95 (1.8)
Singapore	●	7–8	79 (2.0)	○	9–10	36 (2.3)	●	7–8	58 (2.5)
Slovenia	●	6–8	24 (3.4)	●	8	80 (3.3)	●	7–8	98 (1.0)
Sweden	●	6–9	38 (3.4)	●	6–9	26 (3.2)	●	6–9	72 (3.8)
Syrian Arab Republic	●	5–7,9,11–12	36 (5.3)	●	5,8,10,12	46 (5.3)	●	5–10	56 (4.5)
Thailand	●	4–6	66 (4.2)	○	10–12	55 (4.3)	●	4–6	51 (4.3)
Tunisia	○	9	40 (4.0)	○	10	64 (3.6)	○	10	94 (2.0)
Turkey	●	8	94 (2.1)	●	8	99 (0.7)	●	7	87 (2.9)
Ukraine	○	9,11	56 (3.7)	○	11	11 (2.5)	●	6,7,11	35 (4.2)
United States	●	5–8	86 (2.1)	●	5–8	87 (2.0)	●	5–8	89 (1.8)
‡ Morocco	●	8	r 95 (1.1)	○	–	r 43 (6.8)	●	3,7	r 89 (3.0)
International Avg.			57 (0.5)			53 (0.5)			70 (0.4)
Benchmarking Participants									
Basque Country, Spain	●	8	44 (4.8)	●	8	52 (5.3)	●	8	57 (4.6)
British Columbia, Canada	○	9,12	r 14 (3.2)	●	6–7,10–11	r 25 (3.7)	●	7,10	r 54 (3.3)
Dubai, UAE	●	7	s 41 (3.5)	●	5	s 41 (2.9)	●	6	s 57 (3.9)
Massachusetts, US	●	3–8	93 (3.9)	●	6–8	82 (5.0)	●	6–8	86 (5.0)
Minnesota, US	●	7	84 (5.5)	●	7	86 (6.0)	●	7	87 (5.1)
Ontario, Canada	○	9–12	34 (4.7)	●	6	71 (5.0)	●	7	87 (3.5)
Quebec, Canada	●	7–8	71 (4.7)	●	7–8	71 (4.7)	○	10	79 (4.5)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.10 Intended and Taught* TIMSS Biology Topics (Continued)

TIMSS2007 Science 8th Grade

Biology (14 topics)	Cycling of materials in nature			Trends in human population and its effects on the environment			Impact of natural hazards on humans, wildlife and the environment		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	9	37 (4.5)	○	–	68 (3.9)	●	8	30 (4.1)
Armenia	●	8	62 (4.4)	●	8	60 (4.2)	●	8	69 (4.0)
Australia	●	7–12	49 (2.9)	○	9–12	21 (2.6)	●	4–12	38 (3.3)
Bahrain	●	6	66 (2.7)	●	6	23 (2.7)	●	6	18 (2.8)
Bosnia and Herzegovina	●	7–8	96 (1.7)	●	8–9	83 (3.2)	●	8–9	76 (3.2)
Botswana	○	9	20 (3.3)	○	11–12	3 (1.2)	○	10	6 (1.9)
Bulgaria	○	9	56 (4.1)	○	9	25 (4.5)	●	7–8	37 (4.3)
Chinese Taipei	●	7–9	76 (4.0)	●	5–9	71 (4.1)	●	5–9	70 (4.2)
Colombia	●	6–7	77 (4.1)	●	6–7	48 (4.9)	–	–	74 (5.0)
Cyprus	○	9,11	– –	○	9,11	– –	○	9,11	– –
Czech Republic	●	8–12	56 (4.2)	●	8–9,12	43 (4.0)	●	8–12	27 (3.6)
Egypt	○	4–9	92 (2.4)	○	7–8	69 (3.8)	⦿	7–8	78 (3.2)
El Salvador	●	7–9	56 (4.0)	●	6–9,11	71 (4.0)	●	5–9	70 (4.1)
England	●	6,8	r 68 (2.8)	○	–	r 60 (3.2)	●	6,8	r 69 (3.0)
Georgia	●	5	36 (4.2)	●	5–7	33 (5.1)	●	4	45 (5.2)
Ghana	●	7–12	46 (4.4)	●	7–12	45 (4.6)	●	4–12	50 (4.1)
Hong Kong SAR	●	4–12	69 (4.1)	○	10–12	33 (4.5)	○	9–12	54 (5.0)
Hungary	●	8	93 (2.2)	●	4,7	52 (4.4)	●	7–8	79 (3.6)
Indonesia	○	12	74 (3.8)	○	9	65 (4.3)	○	9	61 (4.4)
Iran, Islamic Rep. of	●	6	76 (3.2)	●	6	52 (3.8)	●	5	36 (3.3)
Israel	●	5–9	r 52 (4.0)	●	5–9	r 33 (4.2)	○	–	r 36 (3.8)
Italy	●	4–8	90 (1.8)	●	7–8	49 (3.6)	●	8	78 (2.3)
Japan	●	6,9–12	15 (3.1)	○	–	4 (1.2)	●	6,9–12	8 (1.9)
Jordan	●	6–10	96 (1.6)	●	7–12	83 (3.3)	●	7–12	74 (3.8)
Korea, Rep. of	○	12	27 (3.1)	○	11–12	17 (2.8)	○	–	21 (3.5)
Kuwait	●	6,9	r 58 (4.9)	○	–	r 53 (4.2)	●	–	r 51 (4.4)
Lebanon	●	2	55 (4.5)	○	–	44 (4.9)	○	–	52 (4.9)
Lithuania	○	10	50 (4.0)	●	8	42 (4.0)	○	10	37 (4.2)
Malaysia	●	8	92 (2.2)	●	8	53 (4.3)	●	5	73 (4.2)
Malta	○	10	23 (0.8)	○	10	37 (0.9)	●	8	19 (0.5)
Mongolia	●	7–11	– –	●	7–11	– –	●	7–11	– –
Norway	●	8–10	49 (3.6)	●	8–10	22 (2.6)	○	–	39 (3.5)
Oman	●	5–7	69 (4.3)	○	10	56 (4.5)	⦿	6	51 (3.8)
Palestinian Nat'l Auth.	●	2–3,6–7	61 (4.3)	●	3–4,7,10	46 (4.3)	●	5	47 (3.9)
Qatar	○	9	47 (0.2)	●	8	r 23 (0.1)	○	1–9	30 (0.2)
Romania	●	3,8–9,12	96 (1.7)	○	11	77 (3.4)	○	8–9,12	61 (4.3)
Russian Federation	●	6–9	– –	●	6	– –	○	9	– –
Saudi Arabia	●	8	98 (0.8)	○	–	89 (3.1)	–	–	98 (0.9)
Scotland	●	7	r 46 (3.1)	●	8	r 23 (2.9)	○	10	r 29 (3.4)
Serbia	●	5–6	95 (1.8)	●	8	75 (3.5)	●	8	85 (2.9)
Singapore	●	7–8	50 (2.4)	●	7–8	18 (2.1)	○	–	33 (2.3)
Slovenia	●	6–8	97 (1.4)	●	7–8	70 (3.9)	●	7–8	72 (3.7)
Sweden	●	6–9	77 (3.4)	●	6–9	19 (3.3)	○	–	24 (3.5)
Syrian Arab Republic	●	3,6–7,10	58 (5.0)	●	6–7,10	55 (5.1)	●	3–10	62 (5.3)
Thailand	●	7–9	55 (4.1)	●	7–9	55 (4.6)	○	10–12	63 (4.4)
Tunisia	○	10	18 (3.3)	○	–	51 (4.4)	○	–	21 (3.3)
Turkey	●	7	89 (2.7)	●	7	74 (4.2)	●	7	68 (4.5)
Ukraine	○	11	37 (4.2)	○	9,11	40 (4.0)	●	6–7,9,11	39 (4.3)
United States	●	5–8	86 (2.1)	●	5–8	75 (2.7)	●	5–8	78 (2.7)
‡ Morocco	●	7	r 71 (4.0)	○	9	r 61 (4.9)	●	5,7	r 60 (4.9)
International Avg.			63 (0.5)			48 (0.6)			51 (0.5)
Benchmarking Participants									
Basque Country, Spain	●	8	48 (4.8)	●	8	41 (5.6)	●	8	57 (5.3)
British Columbia, Canada	○	10	r 54 (4.2)	●	7	r 24 (4.4)	●	8,10	r 43 (4.1)
Dubai, UAE	●	6	s 65 (4.1)	●	8	s 39 (2.9)	●	8	s 54 (4.8)
Massachusetts, US	●	3–5,6–8	87 (5.6)	○	–	74 (7.2)	●	6–8	78 (6.0)
Minnesota, US	●	7	81 (5.7)	○	–	72 (4.8)	●	7	73 (6.4)
Ontario, Canada	●	7	77 (4.3)	○	9–12	60 (4.9)	○	9–12	72 (5.0)
Quebec, Canada	○	10	75 (3.7)	○	10	61 (5.3)	●	7–8	67 (4.6)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.10 Intended and Taught* TIMSS Biology Topics (Continued)

TIMSS2007 Science 8th Grade

Biology (14 topics)	Common infectious diseases			Preventive medicine methods		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	9	29 (3.9)	○	9	47 (4.7)
Armenia	●	7	87 (3.5)	●	7	92 (2.3)
Australia	○	9–12	17 (3.2)	○	9–12	26 (3.8)
Bahrain	●	5	93 (1.4)	●	5	74 (2.3)
Bosnia and Herzegovina	●	8–9	92 (2.0)	●	8–9	85 (2.9)
Botswana	○	9	37 (4.9)	●	8	45 (3.8)
Bulgaria	●	7–8	96 (2.0)	●	5–8	98 (1.6)
Chinese Taipei	●	5–6	59 (4.3)	●	5–6	62 (4.1)
Colombia	●	6–7	61 (5.5)	●	6–7	75 (4.0)
Cyprus	○	9–12	– –	○	9–12	– –
Czech Republic	●	8–10,12	88 (2.5)	●	8–9,12	85 (2.7)
Egypt	⦿	4–9	93 (2.0)	⦿	8–9	77 (3.1)
El Salvador	●	2–9,11	68 (4.0)	●	1–11	67 (4.0)
England	●	7	r 88 (2.6)	●	7	r 89 (2.2)
Georgia	○	9	55 (5.0)	○	9	54 (4.8)
Ghana	●	3–9	82 (3.2)	●	7–9	83 (3.1)
Hong Kong SAR	●	4–12	19 (3.8)	●	3–9	32 (4.6)
Hungary	●	5–8	83 (3.1)	●	1–4,8	95 (1.8)
Indonesia	○	10	37 (4.7)	●	8	25 (4.1)
Iran, Islamic Rep. of	●	5	55 (4.2)	●	5	50 (3.8)
Israel	●	5–9	r 20 (3.3)	●	5–9	r 16 (3.5)
Italy	●	5–8	92 (1.9)	●	5–8	96 (1.2)
Japan	○	–	5 (1.8)	○	–	3 (1.4)
Jordan	●	6–10	48 (4.2)	●	6–10	52 (4.6)
Korea, Rep. of	○	11–12	21 (3.6)	○	–	42 (4.2)
Kuwait	●	7,11	r 84 (3.4)	●	4	r 61 (4.3)
Lebanon	●	7	87 (3.7)	●	3–5	64 (3.9)
Lithuania	●	8	54 (4.4)	●	8	45 (3.9)
Malaysia	●	5	22 (3.7)	●	8	37 (3.7)
Malta	●	8	41 (0.8)	●	8	22 (0.7)
Mongolia	●	1–11	– –	●	1–11	– –
Norway	●	8–10	52 (4.0)	●	8–10	30 (3.5)
Oman	○	11	81 (3.3)	●	3–7	62 (4.1)
Palestinian Nat'l Auth.	●	5–6,9–12	81 (2.8)	●	5–7	54 (4.2)
Qatar	●	7–9	66 (0.2)	●	7	50 (0.2)
Romania	●	7,9–12	91 (2.4)	●	1–3,7,10–11	88 (3.1)
Russian Federation	●	8	– –	●	8	– –
Saudi Arabia	●	10–12	24 (3.7)	●	8	24 (3.9)
Scotland	○	10	r 35 (3.3)	●	8	r 37 (2.9)
Serbia	●	8	88 (2.7)	●	8	91 (3.0)
Singapore	○	9–10	38 (2.5)	○	10	33 (2.5)
Slovenia	○	9	25 (3.1)	○	9	34 (3.3)
Sweden	○	–	54 (4.3)	●	6–9	76 (3.3)
Syrian Arab Republic	●	3–12	92 (3.0)	●	1–11	58 (5.5)
Thailand	○	7–9	66 (4.3)	●	7–9	71 (4.0)
Tunisia	●	7	44 (4.5)	○	–	20 (3.3)
Turkey	●	6	76 (3.8)	○	9	56 (4.0)
Ukraine	●	6–7,9,11	99 (0.7)	●	7–10	100 (0.0)
United States	●	5–8	73 (2.9)	●	5–8	72 (3.2)
‡ Morocco	○	9	r 11 (3.7)	○	9	r 14 (3.9)
International Avg.			60 (0.5)			57 (0.5)
Benchmarking Participants						
Basque Country, Spain	●	8	15 (3.3)	●	8	50 (4.8)
British Columbia, Canada	●	5,8,11–12	r 71 (3.4)	●	5,8	r 56 (4.7)
Dubai, UAE	●	7	s 77 (2.8)	●	7	s 63 (3.1)
Massachusetts, US	○	–	60 (7.4)	○	–	69 (6.8)
Minnesota, US	●	7	72 (6.4)	○	–	68 (5.9)
Ontario, Canada	●	8	43 (5.3)	●	5	65 (5.5)
Quebec, Canada	○	9	38 (4.7)	●	5–6	39 (5.0)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.11 Intended and Taught* TIMSS Chemistry Topics

TIMSS2007 Science 8th Grade

Chemistry (8 topics)	Classification and composition of matter			Particulate structure of matter			Solutions		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	8–9	81 (3.3)	●	8–9	67 (4.4)	●	7	83 (3.0)
Armenia	●	7	66 (3.9)	●	8	59 (4.4)	○	9	54 (4.4)
Australia	●	7–12	94 (1.7)	●	7–12	79 (2.8)	●	7–12	84 (2.9)
Bahrain	●	6	89 (0.7)	●	6	98 (0.0)	●	8	93 (1.3)
Bosnia and Herzegovina	●	7–8	98 (1.1)	●	7–8	99 (0.6)	●	7–8	95 (1.7)
Botswana	○	10	16 (3.5)	○	10	9 (2.9)	○	9	16 (3.4)
Bulgaria	●	6–8	96 (1.9)	●	6–7	99 (1.0)	○	10	53 (4.2)
Chinese Taipei	●	7–9	100 (0.4)	●	7–9	100 (0.4)	●	5–6	98 (1.1)
Colombia	●	6–7	88 (2.8)	●	6–7	92 (2.3)	●	8–9	39 (4.8)
Cyprus	●	8,10	r 99 (0.0)	●	8,10	r 99 (0.1)	●	8,11	r 72 (1.3)
Czech Republic	●	8–10	100 (0.0)	●	8–10	100 (0.0)	●	8–10	97 (1.7)
Egypt	●	4–6	90 (2.5)	⦿	4–9	100 (0.0)	⦿	10–12	90 (2.1)
El Salvador	●	7–8,10	95 (1.9)	●	7–10	91 (2.7)	●	8–10	82 (3.3)
England	●	7	r 98 (0.7)	●	6–7	r 75 (3.3)	●	6	r 97 (0.9)
Georgia	●	6–7	98 (1.0)	●	8	99 (0.6)	●	7–8	93 (2.3)
Ghana	●	7–12	98 (1.2)	●	7–12	97 (1.6)	●	7–12	94 (1.8)
Hong Kong SAR	●	7–8	46 (5.0)	○	9–10	51 (5.2)	●	7	80 (3.7)
Hungary	●	7	100 (0.0)	●	7	100 (0.0)	●	7	98 (0.9)
Indonesia	○	10	95 (5.0)	○	10	76 (10.3)	○	10	55 (11.8)
Iran, Islamic Rep. of	●	6	98 (0.9)	●	6,9	99 (0.5)	●	6	100 (0.1)
Israel	●	7–9	r 94 (2.0)	●	7–9	r 97 (1.2)	●	7–9	r 83 (2.9)
Italy	●	6	97 (1.4)	●	6–7	94 (1.3)	●	6–7	90 (1.8)
Japan	●	3–12	97 (1.4)	●	8,10–12	77 (3.6)	●	5–7,10–12	99 (0.8)
Jordan	●	6–12	92 (2.1)	●	4–12	98 (1.0)	●	4–12	78 (3.5)
Korea, Rep. of	●	8	96 (1.3)	○	12	54 (4.0)	●	8	98 (0.8)
Kuwait	●	7–8,10–11	r 85 (3.3)	●	8–10	r 91 (2.0)	●	7,11	r 72 (4.0)
Lebanon	●	7,10	99 (0.8)	○	7,10	98 (1.0)	○	7,10	92 (2.3)
Lithuania	●	5–6	98 (0.7)	●	6,8	99 (0.5)	●	5	93 (2.1)
Malaysia	●	7	89 (2.6)	○	10	38 (4.4)	●	8	99 (1.0)
Malta	●	7	100 (0.0)	●	9	99 (0.2)	●	7,9	85 (0.6)
Mongolia	●	8–11	– –	●	8–11	– –	●	8–11	– –
Norway	●	5–10	47 (4.0)	●	5–10	52 (3.5)	○	8–10	44 (4.0)
Oman	⦿	6,9	97 (1.5)	○	9–10	80 (3.6)	○	10	75 (3.6)
Palestinian Nat'l Auth.	●	3,5–7,9–12	93 (1.9)	●	7, 9–12	99 (0.9)	●	5, 10–12	89 (2.6)
Qatar	●	7–9	94 (0.1)	●	7–8	96 (0.0)	●	7	r 65 (0.2)
Romania	●	4,7	100 (0.0)	●	7,9	100 (0.0)	●	7,9	98 (0.9)
Russian Federation	●	8	– –	●	7–9	– –	○	9	– –
Saudi Arabia	●	8	34 (4.6)	○	9	61 (4.2)	○	9	19 (3.9)
Scotland	●	8	r 92 (1.6)	●	8	r 81 (2.0)	●	7	r 86 (2.5)
Serbia	●	7	100 (0.5)	●	7	100 (0.5)	●	7–8	97 (1.3)
Singapore	●	7–8	82 (1.8)	●	7–8	83 (1.7)	●	7–8	78 (1.8)
Slovenia	●	4,5,7	99 (0.9)	●	8	98 (1.0)	○	9	32 (3.5)
Sweden	●	6–9	91 (2.0)	●	6–9	73 (3.8)	●	6–9	84 (2.7)
Syrian Arab Republic	●	4–12	87 (3.1)	●	4–12	99 (0.7)	●	7,10–12	88 (3.1)
Thailand	●	4–6	91 (2.1)	●	7–9	85 (3.1)	●	7–9	87 (2.5)
Tunisia	●	–	s 26 (4.6)	●	–	s 16 (4.0)	●	–	s 29 (4.9)
Turkey	●	7	97 (1.5)	●	7	96 (1.6)	●	7,9	93 (2.2)
Ukraine	●	8	100 (0.0)	●	8–9	63 (4.4)	○	9	19 (3.4)
United States	●	5–8	89 (2.0)	●	5–8	90 (1.9)	●	5–8	72 (2.9)
‡ Morocco	●	7,10	r 96 (0.7)	○	9–10	r 84 (4.2)	○	9–10	r 94 (3.1)
International Avg.			88 (0.3)			83 (0.4)			77 (0.5)
Benchmarking Participants									
Basque Country, Spain	●	7	78 (3.7)	○	9–10	75 (4.5)	○	9–10	48 (4.7)
British Columbia, Canada	●	7	r 56 (3.9)	●	7,9–10	r 51 (4.4)	●	7–8	r 46 (4.2)
Dubai, UAE	●	6	x x	●	6	x x	●	7	x x
Massachusetts, US	●	6–8	89 (5.0)	●	–	90 (4.6)	○	9–10	62 (6.4)
Minnesota, US	●	6	52 (6.8)	●	6	61 (7.5)	●	6	39 (6.6)
Ontario, Canada	●	5,7	84 (3.5)	○	9–12	48 (5.2)	●	7	86 (3.1)
Quebec, Canada	●	7–8	89 (3.1)	●	7–8	62 (5.2)	⦿	9	87 (3.1)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

For countries that teach science as separate subjects at Grade 8, data are based on chemistry teachers only.

* Includes the TIMSS topics mostly taught during or before the year of the assessment.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.11 Intended and Taught* TIMSS Chemistry Topics (Continued)

TIMSS2007 Science 8th Grade

Chemistry (8 topics)	Properties and uses of water			Properties and uses of common acids and bases			Nature of chemical change		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	8	79 (3.5)	○	–	12 (3.0)	●	8–9	r 65 (4.3)
Armenia	●	7	56 (4.1)	○	9	63 (3.9)	●	8	58 (4.2)
Australia	●	7–12	74 (3.3)	○	9–12	40 (3.0)	●	8–12	61 (3.6)
Bahrain	●	4	34 (2.4)	●	8	96 (0.6)	●	8	61 (2.1)
Bosnia and Herzegovina	●	7–8	96 (1.6)	●	7–8	96 (1.6)	●	7–8	99 (0.8)
Botswana	●	9	72 (4.5)	○	10	7 (2.8)	○	10	8 (2.8)
Bulgaria	●	6	70 (4.8)	●	8	99 (0.9)	●	6,8	77 (4.3)
Chinese Taipei	●	7–9	100 (0.0)	●	7–9	98 (1.0)	●	7–9	100 (0.4)
Colombia	●	8–9	70 (4.9)	●	8–9	44 (5.4)	○	10–11	63 (4.6)
Cyprus	●	8	r 57 (1.4)	●	8–11	r 10 (1.2)	○	11	r 39 (1.7)
Czech Republic	●	8–10	96 (2.1)	●	8–10,12	52 (4.0)	●	8–11	77 (3.7)
Egypt	⦿	7–9	91 (2.4)	⦿	7–9	87 (2.8)	⦿	7–9	73 (3.5)
El Salvador	●	3–7,10–11	84 (3.4)	●	7–8,10	76 (3.6)	●	8,10	81 (3.7)
England	●	6–7	r 89 (2.2)	●	6	r 97 (0.9)	●	8	r 95 (1.2)
Georgia	●	5,7	95 (2.7)	●	8	98 (1.1)	●	6–7	92 (2.0)
Ghana	●	7–9	93 (2.2)	●	7–9	85 (3.1)	●	7–12	84 (3.1)
Hong Kong SAR	●	7	82 (3.5)	●	8	97 (1.4)	○	9	21 (3.8)
Hungary	●	3,8	100 (0.0)	●	8	97 (1.5)	●	8	97 (1.5)
Indonesia	●	–	83 (9.2)	○	11	41 (11.6)	○	11	46 (12.1)
Iran, Islamic Rep. of	●	6	93 (1.9)	●	8	95 (1.8)	●	7	95 (1.5)
Israel	●	5–9	r 90 (2.3)	●	7–9	r 50 (4.6)	●	7–9	r 71 (3.8)
Italy	●	6–8	96 (1.7)	●	6–8	70 (3.3)	●	6–8	71 (3.1)
Japan	●	4,7,10–12	98 (1.2)	●	6–7,10–12	94 (1.8)	●	5–12	97 (1.5)
Jordan	●	1–12	78 (3.4)	●	6–12	69 (3.5)	●	2–12	81 (3.3)
Korea, Rep. of	●	7	52 (4.2)	●	5	10 (2.0)	○	9	18 (3.0)
Kuwait	●	4,10	r 73 (4.1)	●	8,12	r 77 (3.9)	●	6–7	r 51 (4.5)
Lebanon	○	10	86 (3.4)	●	10–12	88 (2.8)	⦿	7,12	97 (1.5)
Lithuania	●	8	30 (4.3)	○	9	5 (1.9)	●	8	79 (3.1)
Malaysia	●	8	99 (0.8)	●	9	97 (1.4)	●	8	36 (3.9)
Malta	●	7	65 (1.1)	●	7,9	51 (1.1)	●	8–10	71 (0.9)
Mongolia	●	8–11	– –	●	8–11	– –	●	9–11	– –
Norway	●	5–10	73 (3.1)	●	8–10	77 (3.5)	●	5–10	37 (4.1)
Oman	●	6,8	67 (4.0)	●	7	90 (2.2)	○	9	66 (4.3)
Palestinian Nat'l Auth.	●	7,10–12	83 (3.6)	●	7,12	96 (1.5)	●	9–12	73 (4.1)
Qatar	●	7	r 58 (0.2)	○	9	r 82 (0.1)	○	9	62 (0.2)
Romania	●	3,7,9	82 (3.5)	●	8–10	100 (0.2)	●	4, 7–12	97 (1.5)
Russian Federation	●	7–8	– –	●	8	– –	●	8	– –
Saudi Arabia	○	9	36 (4.4)	○	9	13 (3.9)	●	8	38 (4.3)
Scotland	●	8	s 77 (2.4)	●	7	r 84 (3.2)	●	7	r 80 (2.5)
Serbia	●	7	97 (1.3)	●	7–8	96 (1.7)	●	7–8	99 (0.8)
Singapore	●	7–8	64 (2.2)	●	7–8	68 (1.7)	●	7–8	66 (2.2)
Slovenia	●	5,7–8	85 (3.2)	○	9	4 (1.6)	●	7–8	89 (2.5)
Sweden	●	6–9	92 (1.8)	●	6–9	81 (3.5)	●	6–9	47 (4.3)
Syrian Arab Republic	●	4–12	91 (2.4)	●	6–12	84 (3.3)	●	5–12	80 (3.7)
Thailand	●	7–9	88 (2.6)	●	7–9	88 (2.7)	●	7–9	81 (3.3)
Tunisia	●	–	s 32 (4.9)	○	10	s 8 (2.8)	○	10	s 14 (3.5)
Turkey	○	9	87 (2.8)	●	8	100 (0.0)	●	8	100 (0.0)
Ukraine	●	8	91 (2.3)	●	8–10	97 (1.5)	●	8	97 (1.4)
United States	●	5–8	79 (2.4)	●	5–8	62 (3.1)	●	5–8	80 (2.6)
‡ Morocco	●	7	r 94 (2.8)	○	9–10,12	r 11 (4.2)	●	8–12	r 84 (4.6)
International Avg.			78 (0.5)			68 (0.5)			70 (0.5)
Benchmarking Participants									
Basque Country, Spain	●	7	79 (4.1)	○	9–10	5 (2.0)	○	9–10	42 (5.2)
British Columbia, Canada	●	2,7–8	r 77 (3.5)	●	7,10–12	r 29 (4.4)	○	9–11	r 41 (3.9)
Dubai, UAE	●	6	x x	○	10	x x	●	5	x x
Massachusetts, US	○	9–10	88 (4.6)	○	9–10	40 (6.4)	●	6–8	78 (5.9)
Minnesota, US	●	6	51 (7.7)	●	6	29 (6.3)	●	6	39 (8.3)
Ontario, Canada	●	5,8	85 (3.5)	○	9–12	38 (4.4)	●	5	42 (5.1)
Quebec, Canada	○	9	85 (3.3)	●	7–8	54 (5.4)	●	7–8	62 (5.2)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.11 Intended and Taught* TIMSS Chemistry Topics (Continued)

TIMSS2007 Science 8th Grade

Chemistry (8 topics)	Common oxidation reactions			Classification of familiar chemical transformations		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	8–9	33 (4.1)	○	–	33 (4.3)
Armenia	○	9	81 (3.2)	●	8	52 (4.3)
Australia	○	9–12	28 (3.3)	○	9–12	29 (2.8)
Bahrain	●	8	58 (3.3)	○	11	32 (2.7)
Bosnia and Herzegovina	●	7–8	97 (1.5)	●	7–8	90 (2.3)
Botswana	○	10	6 (2.7)	○	11–12	5 (2.1)
Bulgaria	●	6,8	86 (3.4)	○	10	37 (4.8)
Chinese Taipei	●	7–9	99 (0.8)	●	7–9	95 (2.4)
Colombia	○	10–11	37 (4.5)	○	10–11	42 (5.1)
Cyprus	○	11	r 5 (1.1)	○	11	r 14 (0.7)
Czech Republic	●	8–10	38 (4.0)	●	8–10	30 (3.7)
Egypt	●	8–9	79 (3.6)	○	10–12	86 (2.8)
El Salvador	●	7–8,10	77 (3.6)	●	7–8,10	69 (3.8)
England	●	8	r 93 (1.6)	○	–	r 74 (2.9)
Georgia	●	7–8	88 (3.6)	○	9	40 (5.1)
Ghana	●	9–12	33 (3.7)	○	10–12	40 (4.2)
Hong Kong SAR	○	10–12	42 (5.1)	○	10–11	21 (4.1)
Hungary	●	8	94 (1.9)	●	7	99 (0.7)
Indonesia	○	11	39 (11.5)	○	10	34 (11.3)
Iran, Islamic Rep. of	●	7	94 (1.5)	●	6	69 (3.6)
Israel	●	7–9	r 72 (4.0)	●	7–9	r 31 (3.4)
Italy	●	6–8	75 (2.7)	●	6–8	62 (3.2)
Japan	●	6,8–12	65 (4.0)	○	9–12	24 (3.7)
Jordan	●	3–12	96 (1.6)	●	3–12	34 (4.2)
Korea, Rep. of	○	11	16 (2.6)	○	12	31 (3.8)
Kuwait	○	12	r 58 (4.9)	○	11	r 45 (5.3)
Lebanon	○	9,11–12	84 (3.1)	○	10–12	78 (3.7)
Lithuania	●	8	61 (4.6)	○	9	49 (3.7)
Malaysia	●	8	67 (3.6)	●	8	59 (3.9)
Malta	●	8–9	60 (0.9)	○	10	3 (0.4)
Mongolia	●	9–11	– –	●	8–11	– –
Norway	○	–	13 (2.8)	○	–	8 (2.0)
Oman	○	9	35 (4.4)	●	7	23 (3.5)
Palestinian Nat'l Auth.	●	7,9,11–12	68 (4.0)	○	11	27 (3.8)
Qatar	○	9	67 (0.1)	○	9	34 (0.1)
Romania	●	4,7–10,12	87 (3.2)	●	7,10,12	79 (3.8)
Russian Federation	●	8	– –	●	8	– –
Saudi Arabia	●	8	61 (4.4)	○	10,12	18 (3.6)
Scotland	●	7	r 61 (3.1)	●	8	r 38 (3.0)
Serbia	●	8	96 (1.6)	●	7–8	78 (3.4)
Singapore	●	7–8	46 (2.2)	○	9–10	45 (2.6)
Slovenia	●	8	85 (3.1)	●	8	96 (1.6)
Sweden	●	6–9	36 (3.6)	○	–	19 (3.4)
Syrian Arab Republic	●	7–12	83 (3.4)	●	10–12	31 (4.3)
Thailand	○	7–9	73 (3.6)	○	10–12	81 (3.4)
Tunisia	○	10	s 23 (4.5)	○	10	s 8 (2.8)
Turkey	○	10–11	70 (3.9)	●	8	98 (1.2)
Ukraine	●	8	87 (2.7)	●	8–9	84 (2.9)
United States	⦿	5–12	54 (3.0)	○	9–12	64 (2.9)
‡ Morocco	●	8–9	r 41 (5.5)	○	10	r 27 (5.7)
International Avg.			61 (0.5)			47 (0.5)
Benchmarking Participants						
Basque Country, Spain	○	9–10	23 (4.5)	○	9–10	30 (4.8)
British Columbia, Canada	○	11	r 22 (3.9)	○	10–12	r 27 (3.4)
Dubai, UAE	●	6	x x	●	7	x x
Massachusetts, US	○	9–10	52 (6.6)	○	9–10	66 (5.7)
Minnesota, US	○	–	15 (4.8)	●	6	26 (6.0)
Ontario, Canada	○	9–12	24 (4.4)	○	9–12	50 (4.7)
Quebec, Canada	○	9	48 (5.2)	⦿	10	31 (5.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

Exhibit 5.12 shows that all ten eighth-grade physics topics featured in the curricula of most countries, and that the majority of students were taught each of the topics, on average. The highest percentages of students were taught about physical states and changes in matter (83%) and the processes of melting, freezing, evaporation, and condensation (84%). About two-thirds of the students were taught each of the other physics topics, including energy forms, transformations, heat, and temperature (74%); temperature changes (63%); properties and behavior of light (66%); properties of sound (60%); electric circuits and the relationship between voltage and current (61%); properties of magnets (55%); forces and motion (67%); and the effects of density and pressure (67%).

Exhibit 5.13 provides the intended and taught results for the 14 earth science topics at the eighth grade. In the general area of Earth's structure and physical features, the three topics—Earth's structure and physical characteristics, water on Earth, and Earth's atmosphere—were in the curriculum of most participants and taught to 61 to 64 percent of students, on average. There also was good coverage of the six topics on Earth's processes, cycles, and history, with the water cycle in the curriculum of practically all participants, and the other topics in the curricula of about two-thirds. Sixty-nine percent of students, on average, were taught about the water cycle; the percentages taught the other topics ranged from 48 to 63 percent. Earth's resources featured in the curriculum of almost all participants, but were taught to just over half the students (57%). The relationship of land management to human use and the supply and demand of fresh water resources were less frequently taught (to 39% and 47% of students, respectively). Finally, topics on Earth in the solar system were intended to be taught by one-half to two-thirds of the TIMSS participants, and actually taught to just over half the students—explaining Earth phenomena in relation to other bodies in the solar system (day and night, tides, phases of the moon, etc.) to 61 percent and physical features of Earth compared with other planets to 55 percent of students.

Exhibit 5.12 Intended and Taught* TIMSS Physics Topics

TIMSS2007 Science 8th Grade

Physics (10 topics)	Physical states and changes in matter			Processes of melting, freezing, evaporation, and condensation			Energy forms, transformations, heat and temperature, including heat transfer		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7–8	65 (3.8)	●	7	91 (2.2)	●	9	46 (4.5)
Armenia	●	7	75 (3.9)	●	8	93 (1.5)	●	7	87 (2.1)
Australia	●	8–12	78 (3.0)	●	7–12	88 (2.2)	●	7–12	70 (2.9)
Bahrain	●	6	52 (3.0)	●	6	57 (2.3)	●	4	58 (2.1)
Bosnia and Herzegovina	●	7–8	99 (0.8)	●	7–8	98 (1.1)	●	7–8	98 (1.1)
Botswana	●	8	95 (1.9)	●	8	96 (1.8)	●	–	53 (4.6)
Bulgaria	●	6,8	96 (2.0)	●	6,8	98 (1.1)	●	6,8	99 (0.6)
Chinese Taipei	●	7–9	95 (1.3)	●	7–9	98 (1.3)	●	5–9	85 (2.9)
Colombia	●	8–9	80 (3.9)	●	6–7	68 (4.5)	●	8–9	64 (4.5)
Cyprus	●	8	r 100 (0.0)	●	8	r 96 (0.8)	●	8	r 100 (0.0)
Czech Republic	●	6–7,10	97 (1.4)	●	6–7,11	85 (3.3)	●	6–12	90 (2.3)
Egypt	●	4–6	86 (3.1)	⦿	7–9	91 (2.2)	⦿	10–12	89 (2.6)
El Salvador	●	7–11	94 (2.1)	●	7–11	78 (3.4)	●	7–8,10	94 (2.2)
England	●	6–7	r 96 (0.9)	●	6–7	r 96 (0.9)	●	6,8	r 94 (1.5)
Georgia	●	5–7	94 (2.4)	○	9	92 (3.0)	○	9	91 (3.0)
Ghana	●	7–12	91 (2.4)	●	4–12	97 (1.4)	●	8–12	79 (3.5)
Hong Kong SAR	●	7	71 (4.4)	●	7	77 (3.5)	●	7	71 (4.0)
Hungary	●	5	100 (0.4)	●	7,10	98 (1.3)	●	7	98 (1.0)
Indonesia	●	7	88 (3.0)	●	7	93 (2.4)	●	8	95 (1.9)
Iran, Islamic Rep. of	●	6	97 (1.1)	●	6	98 (0.9)	●	7	99 (0.7)
Israel	●	7–9	r 97 (1.2)	●	5–9	r 97 (1.2)	●	7–9	r 41 (3.9)
Italy	●	6–7	98 (0.8)	●	6	98 (0.7)	●	4–8	94 (1.5)
Japan	○	10–12	57 (4.4)	●	7,10–12	92 (2.1)	○	9–12	12 (2.6)
Jordan	●	1–12	81 (3.4)	●	1–11	84 (3.2)	●	4–12	70 (4.1)
Korea, Rep. of	●	7	64 (3.7)	●	7	95 (1.7)	●	5	36 (4.1)
Kuwait	●	4–7	r 86 (3.5)	●	3,5	r 84 (3.2)	●	8	r 92 (2.7)
Lebanon	○	7,9,11	89 (2.8)	○	7,9,11	86 (2.7)	○	7,9,11	90 (2.8)
Lithuania	●	8	64 (4.2)	○	9	9 (2.4)	○	9	42 (4.4)
Malaysia	●	8	87 (2.9)	●	8	98 (1.3)	●	8	86 (3.2)
Malta	●	9	78 (0.2)	●	7	19 (0.3)	●	7,9	56 (0.4)
Mongolia	⦿	7–9	– –	○	9–10	– –	○	9–10	– –
Norway	●	5–10	72 (3.6)	●	5–10	85 (2.9)	○	8–10	36 (3.6)
Oman	●	6–9	90 (2.5)	●	4–7	92 (2.2)	●	8,10	89 (2.6)
Palestinian Nat'l Auth.	●	1,5,7	81 (2.9)	●	3,5,7,11	92 (2.5)	●	3,5,7,10–12	83 (3.6)
Qatar	●	7	74 (0.1)	○	4–8	78 (0.1)	○	9	90 (0.1)
Romania	●	3,6–8,10	92 (2.6)	●	3,8,10	100 (0.0)	●	7–10	99 (1.0)
Russian Federation	●	7–10	– –	●	8,10	– –	●	8,10	– –
Saudi Arabia	●	8	75 (4.0)	●	8	78 (3.8)	○	9	29 (3.9)
Scotland	●	8	r 84 (2.1)	●	7	r 88 (2.1)	●	8	r 89 (1.7)
Serbia	●	6	94 (2.1)	●	10	89 (2.8)	●	7	94 (2.1)
Singapore	●	7–8	79 (2.2)	●	7–8	70 (2.5)	●	7–8	69 (2.4)
Slovenia	●	5,8	86 (3.0)	●	5,8	30 (3.9)	●	5,8	57 (4.0)
Sweden	●	6–9	r 78 (3.2)	●	6–9	r 90 (2.9)	●	6–9	r 68 (3.5)
Syrian Arab Republic	⦿	7–12	65 (4.4)	⦿	7–12	88 (3.1)	⦿	7–12	27 (4.2)
Thailand	●	4–6	64 (4.0)	●	4–6	83 (3.4)	●	7–9	69 (3.5)
Tunisia	○	10	s 30 (4.6)	○	10	s 40 (5.2)	○	10	s 27 (4.7)
Turkey	●	4	97 (1.3)	●	4	93 (2.1)	●	4–8	91 (2.3)
Ukraine	●	7–8,10	99 (0.8)	●	8,10	100 (0.3)	●	7–9	100 (0.0)
United States	●	5–8	86 (2.2)	●	5–8	87 (1.9)	●	5–8	78 (2.6)
‡ Morocco	●	7–8,10	r 85 (4.9)	●	7–8	r 96 (2.7)	○	9,11	r 67 (5.2)
International Avg.			83 (0.4)			84 (0.4)			74 (0.4)
Benchmarking Participants									
Basque Country, Spain	●	8	80 (4.0)	●	7	79 (4.4)	●	8	85 (3.5)
British Columbia, Canada	●	2,7,10–11	r 83 (3.2)	●	2,7–8,11	r 84 (2.9)	●	8,10	r 55 (4.8)
Dubai, UAE	○	10	s 73 (2.5)	○	9	s 81 (3.7)	●	7	s 82 (4.0)
Massachusetts, US	●	6–8	93 (3.3)	●	6–10	90 (4.4)	●	3–8	82 (4.8)
Minnesota, US	●	6	56 (6.9)	●	6	58 (6.2)	●	6	55 (9.0)
Ontario, Canada	●	5,7	77 (4.3)	●	5	90 (2.5)	●	7	92 (2.1)
Quebec, Canada	●	7–8	75 (3.4)	○	9	88 (2.9)	●	7–8	64 (4.6)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

For countries that teach science as separate subjects at Grade 8, data are based on physics teachers only.

* Includes the TIMSS topics mostly taught during or before the year of the assessment.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. An "s" indicates data are available for at least 50 but less than 70% of the students.

TIMSS & PIRLS International Study Center
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Exhibit 5.12 Intended and Taught* TIMSS Physics Topics (Continued)

TIMSS2007 Science 8th Grade

Physics (10 topics)	Temperature changes related to volume, pressure, and particle movement or speed			Basic properties/behavior of light			Properties of sound		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7,9	r 41 (4.6)	○	9	17 (2.9)	○	–	8 (2.6)
Armenia	●	8	78 (3.0)	○	9	77 (5.9)	●	8	77 (5.7)
Australia	○	9–10	57 (2.7)	○	9–12	20 (3.2)	○	9–12	29 (3.8)
Bahrain	○	9	34 (2.8)	●	5	98 (1.0)	●	7	98 (0.0)
Bosnia and Herzegovina	●	7–8	97 (1.4)	●	–	78 (3.3)	●	8–9	94 (2.0)
Botswana	○	11–12	38 (4.5)	○	9	8 (3.0)	●	8	78 (3.4)
Bulgaria	●	8	99 (0.8)	●	7	83 (2.8)	●	7	77 (3.0)
Chinese Taipei	●	7–9	77 (3.7)	●	3–9	96 (1.8)	●	7–9	96 (1.7)
Colombia	●	8–9	35 (4.6)	●	8–9	35 (4.1)	●	8–9	42 (4.6)
Cyprus	●	8	r 88 (1.8)	●	8	r 52 (1.6)	○	12	r 4 (0.1)
Czech Republic	●	6–7,11	87 (2.9)	●	6–7,12	66 (4.0)	●	8–9,11	23 (3.4)
Egypt	●	10–12	87 (2.8)	●	7–8	86 (2.8)	⊙	7–9	86 (2.8)
El Salvador	●	8,10	70 (4.0)	●	7–8,11	87 (3.0)	●	8,10	93 (1.9)
England	●	6–8	r 83 (2.4)	●	7	r 98 (0.8)	●	7	r 97 (0.9)
Georgia	●	8	71 (5.4)	○	9	7 (2.8)	○	9	14 (2.8)
Ghana	●	8–12	52 (4.4)	○	9–12	28 (3.8)	○	9–12	24 (3.5)
Hong Kong SAR	●	7	47 (4.4)	○	9	11 (3.1)	●	8	58 (5.0)
Hungary	●	7,10	87 (2.7)	●	5,8	39 (4.5)	○	11	18 (3.2)
Indonesia	○	10	84 (3.5)	●	8	79 (4.4)	●	8	96 (1.6)
Iran, Islamic Rep. of	●	6	94 (2.2)	●	7	98 (1.1)	●	7	81 (3.3)
Israel	●	7–9	r 88 (2.5)	○	5–6,10–12	r 15 (2.8)	⊙	5–6	r 8 (2.0)
Italy	●	6–8	81 (2.7)	●	8	39 (3.3)	●	8	37 (3.2)
Japan	●	4,7,10–12	24 (3.6)	●	3,7,10–12	100 (0.3)	●	3,7,10–12	99 (0.9)
Jordan	●	4–11	57 (4.1)	●	4–11	99 (0.7)	●	4–8	100 (0.3)
Korea, Rep. of	○	9	71 (3.5)	●	7	87 (2.4)	●	7	84 (3.1)
Kuwait	○	–	r 63 (4.2)	●	8,12	r 88 (3.1)	●	7,12	r 88 (3.1)
Lebanon	○	11	71 (4.6)	●	8–11	67 (4.3)	●	8,11	78 (3.9)
Lithuania	○	9	44 (4.3)	●	8	65 (4.5)	●	8	90 (2.5)
Malaysia	●	7	87 (2.8)	●	8,10–11	96 (1.7)	●	8	72 (3.1)
Malta	●	9	22 (0.3)	●	9	78 (0.4)	●	9	60 (0.4)
Mongolia	○	10	– –	⊙	8–9	– –	⊙	8–9	– –
Norway	○	–	49 (3.9)	●	8–10	7 (2.1)	○	–	5 (2.0)
Oman	○	10	75 (3.7)	●	2,5,7	98 (1.1)	⊙	4,10	87 (3.2)
Palestinian Nat'l Auth.	●	3,7,10–12	66 (4.2)	●	4,11–12	98 (1.3)	●	4	96 (2.1)
Qatar	●	8	r 49 (0.2)	●	8	77 (0.1)	●	8	60 (0.2)
Romania	●	6,8,10	68 (4.1)	●	4,6–7,9	99 (0.7)	●	7,11	93 (2.1)
Russian Federation	●	7,10	– –	●	8,11	– –	○	9	– –
Saudi Arabia	○	10	31 (3.7)	●	8	85 (3.7)	●	8	86 (4.0)
Scotland	○	10	r 52 (3.6)	●	7	r 69 (4.0)	●	7–8	r 66 (3.7)
Serbia	●	7	86 (2.9)	●	8	92 (2.7)	●	8	95 (1.9)
Singapore	●	7–8	53 (2.7)	●	7–8	80 (1.9)	●	7–8	62 (2.0)
Slovenia	●	8	33 (4.1)	●	4,7	76 (3.4)	●	3,7	67 (3.9)
Sweden	●	6–9	r 63 (3.5)	●	6–9	r 52 (3.7)	●	6–9	r 51 (3.8)
Syrian Arab Republic	⊙	8–12	48 (4.7)	⊙	4–6,8,10	90 (2.7)	⊙	6,8–9,12	67 (3.9)
Thailand	○	10–12	60 (4.0)	●	7–9	77 (3.6)	●	4–6	25 (3.8)
Tunisia	○	11	s 21 (4.5)	●	–	s 19 (4.5)	○	–	s 3 (1.7)
Turkey	●	4,6,8	78 (3.6)	●	5–7	56 (4.1)	●	4–5,8	56 (3.9)
Ukraine	●	8,10	81 (3.4)	●	8,11	94 (1.9)	○	11	5 (1.6)
United States	●	5–8	74 (2.7)	●	5–8	59 (2.9)	●	5–12	57 (3.0)
‡ Morocco	○	11	r 47 (6.0)	○	11–12	r 60 (6.0)	○	12	r 9 (4.3)
International Avg.			63 (0.5)			66 (0.5)			60 (0.4)
Benchmarking Participants									
Basque Country, Spain	○	9–10	57 (4.6)	○	9–10	66 (4.2)	○	9–10	64 (4.7)
British Columbia, Canada	○	11	r 67 (4.9)	●	4,8–9,11	r 77 (3.7)	●	4,11	r 39 (4.2)
Dubai, UAE	○	11	s 52 (3.7)	●	8	s 82 (3.1)	●	7	s 70 (4.0)
Massachusetts, US	●	6–10	83 (4.5)	●	3–5	53 (8.1)	○	9–10	42 (7.3)
Minnesota, US	●	6	45 (7.4)	●	6	44 (7.5)	●	6	31 (8.1)
Ontario, Canada	●	7–8	84 (3.7)	●	4,8	64 (4.4)	●	4	35 (3.5)
Quebec, Canada	○	9	37 (4.5)	○	9	31 (5.4)	○	9	10 (3.0)

● All or almost all students ⊙ Only the more able students ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.12 Intended and Taught* TIMSS Physics Topics (Continued)

TIMSS2007 Science 8th Grade

Physics (10 topics)	Electric circuits and relationship between voltage and current			Properties of permanent magnets and electromagnets			Forces and motion, use of distance/time graphs		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7,9	67 (3.7)	●	8–9	89 (2.4)	●	8–9	63 (4.1)
Armenia	○	9	88 (5.7)	○	9	88 (5.8)	●	8	65 (4.3)
Australia	○	9–12	37 (3.7)	●	8–12	56 (3.1)	●	8–12	53 (3.8)
Bahrain	●	6	88 (0.8)	●	6	98 (1.2)	●	7	85 (2.2)
Bosnia and Herzegovina	●	8–9	99 (0.8)	●	8–9	99 (1.0)	●	7–8	99 (0.8)
Botswana	○	10	9 (3.0)	○	11–12	5 (1.4)	○	9	10 (2.4)
Bulgaria	●	7	89 (2.5)	●	6	85 (3.8)	●	8	92 (2.9)
Chinese Taipei	●	7–9	18 (3.2)	●	7–9	12 (2.8)	●	5–6,7–9	29 (3.5)
Colombia	○	10–11	22 (3.8)	○	10–11	25 (3.8)	○	10–11	42 (4.7)
Cyprus	⦿	9,11	r 4 (0.1)	⦿	9,11	r 8 (0.6)	●	8,10–11	r 6 (0.3)
Czech Republic	●	8–9,12	78 (3.9)	●	4–5,8–9,12	71 (3.5)	●	6–7,10	99 (0.6)
Egypt	⦿	7–8	93 (2.1)	●	5–6	79 (3.5)	⦿	10–12	72 (4.0)
El Salvador	●	9,11	39 (4.3)	●	9,11	52 (3.6)	●	8,10	94 (2.0)
England	●	6,8	r 97 (1.0)	●	7	r 95 (1.3)	●	6	r 95 (1.1)
Georgia	○	11	60 (5.3)	●	8	21 (4.6)	●	5,7–8	79 (3.8)
Ghana	●	7–12	31 (3.7)	○	9–12	36 (4.1)	●	7–12	63 (3.7)
Hong Kong SAR	●	8	89 (2.8)	●	8	43 (4.6)	○	10–11	76 (4.1)
Hungary	●	8	100 (0.0)	●	8	96 (1.6)	●	7	100 (0.0)
Indonesia	○	9	14 (3.1)	○	9	13 (3.1)	○	10	92 (2.6)
Iran, Islamic Rep. of	●	8	89 (2.5)	●	6	83 (2.8)	●	6	85 (2.9)
Israel	●	5–9	r 74 (3.6)	●	5–9	r 46 (4.1)	●	7–9	r 33 (4.4)
Italy	●	8	52 (3.4)	●	8	49 (3.5)	●	6–8	81 (2.7)
Japan	●	3,4,8,10–12	98 (1.0)	●	3,6,8,10–12	90 (2.3)	●	5,7,9–12	10 (2.6)
Jordan	●	8–12	97 (1.2)	●	1–12	76 (3.4)	●	3–11	95 (1.9)
Korea, Rep. of	●	8	97 (1.1)	●	6	22 (2.8)	●	8	93 (1.8)
Kuwait	○	10	r 61 (4.4)	●	7,12	r 88 (2.9)	●	7,11	r 79 (3.7)
Lebanon	○	7,9	82 (3.7)	●	7	63 (5.1)	●	8,10–11	93 (2.1)
Lithuania	○	9	10 (2.3)	○	9	3 (1.4)	●	8	98 (1.1)
Malaysia	○	9	3 (1.4)	○	9	12 (2.9)	●	8	80 (3.4)
Malta	●	7,10	2 (0.1)	○	10	3 (0.1)	●	9–10	75 (0.4)
Mongolia	○	11	– –	○	10–11	– –	⦿	8–11	– –
Norway	●	8–10	4 (1.6)	●	5–10	4 (1.5)	●	8–10	30 (3.8)
Oman	⦿	6,9	59 (4.3)	●	6,8	65 (4.0)	○	9	59 (4.4)
Palestinian Nat'l Auth.	●	4–6,9,12	34 (4.3)	●	4,7,12	78 (3.8)	●	6,10–12	44 (4.2)
Qatar	○	9	76 (0.1)	○	6	70 (0.1)	○	6	59 (0.1)
Romania	●	4,6,8,10–11	99 (0.7)	●	4,6,8,10	97 (1.4)	●	4,6–7,9	97 (1.3)
Russian Federation	●	8,10	– –	●	8,10	– –	●	7,9–10	– –
Saudi Arabia	●	8	11 (2.4)	●	8	53 (3.8)	●	8	73 (4.2)
Scotland	●	8	r 87 (2.5)	○	10	r 55 (3.9)	○	10	r 63 (3.2)
Serbia	●	8	99 (0.5)	●	8	99 (1.0)	●	6–7	97 (1.7)
Singapore	●	7–8	87 (1.3)	●	3–6	45 (2.6)	●	7–8	57 (2.3)
Slovenia	○	9	10 (2.5)	○	9	6 (2.0)	●	4,8	70 (3.4)
Sweden	●	6–9	r 82 (2.8)	●	6–9	57 (4.5)	○	–	r 67 (3.9)
Syrian Arab Republic	⦿	5,7–12	95 (1.8)	⦿	5,9,11–12	75 (4.0)	⦿	1–12	41 (4.7)
Thailand	○	7–9	12 (2.8)	○	10–12	20 (3.2)	●	1–9	62 (3.5)
Tunisia	●	–	s 34 (5.2)	●	–	s 30 (5.0)	●	–	s 15 (3.9)
Turkey	●	4–7	87 (3.0)	●	4,8	35 (4.2)	●	4–5,7	96 (1.6)
Ukraine	●	8,10	100 (0.0)	●	8,10	99 (0.7)	●	7,9	79 (3.5)
United States	●	5–8	54 (2.8)	●	5–12	56 (2.6)	●	5–8	80 (2.9)
‡ Morocco	●	7–8,10	r 91 (2.7)	●	8,11	r 85 (4.1)	○	9–12	r 9 (2.8)
International Avg.			61 (0.4)			55 (0.5)			67 (0.4)
Benchmarking Participants									
Basque Country, Spain	●	8	26 (4.0)	○	9–10	18 (3.8)	○	9–10	75 (4.5)
British Columbia, Canada	●	6,9,12	r 12 (3.1)	●	1,11	r 13 (2.8)	●	1,5,10–11	r 31 (4.2)
Dubai, UAE	●	8	s 61 (4.0)	●	8	s 69 (3.9)	●	7	s 68 (3.6)
Massachusetts, US	○	9–10	45 (8.2)	○	–	46 (7.6)	●	6–8	82 (5.5)
Minnesota, US	●	6	33 (8.6)	●	6	32 (7.4)	●	6	52 (8.2)
Ontario, Canada	●	6	53 (5.1)	●	6	55 (4.7)	●	5,7,8	57 (4.7)
Quebec, Canada	○	10	5 (2.1)	○	10	8 (2.9)	○	10	44 (4.2)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.12 Intended and Taught* TIMSS Physics Topics (Continued)

TIMSS2007 Science 8th Grade

Physics (10 topics)	Effects of density and pressure		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	–	23 (4.2)
Armenia	●	8	63 (4.5)
Australia	⦿	8–12	31 (3.0)
Bahrain	●	7	70 (2.8)
Bosnia and Herzegovina	●	7,9	96 (1.8)
Botswana	○	11–12	15 (3.0)
Bulgaria	●	6	73 (4.1)
Chinese Taipei	○	10–12	67 (4.1)
Colombia	●	8–9	47 (5.5)
Cyprus	●	8	r 35 (1.9)
Czech Republic	●	6–7,10	100 (0.0)
Egypt	⦿	7–9	77 (3.8)
El Salvador	●	8,11	88 (2.6)
England	●	8	r 86 (2.6)
Georgia	●	7	94 (2.0)
Ghana	●	10–12	68 (3.7)
Hong Kong SAR	●	7–11	56 (4.5)
Hungary	●	7	98 (1.0)
Indonesia	○	10	78 (3.6)
Iran, Islamic Rep. of	○	10	82 (2.8)
Israel	⦿	7–9	r 52 (3.9)
Italy	●	6–8	66 (3.2)
Japan	●	4,7,10–12	87 (2.9)
Jordan	●	4–11	68 (3.8)
Korea, Rep. of	●	8	78 (3.2)
Kuwait	●	7–9	r 75 (4.1)
Lebanon	○	7,9	62 (4.6)
Lithuania	●	8	84 (3.1)
Malaysia	●	7	87 (2.9)
Malta	○	10	63 (0.4)
Mongolia	⦿	8–11	– –
Norway	○	–	24 (3.4)
Oman	○	10	55 (4.3)
Palestinian Nat'l Auth.	●	7,10–11	77 (3.5)
Qatar	○	6	60 (0.2)
Romania	○	10	90 (2.3)
Russian Federation	●	6–8	– –
Saudi Arabia	●	8	44 (4.2)
Scotland	⦿	8	r 44 (3.2)
Serbia	●	7	92 (2.2)
Singapore	●	7–8	52 (2.5)
Slovenia	●	8	93 (2.1)
Sweden	●	6–9	60 (3.9)
Syrian Arab Republic	⦿	7–8,10	81 (3.4)
Thailand	●	7–9	47 (4.2)
Tunisia	●	–	s 24 (4.3)
Turkey	●	4,8	96 (1.6)
Ukraine	●	7,10	97 (1.3)
United States	●	5–12	79 (2.5)
‡ Morocco	●	7	r 25 (4.7)
International Avg.			67 (0.5)
Benchmarking Participants			
Basque Country, Spain	○	9–10	44 (4.3)
British Columbia, Canada	●	8,11–12	r 68 (4.2)
Dubai, UAE	●	8	s 61 (3.4)
Massachusetts, US	○	–	86 (4.7)
Minnesota, US	●	8	64 (6.0)
Ontario, Canada	●	8	76 (3.9)
Quebec, Canada	○	10	24 (4.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

Exhibit 5.13 Intended and Taught* TIMSS Earth Science Topics

TIMSS2007 Science 8th Grade

Earth Science (14 topics)	Earth's structure and physical characteristics			Water on Earth			Earth's atmosphere		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	9	r 6 (2.5)	○	9	r 6 (2.2)	○	–	r 5 (1.6)
Armenia	●	7	70 (4.4)	●	7	66 (4.2)	●	8	65 (4.2)
Australia	●	7–12	56 (3.6)	⦿	7–12	41 (3.3)	●	5–12	56 (3.6)
Bahrain	●	8	83 (1.9)	●	8	69 (2.9)	●	8	87 (1.7)
Bosnia and Herzegovina	●	5–6	94 (2.2)	●	5–6	93 (2.3)	●	5–6	93 (2.3)
Botswana	○	–	2 (0.9)	○	–	15 (3.2)	○	–	5 (1.5)
Bulgaria	●	5	99 (1.0)	●	5	100 (0.5)	●	5	100 (0.5)
Chinese Taipei	●	7–9	14 (3.2)	●	7–9	20 (3.6)	●	7–9	27 (4.0)
Colombia	●	6–7	86 (2.8)	●	8–9	86 (3.6)	●	8–9	86 (3.8)
Cyprus	●	8,11	r 95 (0.7)	○	11	r 42 (1.9)	○	11	r 26 (1.9)
Czech Republic	●	8–10	97 (1.0)	●	8–10	97 (1.0)	●	6–7,10	97 (1.1)
Egypt	●	7–9	96 (1.7)	●	7–8	79 (3.0)	⦿	7–8	98 (1.2)
El Salvador	○	9	49 (4.5)	○	–	63 (4.3)	○	9	62 (4.2)
England	●	7–8	r 53 (4.0)	○	–	r 44 (3.6)	●	8	r 67 (3.7)
Georgia	●	7	94 (2.8)	●	5,8	94 (2.7)	●	5,7	96 (2.5)
Ghana	○	9–12	26 (3.6)	○	9–12	40 (4.1)	○	10–12	23 (3.6)
Hong Kong SAR	○	10–11	5 (2.0)	●	7	26 (3.8)	●	8	51 (4.5)
Hungary	●	6	71 (3.9)	●	6	83 (3.0)	●	7	50 (4.6)
Indonesia	●	7	r 48 (13.0)	○	10	r 60 (13.1)	○	10	r 66 (12.8)
Iran, Islamic Rep. of	○	12	97 (1.2)	○	11	67 (4.0)	●	6	46 (3.7)
Israel	○	9	s 27 (4.4)	●	5–9	s 72 (4.8)	●	5–9	s 51 (4.7)
Italy	●	8	81 (2.6)	●	6–8	86 (2.2)	●	4,6–7	86 (2.2)
Japan	●	7,10–12	76 (3.6)	●	5–6,10–12	50 (4.1)	●	7,10–12	68 (3.8)
Jordan	●	9–12	91 (2.5)	●	4–8	73 (3.7)	●	7–12	83 (3.4)
Korea, Rep. of	●	7	92 (2.1)	●	7	80 (3.3)	●	7	81 (2.7)
Kuwait	○	–	r 43 (4.5)	○	–	r 49 (5.4)	○	–	r 55 (4.7)
Lebanon	●	8	– –	●	8	– –	●	8	– –
Lithuania	●	6	96 (1.6)	●	8	96 (1.5)	●	8	93 (2.1)
Malaysia	●	7	5 (2.0)	●	7	51 (4.0)	●	7	26 (3.6)
Malta	●	9	82 (0.4)	●	–	85 (0.3)	○	–	58 (0.4)
Mongolia	●	7–11	– –	●	8–11	– –	●	7–8,10	– –
Norway	○	–	77 (3.3)	○	8–10	49 (3.8)	○	8–10	69 (3.8)
Oman	●	7	53 (4.3)	●	7	57 (4.0)	●	8	58 (4.6)
Palestinian Nat'l Auth.	●	3,5,7	73 (3.3)	●	3–4,6–7	61 (4.2)	●	6,9	93 (2.2)
Qatar	●	5,8	34 (0.1)	●	6,8	33 (0.2)	●	8	35 (0.2)
Romania	○	9	96 (1.8)	●	3–5,9	97 (1.4)	●	5,9	98 (1.4)
Russian Federation	●	6–8	– –	●	6–8	– –	●	6–8	– –
Saudi Arabia	●	8	98 (1.0)	●	8	68 (4.1)	●	8	98 (1.1)
Scotland	●	6	s 29 (4.3)	⦿	8	s 20 (2.4)	●	6	s 53 (3.6)
Serbia	●	5	99 (0.6)	●	5	98 (1.2)	●	5	99 (0.6)
Singapore	○	9–10	r 12 (1.8)	●	7–8	r 13 (1.8)	○	9–10	r 16 (2.2)
Slovenia	●	6,9	– –	●	6	– –	●	6	– –
Sweden	●	6–9	r 33 (4.1)	●	6–9	r 47 (5.9)	●	6–9	r 62 (4.8)
Syrian Arab Republic	●	4,9–11	42 (5.3)	●	3,6,9–10	r 43 (5.4)	●	4,9	40 (4.9)
Thailand	○	10–12	85 (2.6)	●	7–9	73 (3.4)	●	7–9	60 (3.9)
Tunisia	○	10	29 (3.6)	○	10	8 (2.2)	○	10	6 (1.9)
Turkey	●	4,6	63 (3.7)	●	5	63 (4.1)	●	8	74 (4.1)
Ukraine	●	6–8	97 (1.4)	●	2,5–7	98 (1.1)	●	5–6	99 (0.8)
United States	●	5–8	91 (1.8)	●	5–8	84 (2.4)	●	5–8	84 (2.7)
‡ Morocco	●	8	r 97 (0.3)	●	7	r 47 (5.0)	○	–	r 22 (3.6)
International Avg.			64 (0.5)			61 (0.6)			62 (0.5)
Benchmarking Participants									
Basque Country, Spain	●	8	83 (3.1)	●	8	89 (3.2)	●	8	91 (2.9)
British Columbia, Canada	●	7,10–12	r 46 (3.6)	●	2,8	r 57 (4.7)	●	4,10	r 42 (3.9)
Dubai, UAE	●	6	x x	●	7	x x	●	8	x x
Massachusetts, US	●	6–8	95 (3.2)	○	9–10	85 (4.5)	○	–	86 (4.3)
Minnesota, US	●	8	90 (3.8)	●	8	81 (5.1)	●	8	76 (6.5)
Ontario, Canada	●	7	85 (3.4)	●	8	73 (4.3)	○	9–12	r 73 (5.0)
Quebec, Canada	●	7–8	83 (4.0)	●	7–8	85 (3.5)	●	7–8	80 (3.9)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

For countries that teach science as separate subjects at Grade 8, data are based on earth science teachers only.

* Includes the TIMSS topics mostly taught during or before the year of the assessment.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals 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. 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 the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.13 Intended and Taught* TIMSS Earth Science Topics (Continued)

TIMSS2007 Science 8th Grade

Earth Science (14 topics)	Earth's water cycle			Processes in the rock cycle and the formation of rocks			Weather data/maps, and changes in weather patterns		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	9	r 10 (3.0)	○	9	r 2 (1.2)	○	–	r 16 (3.7)
Armenia	●	7	62 (4.3)	●	8	54 (4.8)	●	7	62 (4.3)
Australia	⦿	7–12	59 (3.0)	●	7–12	51 (4.0)	⦿	7–12	20 (3.0)
Bahrain	●	3	71 (2.9)	○	9	14 (2.1)	●	4	14 (1.5)
Bosnia and Herzegovina	●	5–6	93 (2.0)	●	5–6	94 (2.2)	●	5–6	94 (2.2)
Botswana	●	7	66 (3.7)	○	10	6 (2.8)	○	10	1 (0.4)
Bulgaria	●	8	99 (1.0)	●	8	99 (1.1)	●	8	99 (1.0)
Chinese Taipei	●	5–9	25 (3.9)	○	10	12 (3.0)	●	7–9	11 (2.9)
Colombia	●	6–7	90 (2.9)	●	6–7	56 (5.7)	●	6–7	68 (4.3)
Cyprus	●	8,11	r 51 (2.2)	●	8,11	r 71 (1.7)	●	7,11	r 97 (1.0)
Czech Republic	●	9–10	94 (1.3)	●	6–10	63 (3.9)	●	6–7,10	94 (1.5)
Egypt	●	5–6	97 (1.5)	●	7–8	97 (1.5)	⦿	7–8	78 (3.3)
El Salvador	○	9	76 (4.0)	○	9	28 (3.8)	●	7,9	53 (4.1)
England	●	8	r 68 (3.5)	●	7	r 94 (1.0)	○	–	r 23 (2.8)
Georgia	●	5	93 (2.8)	○	10	95 (2.6)	●	2	96 (2.4)
Ghana	●	7–12	40 (3.7)	●	7–12	38 (4.3)	●	7–12	30 (3.8)
Hong Kong SAR	●	7	57 (4.6)	○	10–11	1 (0.9)	○	–	4 (2.0)
Hungary	●	5	91 (2.3)	●	5	89 (2.5)	●	6,8	96 (1.6)
Indonesia	●	7	r 73 (11.8)	○	10	r 79 (10.9)	○	11	r 46 (13.5)
Iran, Islamic Rep. of	●	6	87 (2.6)	●	7	98 (1.2)	○	11	34 (4.1)
Israel	●	5–9	s 71 (4.6)	○	9	s 19 (3.7)	●	5–9	s 18 (3.4)
Italy	●	3–6	89 (1.9)	●	8	56 (3.4)	●	8	55 (3.6)
Japan	●	8,10–12	54 (4.5)	●	7,10–12	97 (1.4)	●	5,8,10–12	82 (3.1)
Jordan	●	7–12	79 (3.3)	●	4–12	77 (3.7)	●	9–12	40 (4.0)
Korea, Rep. of	○	9	53 (3.5)	●	7	88 (2.4)	○	9	24 (3.4)
Kuwait	○	–	r 60 (4.5)	○	–	r 42 (4.8)	○	–	r 47 (5.0)
Lebanon	●	2–9	– –	●	8	– –	○	–	– –
Lithuania	●	6	96 (1.5)	●	8	96 (1.7)	●	8	95 (1.5)
Malaysia	●	8	56 (4.4)	○	9	4 (1.6)	○	10	5 (1.9)
Malta	●	9	91 (0.2)	○	11	49 (0.4)	○	11	86 (0.3)
Mongolia	●	8,10	– –	●	8,10	– –	●	7–9	– –
Norway	●	5–10	61 (3.6)	○	–	37 (3.7)	●	5–10	38 (3.8)
Oman	●	6–8	78 (3.6)	●	7	50 (4.5)	○	10	42 (4.4)
Palestinian Nat'l Auth.	●	6	66 (4.1)	●	3,5–6	86 (2.7)	●	4,6,9	34 (4.2)
Qatar	●	8	47 (0.2)	○	5,9	r 38 (0.1)	○	9	r 21 (0.1)
Romania	●	4–5,9	95 (1.8)	○	9	89 (2.4)	●	1–2,4–5,9	93 (2.1)
Russian Federation	●	6	– –	●	6	– –	●	6–8	– –
Saudi Arabia	●	8	76 (3.8)	●	8	94 (2.8)	○	11–12	22 (2.8)
Scotland	●	7	s 66 (3.2)	●	6	s 33 (4.2)	○	–	s 6 (1.5)
Serbia	●	5	99 (1.0)	●	5	99 (0.6)	●	5–7	99 (0.6)
Singapore	●	7–8	r 23 (2.2)	●	7–8	r 11 (1.7)	○	9–10	r 12 (1.7)
Slovenia	●	7	– –	●	6	– –	●	6–8	– –
Sweden	●	6–9	r 58 (4.9)	●	6–9	r 24 (3.8)	○	–	r 29 (5.3)
Syrian Arab Republic	●	6–7,9–10	50 (5.2)	●	3–4,7,11	92 (2.7)	●	5,7,11	r 31 (4.5)
Thailand	●	4–6	67 (4.1)	●	7–9	80 (3.5)	●	7–9	49 (4.1)
Tunisia	○	10	14 (2.8)	●	–	72 (3.6)	○	–	12 (2.9)
Turkey	●	7	84 (3.3)	●	6	45 (4.3)	●	8	38 (4.1)
Ukraine	●	5–6	93 (2.0)	●	5–8	98 (1.1)	●	5–6,8	100 (0.0)
United States	●	5–8	87 (2.1)	●	5–8	87 (1.8)	●	5–8	77 (2.7)
‡ Morocco	●	7	r 65 (5.5)	●	7	r 87 (4.9)	○	–	r 19 (4.0)
International Avg.			69 (0.5)			61 (0.5)			48 (0.5)
Benchmarking Participants									
Basque Country, Spain	●	8	86 (3.2)	●	8	76 (3.9)	●	8	60 (5.1)
British Columbia, Canada	●	4,10	r 65 (4.1)	●	2,7,10	r 44 (3.9)	●	1,4	r 23 (3.8)
Dubai, UAE	●	8	x x	●	8	x x	●	7	x x
Massachusetts, US	○	9–10	92 (2.8)	●	6–10	96 (1.8)	●	3–8	82 (5.0)
Minnesota, US	●	8	78 (6.7)	●	8	82 (5.3)	●	8	65 (7.0)
Ontario, Canada	●	8	77 (4.3)	●	4,7	82 (3.4)	●	5	74 (4.3)
Quebec, Canada	●	7–8	93 (2.4)	●	7–8	76 (4.2)	○	–	35 (4.7)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.13 Intended and Taught* TIMSS Earth Science Topics (Continued)

TIMSS2007 Science 8th Grade

Earth Science (14 topics)	Geological processes occurring over millions of years			Formation of fossils and fossil fuels			Environmental concerns		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	9	r 5 (2.0)	●	8	r 61 (4.5)	○	–	r 49 (4.9)
Armenia	●	8	54 (4.9)	●	8	47 (4.8)	●	8	57 (4.0)
Australia	⊙	7–12	29 (3.1)	●	7–12	38 (4.0)	⊙	7–12	49 (3.4)
Bahrain	○	9	8 (0.5)	○	9	5 (0.9)	○	9	15 (1.8)
Bosnia and Herzegovina	●	5–6	95 (2.0)	●	5–6	82 (3.2)	●	–	69 (4.0)
Botswana	○	–	3 (1.5)	●	8	78 (3.8)	○	10	10 (3.3)
Bulgaria	●	8	94 (1.8)	●	5	50 (5.3)	●	8	80 (4.3)
Chinese Taipei	●	7–9	11 (2.9)	●	7–9	21 (3.5)	●	7–9	31 (3.9)
Colombia	●	6–7	72 (4.1)	●	6–7	62 (5.7)	●	6–7	91 (3.0)
Cyprus	●	8,11	r 97 (0.1)	●	8,11	r 58 (1.5)	○	9,11	r 85 (1.0)
Czech Republic	●	8–10	85 (3.1)	●	6–10	56 (4.3)	●	1–4,8–10	65 (4.2)
Egypt	●	6–8	97 (1.5)	⊙	7–9	90 (2.4)	⊙	6–8	96 (1.5)
El Salvador	○	9	43 (4.2)	○	9	37 (4.0)	○	9,11	73 (3.8)
England	●	7–8	r 70 (3.2)	●	6	r 90 (2.3)	●	6,8	r 94 (1.3)
Georgia	○	8,11	95 (2.5)	○	9	94 (1.7)	○	9	80 (3.6)
Ghana	○	10–12	43 (4.0)	○	10–12	27 (3.7)	●	6–12	67 (4.5)
Hong Kong SAR	○	–	5 (2.1)	●	7	41 (4.5)	●	8	84 (3.2)
Hungary	●	5	95 (1.7)	●	8–9	76 (3.7)	●	8	80 (3.2)
Indonesia	○	9	r 46 (13.5)	○	9	r 24 (11.7)	○	9	r 67 (12.6)
Iran, Islamic Rep. of	○	9	87 (2.7)	○	9	97 (1.4)	○	11	66 (3.4)
Israel	○	9	s 15 (3.3)	●	5–9	s 15 (3.0)	○	9	s 43 (5.0)
Italy	●	8	68 (3.1)	●	8	63 (3.4)	●	7–8	85 (2.0)
Japan	●	7,10–12	94 (2.1)	●	6–7,10–12	62 (4.3)	○	9–12	13 (2.4)
Jordan	●	7–12	85 (2.8)	●	6–12	94 (1.9)	●	6–12	93 (2.1)
Korea, Rep. of	●	8	95 (1.5)	●	8	92 (1.6)	○	10	31 (3.3)
Kuwait	○	–	r 30 (4.3)	○	–	r 46 (5.1)	○	–	r 45 (4.7)
Lebanon	●	8	– –	●	8	– –	●	4–6	– –
Lithuania	●	8	97 (1.2)	●	8	64 (3.9)	●	8	77 (3.5)
Malaysia	●	7	6 (1.9)	○	9	38 (3.8)	●	7–8	81 (3.2)
Malta	⊙	9	71 (0.4)	○	8,10	37 (0.4)	●	8	67 (0.4)
Mongolia	●	6–7,10	– –	●	8,10	– –	●	8–9	– –
Norway	●	8–10	57 (4.2)	●	8–10	55 (3.7)	●	5–10	56 (3.7)
Oman	○	9	39 (4.5)	●	5,8	60 (3.5)	●	6–8	62 (4.3)
Palestinian Nat'l Auth.	●	5	41 (4.1)	●	5,10	86 (3.0)	●	–	54 (4.3)
Qatar	○	5,9	22 (0.1)	●	7	47 (0.1)	○	5–6	26 (0.1)
Romania	○	9	94 (2.3)	○	–	75 (2.8)	●	1–5,9–11	88 (2.6)
Russian Federation	●	6–8	– –	●	6–7	– –	●	6–8	– –
Saudi Arabia	○	11–12	20 (3.4)	○	11–12	53 (4.3)	●	8	63 (4.6)
Scotland	○	–	s 17 (3.3)	●	6	s 56 (3.5)	●	7	s 71 (3.0)
Serbia	●	5–7	99 (0.6)	●	5	93 (2.2)	●	7–8	95 (1.9)
Singapore	○	9–10	r 13 (1.7)	○	–	r 20 (2.1)	●	7–8	r 39 (3.0)
Slovenia	●	6,9	– –	●	6	– –	●	6–7	– –
Sweden	●	6–9	r 21 (4.4)	●	6–9	r 50 (5.5)	●	6–9	r 60 (5.5)
Syrian Arab Republic	●	5,7,11	54 (5.1)	●	5,8,11	81 (4.0)	●	4,7,10	70 (4.7)
Thailand	○	10–12	80 (3.5)	●	7–9	70 (4.1)	●	7–9	72 (4.2)
Tunisia	○	10	38 (3.8)	○	11	57 (4.0)	○	10	12 (2.7)
Turkey	●	6	50 (4.2)	●	4,7	61 (4.5)	●	7	83 (3.2)
Ukraine	●	6–7	99 (0.8)	●	6–7	99 (0.6)	●	1–8	93 (2.2)
United States	●	5–8	88 (1.9)	●	5–8	80 (2.4)	–	5–8	78 (2.5)
‡ Morocco	●	7	r 97 (0.3)	●	7	r 55 (6.5)	●	4,7	r 54 (4.1)
International Avg.			57 (0.5)			60 (0.6)			63 (0.6)
Benchmarking Participants									
Basque Country, Spain	○	9–10	71 (4.7)	●	8	62 (4.8)	●	8	87 (3.2)
British Columbia, Canada	●	7,10	r 42 (4.8)	●	5	r 36 (4.6)	●	6–7,10	r 56 (4.3)
Dubai, UAE	●	8	x x	●	8	x x	●	7	x x
Massachusetts, US	●	6–8	89 (4.6)	○	9–10	79 (5.2)	○	9–10	78 (4.8)
Minnesota, US	●	8	83 (5.0)	●	8	70 (6.4)	●	8	63 (8.1)
Ontario, Canada	●	7	82 (3.9)	●	7	72 (4.3)	○	9–12	84 (4.0)
Quebec, Canada	●	7–8	72 (4.6)	○	10	52 (5.8)	●	7–8	83 (3.3)

● All or almost all students ⊙ Only the more able students ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.13 Intended and Taught* TIMSS Earth Science Topics (Continued)

TIMSS2007 Science 8th Grade

Earth Science (14 topics)	Earth's resources			Relationship of land management to human Use			Supply and demand of fresh water resources		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	9	r 14 (2.9)	○	9	r 20 (3.7)	○	9	r 6 (2.6)
Armenia	●	8	67 (4.2)	●	7	53 (4.1)	●	7	50 (4.2)
Australia	●	7–12	43 (3.4)	⦿	7–12	15 (3.0)	⦿	7–12	27 (2.7)
Bahrain	●	6	r 16 (1.6)	●	6	r 5 (1.6)	●	4	r 28 (2.3)
Bosnia and Herzegovina	●	–	69 (3.8)	●	–	59 (4.0)	●	5–6	70 (3.7)
Botswana	●	–	63 (4.4)	○	11–12	4 (1.8)	●	7	35 (4.5)
Bulgaria	○	9	70 (4.7)	○	9	55 (4.9)	●	8	50 (5.1)
Chinese Taipei	●	3–9	18 (3.5)	○	–	11 (2.9)	○	–	18 (3.6)
Colombia	●	6–7	92 (3.0)	●	8–9	64 (5.4)	●	8–9	61 (5.7)
Cyprus	●	8,11	r 91 (0.9)	●	8,11	r 55 (1.8)	●	8,11	r 70 (1.3)
Czech Republic	●	8–10	59 (4.2)	●	1–10	66 (4.0)	●	6–7,10	72 (3.0)
Egypt	⦿	7–9	95 (1.9)	⦿	7–8	40 (4.3)	⦿	6–7	73 (3.7)
El Salvador	●	3–10	78 (3.9)	●	4,6–8	48 (4.4)	○	–	62 (4.6)
England	●	6–8	r 85 (2.1)	○	–	r 52 (3.5)	○	–	r 31 (3.0)
Georgia	○	5–6	65 (4.8)	○	11	39 (5.9)	●	5–8	69 (4.4)
Ghana	●	7–12	56 (4.5)	●	7–12	53 (4.5)	●	7–12	53 (4.5)
Hong Kong SAR	●	8	59 (5.0)	○	10–11	6 (2.2)	●	7	35 (4.3)
Hungary	●	8–10	80 (3.3)	●	8–10	71 (3.7)	○	9–10	72 (3.8)
Indonesia	●	7	r 48 (13.6)	●	7	r 43 (13.5)	●	7	r 14 (9.0)
Iran, Islamic Rep. of	●	7	55 (3.8)	○	5	34 (3.9)	●	6	29 (3.7)
Israel	●	5–9	s 43 (5.2)	○	–	s 17 (3.3)	●	5–9	s 61 (4.8)
Italy	●	8	76 (2.9)	●	7–8	50 (3.4)	●	8	58 (3.4)
Japan	●	6,9–12	5 (1.8)	○	–	2 (1.0)	○	–	8 (2.0)
Jordan	●	6–12	93 (2.1)	●	9–12	56 (4.4)	●	5–12	53 (4.4)
Korea, Rep. of	○	–	25 (3.3)	○	–	14 (2.7)	○	–	20 (3.2)
Kuwait	○	–	r 58 (4.4)	○	–	r 45 (5.0)	○	–	r 51 (4.8)
Lebanon	●	6	– –	●	6	– –	●	4	– –
Lithuania	●	8	60 (3.9)	●	8	41 (4.2)	●	8	63 (4.1)
Malaysia	●	7	84 (3.0)	●	8	58 (3.9)	●	8	71 (3.8)
Malta	○	8,10	29 (0.4)	○	–	36 (0.4)	○	–	89 (0.2)
Mongolia	●	7–9	– –	●	8–9	– –	●	8–10	– –
Norway	●	8–10	34 (3.7)	○	–	15 (2.8)	○	–	18 (3.1)
Oman	○	9	64 (3.9)	○	–	36 (3.9)	⦿	6,8	56 (4.9)
Palestinian Nat'l Auth.	●	7	72 (4.1)	●	5–7	33 (4.2)	●	3,6	43 (4.4)
Qatar	○	6,9	23 (0.1)	○	5–6	14 (0.1)	○	6	r 18 (0.1)
Romania	○	10–11	89 (2.3)	○	9–11	67 (3.5)	○	9–11	65 (3.3)
Russian Federation	●	6–9	– –	○	–	– –	○	10	– –
Saudi Arabia	●	8	42 (4.6)	○	9	43 (4.4)	○	9	38 (4.1)
Scotland	●	8	s 62 (3.2)	○	10	s 13 (2.8)	●	7	s 13 (1.8)
Serbia	●	7–8	97 (1.6)	●	7–8	99 (0.7)	●	7–8	97 (1.7)
Singapore	●	7–8	r 30 (2.6)	●	7–8	r 13 (1.9)	●	7–8	r 15 (1.9)
Slovenia	●	6	– –	●	6	– –	●	7	– –
Sweden	●	6–9	r 38 (5.7)	●	6–9	r 15 (4.1)	●	6–9	r 32 (6.0)
Syrian Arab Republic	●	3–4,7,10	29 (4.6)	●	6,10	r 51 (5.9)	●	6,9,10	r 39 (5.5)
Thailand	○	7–9	69 (4.1)	○	10–12	60 (4.2)	●	7–9	68 (4.1)
Tunisia	○	11	9 (2.4)	○	–	25 (3.9)	○	10	7 (1.8)
Turkey	●	7–8	77 (3.7)	●	7	54 (4.8)	●	7	60 (4.6)
Ukraine	●	6–8	93 (2.4)	●	7	71 (4.3)	●	7	93 (2.0)
United States	●	5–8	78 (2.5)	●	5–8	63 (3.0)	●	5–8	66 (3.2)
‡ Morocco	●	7–8	r 29 (5.1)	●	6	r 28 (4.4)	●	7	r 42 (6.0)
International Avg.			57 (0.6)			39 (0.6)			47 (0.6)
Benchmarking Participants									
Basque Country, Spain	●	8	80 (4.1)	○	9–10	16 (3.8)	●	8	55 (4.2)
British Columbia, Canada	●	5,10–11	r 43 (4.1)	●	5	r 26 (3.9)	●	8	r 50 (4.2)
Dubai, UAE	●	8	x x	●	8	x x	●	8	x x
Massachusetts, US	○	9–10	64 (6.6)	○	–	56 (7.6)	○	–	58 (6.3)
Minnesota, US	●	8	72 (5.9)	○	–	48 (7.4)	○	–	63 (6.1)
Ontario, Canada	●	4–8	80 (4.5)	○	9–12	r 64 (4.9)	●	8	66 (4.6)
Quebec, Canada	●	7–8	79 (3.6)	○	10	31 (4.6)	●	7–8	51 (4.9)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.13 Intended and Taught* TIMSS Earth Science Topics (Continued)

TIMSS2007 Science 8th Grade

Earth Science (14 topics)	Explanation of phenomena on Earth in relation to the solar system			Physical features of Earth compared with other planets		
Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7	r 5 (2.0)	○	–	r 3 (1.7)
Armenia	●	8	69 (4.1)	●	8	72 (4.0)
Australia	⦿	7–10	62 (3.9)	⦿	7–10	62 (3.2)
Bahrain	●	8	93 (1.8)	●	8	89 (1.7)
Bosnia and Herzegovina	●	5–6	94 (2.2)	●	5–6	94 (1.8)
Botswana	○	10	7 (2.9)	○	10–12	6 (2.2)
Bulgaria	●	8	99 (0.8)	●	8	94 (2.2)
Chinese Taipei	●	7–9	11 (2.9)	○	–	10 (2.8)
Colombia	●	8–9	72 (5.5)	●	8–9	72 (5.6)
Cyprus	●	7	r 89 (1.1)	●	7,11	r 80 (1.6)
Czech Republic	●	8–10	98 (0.8)	●	8–10	97 (0.9)
Egypt	⦿	7–8	98 (0.9)	●	7–8	92 (2.1)
El Salvador	○	9	38 (4.3)	○	9	41 (4.5)
England	●	6,8	r 92 (1.4)	●	6	r 84 (2.2)
Georgia	●	5	87 (3.5)	●	6,8	83 (4.0)
Ghana	●	7–9	42 (4.4)	○	9–12	40 (4.1)
Hong Kong SAR	●	6	12 (2.9)	●	1–11	9 (2.5)
Hungary	●	6	47 (4.6)	○	9	46 (4.5)
Indonesia	○	9	r 87 (8.1)	○	11	r 76 (10.7)
Iran, Islamic Rep. of	○	12	82 (3.1)	○	12	66 (3.9)
Israel	⦿	5–6,10–12	s 28 (4.3)	○	–	s 27 (4.3)
Italy	●	8	70 (3.0)	●	8	70 (3.1)
Japan	●	4,9–12	4 (1.7)	○	9–12	4 (1.7)
Jordan	●	6–12	64 (3.9)	●	5–12	50 (4.1)
Korea, Rep. of	○	–	38 (4.4)	●	8	55 (3.7)
Kuwait	○	–	r 80 (4.1)	○	–	r 61 (4.7)
Lebanon	○	–	– –	○	8	– –
Lithuania	●	8	85 (3.1)	○	10	73 (4.0)
Malaysia	●	5–6	9 (2.2)	●	6	8 (2.1)
Malta	○	–	33 (0.4)	○	–	18 (0.3)
Mongolia	●	10	– –	●	4–5,10	– –
Norway	●	5–10	88 (2.4)	●	5–10	85 (2.7)
Oman	⦿	5,9	88 (2.6)	●	3–7	67 (4.0)
Palestinian Nat'l Auth.	●	4,7	90 (2.9)	●	4,7	68 (4.1)
Qatar	○	3	50 (0.2)	○	10	34 (0.1)
Romania	●	3–5,9,11	96 (1.7)	●	5,9	94 (2.1)
Russian Federation	●	5,11	– –	●	6,11	– –
Saudi Arabia	●	8	85 (3.4)	○	11–12	83 (3.4)
Scotland	●	6	s 38 (3.3)	●	6	s 30 (3.1)
Serbia	●	5	99 (0.6)	●	5	98 (1.3)
Singapore	○	–	r 12 (2.0)	○	–	r 7 (1.5)
Slovenia	●	6,9	– –	●	6,9	– –
Sweden	●	1–5	r 65 (5.3)	●	6–9	r 64 (5.7)
Syrian Arab Republic	●	4–5	61 (5.1)	○	5,9	32 (4.4)
Thailand	●	4–6	27 (4.3)	○	10–12	31 (4.2)
Tunisia	○	10	7 (2.2)	○	–	5 (1.9)
Turkey	●	7	89 (2.7)	●	7	81 (3.4)
Ukraine	●	5–6,10	98 (1.3)	●	5–6	96 (1.8)
United States	●	5–8	83 (2.3)	●	5–8	84 (2.3)
‡ Morocco	○	–	r 20 (4.3)	○	–	r 7 (2.8)
International Avg.			61 (0.5)			55 (0.5)
Benchmarking Participants						
Basque Country, Spain	●	7	92 (2.2)	●	7	83 (3.8)
British Columbia, Canada	●	3,9	r 32 (3.6)	●	3,9	r 25 (3.8)
Dubai, UAE	●	7	x x	○	10	x x
Massachusetts, US	●	6–8	96 (3.1)	●	6–8	87 (5.5)
Minnesota, US	●	8	79 (5.3)	●	8	78 (5.8)
Ontario, Canada	●	1,6	60 (5.3)	●	6	56 (5.3)
Quebec, Canada	●	7–8	78 (4.1)	○	9	79 (4.1)

● All or almost all students ⦿ Only the more able students ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007