

Chapter 4



Students' Backgrounds and Attitudes Toward Science

In describing the educational context in which learning takes place, TIMSS focuses primarily on curricular, instructional, and school resource factors that are expected to have an impact on mathematics and science learning and that may be modified through policy initiatives. However, there is ample evidence from previous IEA studies of science achievement¹ and other studies that student achievement is related to home background factors, and to student activities and attitudes. Since information on such factors is very important in interpreting the achievement results, this chapter presents detailed information about students' home backgrounds and resources for learning, homework, their attitude toward science, the value they place on science, and their self-confidence in learning science. As a point of reference, an average across the participating countries (not including the benchmarking participants) is provided at the bottom of the table for each of the response categories for each background factor and attitude index (labeled the international average (avg.)).

What Educational Resources Do Students Have in Their Homes?

For the 2007 data presented in this report, TIMSS has focused on just a few central variables: level of parents' education; speaking the language of the test at home; students having their parents born in the country; having books, computers, and Internet connections at home; and computer use at home and elsewhere.

¹ For example, for results from TIMSS 2003, see Martin, M.O., Mullis, I.V.S., Gonzalez, E.J., & Chrostowski, S.J. (2004). *TIMSS 2003 international science report: Findings from IEA's Trends in International Mathematics and Science Study at the fourth and eighth grades*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Exhibit 4.1 summarizes eighth grade students' reports of the highest level of education attained by their parents. Ordered alphabetically by country, this two-page display shows the percentage of students in each of five categories of parents' educational level, together with the average science achievement of students in each category. Because students sometimes were in doubt as to their parents' educational attainment, a sixth category for students reporting "I do not know" also was included. Standard errors for percentages and averages are shown. The education level of the parent with more education was used in assigning students to categories.

As shown in the exhibit, and in line with the diversity in economic development described in the introduction, the level of parents' education varied widely both across and within the TIMSS 2007 countries and benchmarking participants. On average across countries,² 23 percent of students had at least one parent with a university degree, 14 percent had a parent who had completed post-secondary education but not university, 26 percent a parent who completed upper-secondary school, 15 percent a parent who completed lower-secondary school, 9 percent had neither parent completing secondary school, and 13 percent did not know. Countries with the highest percentages of students (40% or more) with university-educated parents included Armenia, Georgia, Korea, Kuwait, Qatar, the Ukraine, and the United States, as well as Dubai, Massachusetts, and Minnesota among benchmarking participants. In contrast, countries where students reported the greatest percentages (30% or more) of parents with less than lower secondary education included Iran, Oman, and Morocco.

Differences in educational approaches, organizations, and structures across the TIMSS participants make comparisons of educational levels difficult, and this is exacerbated by high levels of "Do Not Know" responses in some countries. Ten countries had 20 percent or more of students in this response category, most notably Norway (46%) and Sweden (50%) but also including Australia (28%), Botswana (20%), Israel (26%), Japan (21%), Lithuania (24%), Malta (27%), Singapore (21%), and Slovenia (22%), as well as four benchmarking participants: British Columbia, Dubai, Minnesota, and Ontario. Nonetheless, Exhibit 4.1 makes it clear that higher levels of

2 The international average is based on all participating countries, but does not include the benchmarking participants.

parents' education are associated with higher average science achievement in almost all countries. At 499 score points, the average science achievement of eighth grade students with university-educated parents was 85 points greater than the average of students whose parents had less than lower secondary schooling. It can be noted, however, that in some high performing countries, students whose parents have little education have relatively high achievement (higher than students with university educated parents in many countries).

TIMSS has shown previously that, with some exceptions, countries with large proportions of students from homes where the language of the test (and consequently the language of instruction) is not often spoken had lower average science achievement than those who spoke it more often. Exhibit 4.2, which presents students' reports of how frequently they spoke the language of the TIMSS test at home, together with average science achievement and changes since TIMSS 2003, shows that this pattern continued in 2007. At both fourth and eighth grades, on average across countries, a large majority of students reported always or almost always speaking the language of the test at home (84% at fourth grade and 78% at eighth grade), and these students had higher average science achievement than those who reported speaking it less frequently—483 points on average compared with 438 for those fourth grade students who sometimes speak the language of the test at home and 386 for those who never do so, and, at the eighth grade, 471 compared to 438 and 409, respectively.

The overall pattern notwithstanding, there were several countries where students who only sometimes or never speak the language of the test at home did have the highest average science achievement. At the fourth grade, these included Kazakhstan, Kuwait, Morocco, Tunisia, and the Ukraine and at the eighth grade, Egypt, Kuwait, Morocco, and Tunisia. Compared with 2003, a number of countries had increased percentages of students reporting that they frequently spoke the language of the test at home, including, at the fourth grade, Chinese Taipei, Hong Kong SAR, Italy, Scotland, and Singapore, and at the eighth grade, Australia, Botswana, Egypt, Italy, Jordan, Lebanon, Romania, Singapore, and, among benchmarking participants, the Basque Country.

Exhibit 4.1 Highest Level of Education of Either Parent*

TIMSS2007
Science 8th Grade

Country	University Degree**		Completed Post-secondary Education but Not University		Completed Upper-secondary School	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Algeria	15 (0.9)	418 (3.2)	12 (0.6)	418 (4.0)	22 (0.7)	409 (2.7)
Armenia	52 (1.7)	493 (6.4)	23 (0.9)	489 (5.9)	16 (1.0)	478 (7.6)
Australia	19 (1.1)	569 (5.2)	23 (0.9)	524 (4.8)	16 (0.7)	504 (3.7)
Bahrain	21 (0.6)	494 (2.9)	8 (0.5)	482 (5.9)	33 (0.9)	476 (2.3)
Bosnia and Herzegovina	15 (1.0)	510 (4.9)	16 (0.6)	480 (4.7)	54 (1.1)	464 (2.8)
Botswana	15 (0.6)	376 (5.3)	17 (0.8)	339 (6.5)	17 (0.7)	348 (4.6)
Bulgaria	22 (1.7)	496 (8.3)	31 (1.4)	489 (5.9)	28 (1.5)	451 (9.0)
Chinese Taipei	20 (1.4)	608 (3.9)	12 (0.7)	589 (4.3)	42 (1.0)	557 (3.4)
Colombia	20 (1.1)	455 (4.6)	9 (0.6)	444 (5.2)	20 (0.7)	418 (4.6)
Cyprus	30 (0.8)	481 (2.6)	12 (0.5)	473 (4.6)	37 (0.7)	446 (2.7)
Czech Republic	17 (0.9)	582 (3.5)	11 (0.5)	550 (3.7)	57 (0.9)	534 (1.9)
Egypt	15 (0.7)	406 (5.3)	19 (1.0)	448 (5.1)	14 (0.6)	425 (5.8)
El Salvador	13 (1.1)	433 (5.6)	9 (0.7)	413 (5.7)	19 (0.9)	397 (4.2)
England	--	--	--	--	--	--
Georgia	47 (2.1)	438 (5.4)	0 (0.0)	~ ~	33 (2.1)	415 (5.9)
Ghana	11 (0.8)	349 (11.2)	20 (0.9)	317 (7.2)	24 (0.9)	306 (5.2)
Hong Kong SAR	13 (1.0)	557 (6.1)	12 (0.6)	542 (6.7)	28 (0.8)	532 (5.1)
Hungary	29 (1.3)	577 (4.2)	13 (0.7)	549 (3.8)	45 (1.2)	531 (2.6)
Indonesia	9 (0.8)	477 (6.3)	6 (0.5)	460 (6.9)	25 (1.2)	442 (4.5)
Iran, Islamic Rep. of	10 (1.0)	523 (9.1)	10 (1.0)	496 (5.5)	18 (1.0)	480 (4.8)
Israel	38 (1.2)	507 (4.7)	10 (0.6)	469 (7.0)	17 (0.8)	448 (8.8)
Italy	21 (1.2)	523 (3.4)	5 (0.4)	509 (7.1)	37 (1.1)	506 (2.9)
Japan	34 (1.0)	582 (3.1)	16 (0.6)	558 (3.6)	27 (1.0)	535 (2.9)
Jordan	29 (1.1)	514 (4.6)	18 (0.9)	508 (4.3)	28 (0.9)	474 (4.2)
Korea, Rep. of	44 (1.4)	576 (2.4)	3 (0.3)	571 (6.0)	39 (1.2)	541 (2.2)
Kuwait	43 (1.4)	433 (3.9)	15 (0.8)	429 (4.5)	26 (0.9)	403 (3.7)
Lebanon	20 (1.3)	476 (7.2)	19 (1.2)	439 (6.9)	16 (1.1)	419 (6.1)
Lithuania	14 (0.8)	558 (4.3)	34 (0.9)	530 (3.0)	23 (1.1)	509 (3.1)
Malaysia	13 (1.0)	515 (8.0)	17 (0.8)	494 (6.5)	34 (0.9)	475 (5.5)
Malta	11 (0.4)	525 (4.0)	11 (0.4)	498 (4.5)	13 (0.5)	483 (4.2)
Norway	39 (1.0)	513 (2.1)	6 (0.4)	491 (5.2)	6 (0.5)	468 (6.6)
Oman	16 (0.9)	440 (5.0)	4 (0.4)	446 (10.5)	18 (0.8)	435 (4.2)
Palestinian Nat'l Auth.	24 (0.9)	437 (5.8)	13 (0.6)	427 (6.0)	35 (0.9)	404 (4.4)
Qatar	48 (0.6)	343 (2.7)	4 (0.2)	335 (9.0)	19 (0.5)	306 (4.1)
Romania	13 (1.0)	510 (6.0)	14 (0.9)	491 (4.6)	44 (1.4)	463 (4.3)
Russian Federation	38 (1.3)	555 (4.1)	34 (1.3)	528 (5.0)	12 (1.0)	499 (6.6)
Saudi Arabia	31 (1.2)	426 (3.4)	5 (0.5)	416 (9.1)	20 (0.9)	406 (3.3)
Scotland	--	--	--	--	--	--
Serbia	20 (1.2)	510 (4.7)	16 (0.8)	479 (4.1)	51 (1.3)	465 (3.6)
Singapore	20 (0.7)	634 (4.2)	19 (0.6)	580 (5.2)	28 (0.7)	563 (4.8)
Slovenia	24 (0.9)	570 (3.3)	35 (1.0)	540 (2.9)	15 (0.7)	525 (5.1)
Sweden	19 (0.8)	538 (3.5)	13 (0.6)	537 (3.4)	13 (0.6)	510 (4.4)
Syrian Arab Republic	15 (0.9)	469 (4.0)	22 (0.9)	467 (4.0)	23 (0.8)	447 (3.8)
Thailand	12 (1.1)	539 (9.6)	5 (0.3)	502 (9.2)	14 (0.6)	488 (5.6)
Tunisia	13 (1.1)	469 (3.9)	17 (0.9)	460 (3.5)	25 (1.0)	439 (2.7)
Turkey	7 (0.8)	554 (7.0)	3 (0.3)	513 (8.0)	20 (1.2)	485 (4.0)
Ukraine	40 (1.4)	512 (3.7)	34 (0.9)	491 (3.7)	12 (0.8)	444 (5.9)
United States	44 (1.2)	545 (3.3)	7 (0.4)	514 (4.6)	21 (0.6)	509 (2.5)
‡ Morocco	20 (1.3)	426 (4.5)	0 (0.0)	~ ~	18 (1.0)	405 (5.0)
International Avg.	23 (0.2)	499 (0.9)	14 (0.1)	483 (1.0)	26 (0.1)	461 (0.8)
Benchmarking Participants						
Basque Country, Spain	--	--	--	--	--	--
British Columbia, Canada	39 (1.6)	544 (3.3)	15 (0.7)	521 (4.4)	15 (0.8)	519 (4.7)
Dubai, UAE	41 (1.0)	527 (2.6)	15 (0.9)	486 (5.4)	14 (0.6)	452 (4.9)
Massachusetts, US	56 (1.6)	580 (4.5)	6 (0.6)	524 (9.0)	16 (1.2)	525 (7.7)
Minnesota, US	46 (1.7)	557 (5.6)	9 (0.7)	545 (6.3)	18 (1.3)	525 (4.7)
Ontario, Canada	37 (1.9)	550 (3.6)	19 (0.9)	522 (4.4)	11 (0.8)	522 (5.5)
Quebec, Canada	39 (1.4)	529 (4.6)	18 (0.9)	510 (3.5)	21 (1.1)	489 (4.0)

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

Background data provided by students.

* Based on countries' categorizations to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-1997).

** Includes postgraduate degrees (e.g., doctorate, master's, other postgraduate degree or diploma).

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

Note: The distribution of students' reports on parents' educational levels may not match the distribution from national population statistics, particularly where large percentages of students report that they "Do not know" (e.g., Sweden).



Exhibit 4.1 Highest Level of Education of Either Parent* (Continued)

TIMSS2007
Science 8th Grade

Country	Completed Lower-secondary School		Less than Lower-secondary School		Do Not Know	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Algeria	26 (0.8)	403 (2.9)	19 (1.2)	405 (2.9)	6 (0.3)	398 (3.8)
Armenia	2 (0.4)	~ ~	1 (0.2)	~ ~	6 (0.5)	457 (7.6)
Australia	14 (0.9)	492 (5.5)	1 (0.2)	~ ~	28 (0.9)	501 (5.1)
Bahrain	15 (0.6)	442 (3.8)	6 (0.5)	455 (7.2)	18 (0.6)	452 (3.5)
Bosnia and Herzegovina	12 (0.9)	418 (6.1)	1 (0.3)	~ ~	3 (0.3)	429 (9.7)
Botswana	18 (0.6)	350 (4.4)	14 (0.7)	361 (6.2)	20 (0.8)	382 (4.3)
Bulgaria	10 (1.3)	438 (14.9)	1 (0.3)	~ ~	9 (0.9)	451 (10.0)
Chinese Taipei	14 (0.9)	521 (5.0)	3 (0.4)	516 (10.6)	9 (0.5)	518 (8.7)
Colombia	23 (0.9)	403 (5.0)	23 (1.2)	394 (4.2)	6 (0.5)	393 (7.4)
Cyprus	9 (0.4)	425 (4.8)	4 (0.3)	398 (7.0)	7 (0.6)	402 (6.4)
Czech Republic	2 (0.2)	~ ~	0 (0.0)	~ ~	13 (0.6)	500 (3.8)
Egypt	29 (1.1)	400 (4.2)	14 (0.8)	384 (5.8)	10 (0.7)	390 (6.5)
El Salvador	39 (1.3)	373 (2.8)	16 (1.1)	369 (4.4)	4 (0.4)	368 (7.9)
England	--	--	--	--	--	--
Georgia	2 (0.3)	~ ~	0 (0.1)	~ ~	18 (1.2)	402 (6.7)
Ghana	27 (1.2)	287 (6.0)	12 (0.8)	299 (10.1)	6 (0.6)	295 (10.5)
Hong Kong SAR	29 (0.9)	525 (6.3)	3 (0.3)	525 (9.7)	16 (0.8)	510 (5.7)
Hungary	7 (0.9)	464 (8.8)	1 (0.2)	~ ~	5 (0.6)	522 (6.9)
Indonesia	24 (0.9)	413 (4.2)	28 (1.4)	413 (3.9)	9 (0.6)	397 (5.3)
Iran, Islamic Rep. of	28 (1.0)	446 (4.1)	31 (1.5)	432 (3.5)	3 (0.3)	413 (10.3)
Israel	7 (0.6)	416 (9.5)	3 (0.4)	409 (15.4)	26 (1.0)	457 (6.0)
Italy	24 (1.1)	472 (4.5)	3 (0.3)	432 (11.0)	10 (0.7)	458 (5.6)
Japan	2 (0.2)	~ ~	0 (0.1)	~ ~	21 (0.8)	537 (3.2)
Jordan	9 (0.5)	444 (7.4)	9 (0.8)	443 (7.6)	7 (0.6)	443 (10.5)
Korea, Rep. of	3 (0.3)	517 (7.1)	1 (0.1)	~ ~	10 (0.6)	509 (4.2)
Kuwait	0 (0.0)	~ ~	16 (0.9)	401 (4.4)	0 (0.0)	~ ~
Lebanon	13 (1.0)	382 (8.7)	19 (1.6)	366 (9.2)	13 (0.9)	403 (8.7)
Lithuania	4 (0.5)	453 (6.7)	0 (0.1)	~ ~	24 (1.0)	504 (4.2)
Malaysia	19 (0.9)	450 (5.4)	7 (0.6)	445 (10.2)	11 (1.0)	425 (11.8)
Malta	34 (0.7)	435 (3.1)	3 (0.3)	408 (10.9)	27 (0.6)	436 (3.4)
Norway	2 (0.2)	~ ~	1 (0.1)	~ ~	46 (0.9)	473 (2.7)
Oman	17 (0.7)	429 (4.2)	31 (1.1)	422 (3.5)	14 (0.9)	389 (5.7)
Palestinian Nat'l Auth.	11 (0.6)	385 (6.2)	9 (0.7)	378 (8.3)	8 (0.6)	353 (9.5)
Qatar	13 (0.4)	279 (4.1)	7 (0.3)	303 (4.6)	9 (0.4)	294 (4.9)
Romania	9 (1.0)	437 (9.9)	2 (0.4)	~ ~	17 (1.0)	434 (5.0)
Russian Federation	5 (0.5)	489 (7.8)	0 (0.1)	~ ~	10 (0.8)	502 (6.4)
Saudi Arabia	17 (0.9)	387 (4.8)	23 (1.2)	388 (4.5)	5 (0.5)	396 (8.0)
Scotland	--	--	--	--	--	--
Serbia	7 (0.9)	407 (9.7)	0 (0.1)	~ ~	5 (0.4)	440 (6.8)
Singapore	6 (0.4)	529 (9.0)	6 (0.4)	510 (8.8)	21 (0.7)	530 (7.2)
Slovenia	4 (0.4)	491 (7.6)	1 (0.1)	~ ~	22 (0.9)	531 (3.0)
Sweden	4 (0.3)	491 (5.6)	1 (0.2)	~ ~	50 (1.1)	500 (3.1)
Syrian Arab Republic	25 (1.0)	445 (3.5)	11 (0.8)	447 (5.4)	4 (0.4)	425 (8.0)
Thailand	26 (0.9)	453 (4.1)	26 (1.6)	457 (6.3)	18 (1.1)	451 (5.4)
Tunisia	25 (1.0)	433 (3.0)	12 (0.9)	438 (4.0)	8 (0.5)	443 (4.2)
Turkey	52 (1.3)	439 (3.9)	16 (1.0)	419 (4.8)	1 (0.2)	~ ~
Ukraine	5 (0.4)	430 (5.9)	0 (0.1)	~ ~	8 (0.6)	451 (6.7)
United States	7 (0.5)	469 (4.9)	2 (0.2)	~ ~	18 (0.5)	504 (3.6)
‡ Morocco	16 (1.0)	390 (6.4)	36 (1.7)	396 (4.1)	10 (0.9)	384 (6.9)
International Avg.	15 (0.1)	433 (1.3)	9 (0.1)	414 (1.6)	13 (0.1)	441 (1.0)

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

Benchmarking Participants

Basque Country, Spain	--	--	--	--	--	--
British Columbia, Canada	3 (0.3)	486 (11.0)	0 (0.1)	~ ~	28 (0.9)	513 (3.8)
Dubai, UAE	6 (0.4)	420 (6.7)	3 (0.4)	423 (12.0)	21 (1.1)	481 (5.9)
Massachusetts, US	3 (0.4)	499 (9.8)	1 (0.2)	~ ~	18 (0.9)	537 (8.6)
Minnesota, US	3 (0.6)	463 (12.6)	1 (0.3)	~ ~	23 (1.4)	523 (5.9)
Ontario, Canada	2 (0.3)	~ ~	0 (0.1)	~ ~	31 (1.6)	508 (5.6)
Quebec, Canada	3 (0.3)	485 (6.5)	0 (0.1)	~ ~	19 (0.9)	487 (4.1)



Exhibit 4.2 Students Speak the Language of the Test at Home with Trends

TIMSS2007
Science 4th Grade

Country	Always or Almost Always			Sometimes			Never		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	56 (2.4)	360 (6.5)	∅ ∅	32 (1.9)	358 (9.3)	∅ ∅	12 (1.0)	339 (9.0)	∅ ∅
Armenia	95 (0.6)	486 (5.9)	0 (0.8)	4 (0.4)	458 (12.0)	0 (0.6)	1 (0.4)	~ ~	1 (0.4)
Australia	90 (1.0)	533 (3.0)	-1 (1.5)	8 (1.0)	487 (8.7)	1 (1.4)	1 (0.2)	~ ~	0 (0.3)
Austria	88 (0.7)	534 (2.5)	∅ ∅	10 (0.6)	458 (4.0)	∅ ∅	2 (0.3)	~ ~	∅ ∅
Chinese Taipei	84 (0.8)	564 (1.9)	12 (1.4) ▲	15 (0.8)	527 (3.9)	-11 (1.4) ▼	1 (0.2)	~ ~	0 (0.2)
Colombia	89 (0.9)	408 (5.5)	∅ ∅	8 (0.8)	371 (7.4)	∅ ∅	3 (0.3)	346 (12.8)	∅ ∅
Czech Republic	97 (0.3)	516 (3.2)	∅ ∅	2 (0.3)	~ ~	∅ ∅	0 (0.1)	~ ~	∅ ∅
Denmark	94 (0.9)	522 (2.7)	∅ ∅	6 (0.9)	450 (11.6)	∅ ∅	1 (0.2)	~ ~	∅ ∅
El Salvador	93 (0.8)	396 (3.2)	∅ ∅	5 (0.6)	351 (10.4)	∅ ∅	2 (0.3)	~ ~	∅ ∅
England	93 (0.6)	546 (2.9)	-2 (1.0)	6 (0.6)	487 (8.4)	2 (0.9) ▲	1 (0.1)	~ ~	0 (0.2)
Georgia	92 (0.7)	422 (4.5)	∅ ∅	8 (0.6)	393 (9.3)	∅ ∅	0 (0.1)	~ ~	∅ ∅
Germany	92 (0.6)	537 (2.4)	∅ ∅	7 (0.6)	456 (5.4)	∅ ∅	1 (0.1)	~ ~	∅ ∅
Hong Kong SAR	82 (0.9)	561 (3.3)	7 (1.5) ▲	15 (0.9)	529 (5.4)	-5 (1.3) ▼	3 (0.3)	486 (10.1)	-2 (0.5) ▼
Hungary	98 (0.4)	538 (3.3)	-1 (0.5) ▼	2 (0.4)	~ ~	1 (0.5)	0 (0.1)	~ ~	0 (0.1)
Iran, Islamic Rep. of	62 (2.1)	459 (4.9)	4 (4.0)	21 (1.9)	408 (6.3)	0 (2.7)	16 (1.6)	388 (6.4)	-4 (3.0)
Italy	96 (0.2)	537 (3.2)	5 (0.6) ▲	3 (0.2)	488 (9.0)	-3 (0.5) ▼	0 (0.1)	~ ~	-2 (0.3) ▼
Japan	99 (0.2)	549 (2.1)	0 (0.3)	1 (0.1)	~ ~	0 (0.2)	0 (0.1)	~ ~	0 (0.1)
Kazakhstan	93 (1.3)	532 (5.5)	∅ ∅	7 (1.3)	551 (9.9)	∅ ∅	0 (0.1)	~ ~	∅ ∅
Kuwait	74 (1.8)	356 (5.0)	∅ ∅	18 (1.3)	361 (6.4)	∅ ∅	8 (1.2)	351 (11.1)	∅ ∅
Latvia	88 (1.5)	546 (2.0)	-2 (2.1)	9 (1.1)	504 (6.0)	2 (1.5)	3 (0.6)	524 (11.6)	0 (0.8)
Lithuania	98 (0.4)	515 (2.3)	1 (0.8)	2 (0.3)	~ ~	-1 (0.7)	0 (0.1)	~ ~	0 (0.2)
Morocco	50 (2.6)	299 (7.9)	4 (3.5)	29 (2.1)	325 (10.9)	1 (2.7)	21 (2.4)	276 (15.5)	-6 (3.4)
Netherlands	89 (1.2)	527 (2.8)	-3 (1.4) ▼	8 (0.8)	487 (7.8)	1 (1.2)	3 (0.6)	519 (12.4)	2 (0.6) ▲
New Zealand	87 (0.8)	512 (2.4)	-2 (1.1) ▼	12 (0.7)	454 (6.3)	2 (1.0) ▲	1 (0.2)	~ ~	0 (0.2)
Norway	94 (0.5)	480 (3.5)	1 (0.7)	5 (0.4)	426 (8.0)	-1 (0.6)	1 (0.2)	~ ~	0 (0.3)
Qatar	71 (0.6)	325 (2.5)	∅ ∅	20 (0.6)	242 (4.4)	∅ ∅	9 (0.3)	207 (7.7)	∅ ∅
Russian Federation	92 (1.4)	549 (4.6)	2 (2.5)	7 (1.2)	524 (17.4)	-2 (2.1)	2 (0.6)	~ ~	0 (0.8)
Scotland	91 (0.8)	504 (2.3)	4 (1.2) ▲	6 (0.5)	468 (6.1)	-3 (0.9) ▼	3 (0.6)	446 (10.9)	0 (0.7)
Singapore	50 (0.9)	620 (4.1)	4 (2.0) ▲	45 (0.9)	559 (4.4)	-2 (1.8)	5 (0.4)	508 (8.2)	-2 (0.7) ▼
Slovak Republic	87 (1.5)	536 (3.2)	∅ ∅	11 (1.3)	465 (13.0)	∅ ∅	3 (0.7)	473 (25.4)	∅ ∅
Slovenia	90 (0.8)	523 (2.0)	0 (1.3)	8 (0.7)	477 (5.8)	0 (1.2)	2 (0.4)	~ ~	0 (0.5)
Sweden	92 (1.0)	530 (2.6)	∅ ∅	8 (1.0)	466 (5.6)	∅ ∅	1 (0.1)	~ ~	∅ ∅
Tunisia	26 (1.7)	325 (8.9)	--	49 (2.0)	338 (6.4)	--	25 (1.8)	303 (8.8)	--
Ukraine	74 (2.1)	471 (3.4)	∅ ∅	21 (1.7)	488 (5.2)	∅ ∅	5 (0.6)	476 (8.5)	∅ ∅
United States	87 (0.8)	548 (2.4)	0 (1.2)	12 (0.8)	482 (4.4)	0 (1.1)	2 (0.1)	~ ~	0 (0.2)
Yemen	85 (1.7)	208 (7.8)	∅ ∅	11 (1.3)	176 (9.4)	∅ ∅	4 (0.9)	153 (14.7)	∅ ∅
International Avg.	84 (0.2)	483 (0.7)		12 (0.2)	438 (1.5)		4 (0.1)	386 (3.2)	
Benchmarking Participants									
Alberta, Canada	87 (1.4)	548 (3.7)	∅ ∅	11 (1.2)	511 (5.8)	∅ ∅	2 (0.3)	~ ~	∅ ∅
British Columbia, Canada	87 (1.2)	543 (2.5)	∅ ∅	12 (1.1)	505 (7.0)	∅ ∅	1 (0.3)	~ ~	∅ ∅
Dubai, UAE	55 (2.4)	486 (4.2)	∅ ∅	39 (2.1)	452 (5.4)	∅ ∅	6 (0.8)	404 (14.1)	∅ ∅
Massachusetts, US	93 (1.0)	575 (3.8)	∅ ∅	6 (1.0)	519 (13.0)	∅ ∅	1 (0.2)	~ ~	∅ ∅
Minnesota, US	89 (2.5)	560 (4.7)	∅ ∅	10 (2.3)	481 (17.5)	∅ ∅	1 (0.4)	~ ~	∅ ∅
Ontario, Canada	85 (1.0)	541 (3.2)	-1 (1.5)	13 (0.9)	517 (6.3)	0 (1.4)	2 (0.4)	~ ~	1 (0.5)
Quebec, Canada	90 (0.9)	519 (2.6)	-1 (1.3)	8 (0.8)	498 (5.6)	1 (1.1)	1 (0.2)	~ ~	0 (0.3)

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by students.

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

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


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

Exhibit 4.2 Students Speak the Language of the Test at Home with Trends (Continued)

TIMSS2007
Science 8th Grade

Country	Always or Almost Always			Sometimes			Never		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	57 (1.7)	410 (2.1)	0 0	31 (1.2)	409 (2.1)	0 0	11 (1.1)	399 (4.8)	0 0
Armenia	97 (0.5)	489 (5.8)	1 (0.8)	3 (0.4)	441 (10.6)	-1 (0.7)	0 (0.1)	~ ~	0 (0.2)
Australia	96 (0.5)	517 (3.5)	4 (1.6) ▲	4 (0.5)	471 (13.1)	-3 (1.4) ▼	1 (0.1)	~ ~	-1 (0.4)
Bahrain	81 (0.8)	468 (1.9)	0 (1.3)	14 (0.6)	469 (4.8)	-1 (0.9)	5 (0.5)	474 (6.9)	1 (0.7)
Bosnia and Herzegovina	98 (0.4)	466 (2.8)	0 0	2 (0.3)	~ ~	0 0	0 (0.1)	~ ~	0 0
Botswana	34 (1.0)	360 (4.5)	23 (1.2) ▲	62 (1.0)	361 (3.0)	-18 (1.2) ▼	5 (0.4)	271 (8.8)	-4 (0.7) ▼
Bulgaria	87 (2.1)	480 (5.7)	--	12 (1.9)	414 (12.4)	--	1 (0.3)	~ ~	--
Chinese Taipei	83 (1.2)	570 (3.5)	3 (1.8)	16 (1.1)	517 (6.0)	-3 (1.7)	1 (0.2)	~ ~	0 (0.3)
Colombia	96 (0.3)	419 (3.5)	0 0	4 (0.3)	374 (5.7)	0 0	0 (0.1)	~ ~	0 0
Cyprus	91 (0.5)	455 (2.1)	-1 (0.8)	6 (0.4)	425 (6.6)	0 (0.6)	2 (0.3)	~ ~	0 (0.4)
Czech Republic	98 (0.3)	539 (1.9)	0 0	2 (0.3)	~ ~	0 0	0 (0.1)	~ ~	0 0
Egypt	82 (1.2)	408 (3.6)	7 (1.6) ▲	15 (1.0)	420 (6.0)	-7 (1.4) ▼	3 (0.4)	401 (12.1)	0 (0.5)
El Salvador	97 (0.3)	389 (2.9)	0 0	2 (0.3)	~ ~	0 0	1 (0.2)	~ ~	0 0
England	97 (0.4)	543 (4.5)	0 (0.7)	2 (0.3)	~ ~	0 (0.6)	0 (0.1)	~ ~	0 (0.2)
Georgia	95 (0.9)	423 (4.7)	0 0	5 (0.9)	407 (17.4)	0 0	0 (0.1)	~ ~	0 0
Ghana	31 (1.2)	308 (7.4)	-2 (1.8)	66 (1.3)	307 (5.0)	3 (1.8)	3 (0.5)	225 (13.5)	-2 (1.0)
Hong Kong SAR	91 (1.0)	537 (4.4)	-2 (1.2)	8 (0.7)	477 (10.2)	1 (0.9)	2 (0.4)	~ ~	0 (0.4)
Hungary	99 (0.3)	540 (2.8)	-1 (0.4)	1 (0.2)	~ ~	0 (0.3)	1 (0.2)	~ ~	0 (0.2)
Indonesia	35 (2.8)	428 (5.3)	2 (3.6)	58 (2.5)	426 (4.2)	0 (3.2)	7 (0.6)	436 (6.9)	-3 (1.0) ▼
Iran, Islamic Rep. of	63 (2.2)	479 (4.1)	-2 (3.9)	22 (1.7)	426 (4.6)	1 (2.5)	15 (1.3)	423 (4.6)	0 (2.3)
Israel	92 (0.7)	471 (4.3)	-1 (0.9)	6 (0.6)	462 (10.5)	1 (0.8)	1 (0.3)	~ ~	0 (0.3)
Italy	99 (0.1)	496 (2.8)	3 (0.4) ▲	1 (0.1)	~ ~	-2 (0.3) ▼	0 (0.1)	~ ~	-1 (0.2)
Japan	98 (0.2)	555 (1.9)	0 (0.3)	1 (0.2)	~ ~	0 (0.3)	0 (0.1)	~ ~	0 (0.1)
Jordan	89 (0.9)	484 (4.0)	4 (1.4) ▲	8 (0.7)	471 (9.0)	-3 (1.0) ▼	3 (0.4)	469 (12.2)	-1 (0.7)
Korea, Rep. of	95 (0.4)	556 (2.1)	-4 (0.5) ▼	5 (0.4)	512 (7.4)	4 (0.4) ▲	0 (0.1)	~ ~	0 (0.1)
Kuwait	67 (1.2)	417 (3.0)	0 0	19 (0.8)	428 (4.5)	0 0	14 (0.9)	414 (6.5)	0 0
Lebanon	20 (1.2)	435 (8.6)	4 (1.5) ▲	64 (1.7)	416 (5.5)	-5 (2.0) ▼	16 (1.2)	391 (9.2)	1 (1.5)
Lithuania	98 (0.4)	519 (2.6)	0 (0.8)	2 (0.4)	~ ~	0 (0.6)	0 (0.1)	~ ~	0 (0.3)
Malaysia	64 (2.1)	474 (6.2)	-2 (3.2)	28 (1.6)	469 (8.7)	0 (2.5)	9 (0.9)	457 (15.5)	2 (1.2)
Malta	17 (0.4)	509 (4.7)	0 0	46 (0.7)	456 (2.3)	0 0	38 (0.7)	436 (2.3)	0 0
Norway	96 (0.4)	490 (2.2)	0 (0.6)	3 (0.3)	428 (7.8)	0 (0.5)	1 (0.2)	~ ~	0 (0.3)
Oman	76 (1.9)	422 (3.1)	0 0	19 (1.6)	429 (5.3)	0 0	5 (0.6)	436 (9.4)	0 0
Palestinian Nat'l Auth.	87 (1.4)	406 (3.8)	3 (1.8)	10 (1.1)	406 (8.8)	-3 (1.4) ▼	3 (0.5)	396 (15.7)	1 (0.6)
Qatar	72 (0.4)	350 (2.1)	0 0	20 (0.4)	255 (4.1)	0 0	8 (0.3)	201 (5.6)	0 0
Romania	98 (0.3)	463 (3.9)	5 (1.7) ▲	1 (0.3)	~ ~	-3 (1.0) ▼	0 (0.0)	~ ~	-2 (1.0) ▼
Russian Federation	93 (1.8)	531 (3.7)	-2 (2.2)	6 (1.6)	504 (13.1)	2 (1.9)	1 (0.3)	~ ~	0 (0.4)
Saudi Arabia	72 (2.2)	404 (2.7)	--	18 (1.5)	409 (3.9)	--	11 (1.1)	398 (4.9)	--
Scotland	96 (0.5)	498 (3.3)	-1 (0.6)	3 (0.4)	464 (10.8)	0 (0.5)	1 (0.2)	~ ~	0 (0.3)
Serbia	97 (0.8)	472 (3.1)	-1 (0.9)	2 (0.6)	~ ~	0 (0.7)	1 (0.2)	~ ~	0 (0.2)
Singapore	47 (0.9)	603 (4.1)	4 (1.3) ▲	46 (0.8)	540 (5.3)	-3 (1.1) ▼	7 (0.4)	515 (10.0)	-1 (0.6)
Slovenia	90 (1.1)	543 (2.1)	-1 (1.5)	7 (0.7)	490 (6.5)	0 (1.0)	3 (0.6)	488 (9.9)	1 (0.8)
Sweden	94 (0.6)	514 (2.4)	1 (1.0)	4 (0.5)	467 (9.3)	-1 (0.8)	1 (0.2)	~ ~	0 (0.3)
Syrian Arab Republic	86 (1.0)	454 (3.0)	0 0	11 (0.8)	452 (5.4)	0 0	3 (0.4)	417 (9.8)	0 0
Thailand	67 (1.9)	484 (5.1)	0 0	30 (1.6)	446 (6.4)	0 0	3 (0.6)	417 (15.0)	0 0
Tunisia	22 (0.9)	429 (3.7)	--	49 (1.0)	451 (2.2)	--	29 (1.1)	447 (3.6)	--
Turkey	89 (1.2)	461 (3.8)	0 0	10 (1.2)	399 (5.3)	0 0	1 (0.2)	~ ~	0 0
Ukraine	69 (2.6)	484 (4.0)	0 0	23 (1.9)	493 (4.7)	0 0	8 (1.0)	474 (6.7)	0 0
United States	91 (0.7)	525 (2.8)	-3 (0.9) ▼	8 (0.7)	476 (5.3)	3 (0.8) ▲	1 (0.1)	~ ~	0 (0.2)
‡ Morocco	52 (1.7)	396 (3.2)	--	37 (1.5)	406 (3.9)	--	11 (0.8)	415 (7.9)	--
International Avg.	78 (0.2)	471 (0.6)		17 (0.1)	438 (1.2)		5 (0.1)	409 (2.0)	
Benchmarking Participants									
Basque Country, Spain	93 (0.5)	500 (3.0)	4 (1.2) ▲	6 (0.5)	506 (6.9)	-2 (0.9) ▼	1 (0.3)	~ ~	-1 (0.6)
British Columbia, Canada	85 (1.8)	528 (2.7)	0 0	10 (0.9)	518 (6.8)	0 0	5 (1.2)	509 (7.3)	0 0
Dubai, UAE	58 (1.2)	498 (3.0)	0 0	37 (1.1)	485 (4.8)	0 0	5 (0.7)	476 (13.1)	0 0
Massachusetts, US	92 (0.9)	562 (4.3)	0 0	7 (0.8)	487 (10.3)	0 0	1 (0.3)	~ ~	0 0
Minnesota, US	95 (1.2)	542 (4.2)	0 0	4 (1.1)	467 (18.7)	0 0	1 (0.2)	~ ~	0 0
Ontario, Canada	90 (1.3)	529 (3.2)	1 (1.7)	9 (1.1)	505 (13.2)	0 (1.4)	1 (0.3)	~ ~	-1 (0.4)
Quebec, Canada	91 (1.2)	509 (2.8)	0 (1.7)	7 (0.9)	495 (9.9)	0 (1.3)	2 (0.4)	~ ~	0 (0.6)

▲ 2007 percent significantly higher
▼ 2007 percent significantly lower

Background data provided by students.

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

A diamond (0) indicates the country did not participate in the assessment.

A contributing factor in some countries to not all students speaking the language of the test at home may be the presence of an immigrant population. Exhibit 4.3 presents students' reports on whether their parents were born in the country. The exhibit presents for each participant the percentage of students with both parents, one parent, or neither parent born in the country, together with average science achievement and changes in percentages since 2003. (For clarification, as denoted by the data label, the benchmarking participants, except Dubai, asked about the entire country, that is, Spain, Canada, and the United States, respectively.)

Although response rates to questions in the TIMSS questionnaires generally were high, students in some countries had difficulties in answering specific questions, particularly about their parents' level of education. The exhibits in this chapter have special notation on this point. For a country where responses were available for at least 70 but less than 85 percent of the students, an "r" is included next to its data. Where responses were available for at least 50 but less than 70 percent of the students, an "s" is included. Where responses were available for less than 50 percent, an "x" replaces the data.

At fourth grade, more than three-quarters (77%) of students, on average internationally, reported that both parents were born in the country, whereas 13 percent reported that only one parent and 10 percent that neither parent was born in the country. In the Czech Republic, Hungary, Iran, Japan, and Lithuania, 90 percent or more of students reported that both parents were born in the country, as well as 80 percent or more (but less than 90%) in Chinese Taipei, Denmark, Georgia, Italy, Kazakhstan, Latvia, Norway, the Russian Federation, Scotland, and the Slovak Republic. Countries with an increase since 2003 included Hungary, Iran, Japan, and Lithuania, as well as the Canadian province of Quebec. The largest percentages of students (20% or more) reporting that neither parent was born in the country were in Australia, Hong Kong SAR, New Zealand, Qatar, and among the benchmarking participants the Canadian provinces of Alberta, British Columbia, and Ontario as well as Dubai. The high percentage of students

in Dubai (72%) is a result of high immigration, but also because Dubai did not ask about the country, the United Arab Emirates, but only Dubai in particular. Australia, Hong Kong SAR, New Zealand, and Qatar also had relatively large percentages of students (20% or more) with only one parent born in the country, as did Algeria, Kuwait, Singapore, and Yemen. Countries with a decrease since 2003 in the percentage of students with neither parent born in the country included Armenia, Chinese Taipei, Hong Kong SAR, Hungary, Iran, and Scotland, while two countries, Slovenia and Tunisia, showed an increase.

Although on average across countries, fourth grade science achievement was highest among students with both parents born in the country (482 points, on average), next highest among students with one parent born in the country (462 points), and lowest among those with neither parent born in the country (452 points), this was not the case in all countries. In a number of countries (for example, Australia, Kuwait, Qatar, and Dubai among benchmarking participants), students with neither parent born in the country had average science achievement higher than those with both parents born in the country.

At the eighth grade, the situation was similar, although a greater percentage of students (85% on average internationally) reported that both parents were born in the country, and a smaller percentage that one parent (9%) or neither parent (7%) was born in the country. Eighteen countries had 90 percent or more of students with both parents born in the country. Countries showing an increase in percentage of students in this category included Australia, Ghana, Indonesia, Jordan, and Lithuania, and those showing a decrease included Botswana, Cyprus, Hungary, Italy, Lebanon, Malaysia, Scotland, Tunisia, and the United States. The Basque Country of Spain also showed a decrease. More than 20 percent of students reported that neither parent was born in the country in Hong Kong SAR, Israel, Qatar, and the provinces of British Columbia and Ontario as well as Dubai (where the results were only for Dubai per se and not the country). Increased percentages in this category since 2003 were found in Tunisia, the United

Exhibit 4.3 Students' Parents Born in the Country with Trends

TIMSS2007
Science 4th Grade

Country	Both Parents Born in Country			Only One Parent Born in Country			Neither Parent Born in Country		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	67 (1.9)	363 (7.1)	0 0	20 (1.1)	332 (7.6)	0 0	13 (1.1)	349 (8.4)	0 0
Armenia	77 (1.5)	485 (4.4)	1 (1.9)	19 (1.3)	509 (19.7)	9 (1.4) ▲	5 (0.4)	468 (14.4)	-10 (1.1) ▼
Australia	57 (1.7)	527 (2.8)	0 (2.7)	21 (0.9)	526 (4.9)	1 (1.3)	21 (1.4)	533 (5.9)	-1 (2.3)
Austria	73 (1.0)	541 (2.6)	0 0	11 (0.6)	514 (4.7)	0 0	16 (0.8)	467 (4.0)	0 0
Chinese Taipei	88 (0.6)	564 (1.9)	0 (0.9)	7 (0.5)	520 (5.4)	2 (0.6) ▲	5 (0.4)	496 (6.2)	-3 (0.6) ▼
Colombia	73 (1.3)	410 (5.3)	0 0	13 (0.8)	379 (8.5)	0 0	14 (0.8)	398 (5.5)	0 0
Czech Republic	90 (0.6)	517 (3.1)	0 0	7 (0.5)	507 (6.0)	0 0	3 (0.3)	477 (11.4)	0 0
Denmark	82 (1.3)	525 (2.8)	0 0	8 (0.6)	513 (5.0)	0 0	10 (1.2)	463 (8.2)	0 0
El Salvador	78 (0.9)	398 (3.6)	0 0	14 (0.7)	363 (5.8)	0 0	8 (0.6)	382 (7.7)	0 0
England	74 (1.5)	548 (2.9)	-4 (2.4)	16 (0.9)	540 (4.6)	4 (1.2) ▲	11 (1.0)	505 (6.2)	0 (1.8)
Georgia	84 (1.1)	428 (4.4)	0 0	8 (0.6)	383 (8.5)	0 0	8 (0.7)	384 (8.6)	0 0
Germany	70 (1.4)	548 (2.2)	0 0	12 (0.7)	505 (4.9)	0 0	17 (1.0)	476 (3.9)	0 0
Hong Kong SAR	48 (1.8)	554 (4.2)	1 (2.6)	24 (0.9)	548 (3.9)	4 (1.1) ▲	28 (1.4)	562 (4.5)	-5 (2.3) ▼
Hungary	91 (0.6)	541 (3.2)	2 (0.9) ▲	6 (0.5)	499 (11.7)	1 (0.8)	3 (0.3)	514 (11.3)	-2 (0.5) ▼
Iran, Islamic Rep. of	92 (1.0)	437 (4.3)	4 (1.6) ▲	4 (0.5)	421 (9.4)	-1 (0.7)	4 (0.8)	442 (10.0)	-3 (1.3) ▼
Italy	87 (0.6)	538 (3.4)	0 (0.9)	8 (0.5)	516 (5.7)	0 (0.7)	5 (0.4)	512 (7.2)	0 (0.6)
Japan	96 (0.4)	550 (2.0)	2 (0.5) ▲	3 (0.3)	517 (9.0)	-2 (0.4) ▼	1 (0.2)	~ ~	0 (0.2)
Kazakhstan	84 (1.4)	533 (6.2)	0 0	8 (0.6)	535 (7.5)	0 0	9 (1.3)	531 (9.5)	0 0
Kuwait	65 (1.6)	358 (4.6)	0 0	22 (1.1)	320 (6.5)	0 0	13 (1.0)	390 (11.2)	0 0
Latvia	85 (0.9)	546 (2.1)	1 (1.5)	12 (0.7)	528 (4.9)	-1 (1.2)	3 (0.4)	504 (10.3)	0 (0.7)
Lithuania	91 (0.7)	516 (2.3)	2 (1.0) ▲	7 (0.6)	499 (6.4)	-1 (0.8)	1 (0.3)	~ ~	-1 (0.4)
Morocco	76 (1.6)	305 (6.9)	4 (2.6)	17 (1.1)	281 (9.2)	-2 (1.9)	7 (0.8)	306 (9.2)	-2 (1.2)
Netherlands	77 (1.4)	533 (2.8)	3 (2.2)	11 (0.8)	515 (5.0)	-1 (1.1)	12 (1.1)	478 (6.9)	-2 (1.8)
New Zealand	r 60 (1.2)	507 (2.4)	-2 (1.7)	20 (0.7)	506 (5.2)	-1 (1.0)	21 (1.0)	499 (4.7)	3 (1.5)
Norway	85 (0.8)	484 (3.4)	1 (1.1)	10 (0.7)	466 (6.6)	0 (0.9)	5 (0.5)	434 (8.4)	0 (0.8)
Qatar	49 (0.6)	287 (3.3)	0 0	26 (0.6)	279 (3.9)	0 0	25 (0.5)	347 (3.3)	0 0
Russian Federation	81 (1.1)	551 (4.8)	2 (1.6)	10 (0.6)	542 (6.9)	-1 (0.9)	8 (0.8)	509 (7.6)	-1 (1.1)
Scotland	84 (0.7)	505 (2.4)	1 (1.1)	11 (0.6)	491 (4.4)	2 (0.8)	5 (0.4)	456 (8.7)	-2 (0.8) ▼
Singapore	63 (0.8)	587 (4.4)	-2 (1.2)	20 (0.7)	587 (4.7)	1 (0.9)	16 (0.6)	587 (6.2)	1 (0.9)
Slovak Republic	87 (0.9)	534 (3.9)	0 0	8 (0.7)	493 (11.0)	0 0	6 (0.5)	477 (8.7)	0 0
Slovenia	78 (1.1)	525 (2.2)	-3 (1.5)	10 (0.7)	503 (4.3)	-1 (1.0)	12 (0.8)	491 (4.7)	3 (1.1) ▲
Sweden	74 (1.8)	535 (2.7)	0 0	12 (0.5)	524 (3.6)	0 0	14 (1.7)	475 (5.0)	0 0
Tunisia	79 (1.4)	331 (6.2)	-21 (1.4) ▼	16 (1.2)	286 (9.9)	16 (1.2) ▲	6 (0.6)	323 (13.5)	6 (0.6) ▲
Ukraine	76 (1.1)	480 (3.4)	0 0	15 (0.7)	470 (4.5)	0 0	8 (0.9)	443 (6.1)	0 0
United States	70 (1.1)	551 (2.4)	-2 (1.7)	13 (0.5)	517 (4.9)	2 (0.6) ▲	17 (1.0)	509 (5.1)	0 (1.5)
Yemen	71 (1.8)	206 (8.0)	0 0	22 (1.4)	189 (8.0)	0 0	7 (0.9)	195 (17.1)	0 0
International Avg.	77 (0.2)	482 (0.7)		13 (0.1)	462 (1.2)		10 (0.1)	452 (1.5)	
Benchmarking Participants									
Alberta, Canada	62 (2.1)	551 (4.1)	0 0	15 (0.8)	538 (4.6)	0 0	23 (1.8)	526 (5.8)	0 0
British Columbia, Canada	51 (2.4)	542 (3.2)	0 0	18 (0.9)	542 (4.2)	0 0	31 (2.5)	529 (5.1)	0 0
Dubai, UAE	r 17 (0.6)	409 (6.0)	0 0	11 (0.8)	411 (10.3)	0 0	72 (1.0)	490 (3.4)	0 0
Massachusetts, US	73 (1.9)	579 (3.6)	0 0	13 (0.7)	564 (8.2)	0 0	14 (1.7)	541 (10.8)	0 0
Minnesota, US	75 (3.4)	566 (4.7)	0 0	9 (0.8)	526 (9.8)	0 0	15 (3.3)	503 (13.0)	0 0
Ontario, Canada	52 (2.0)	539 (4.7)	2 (3.4)	17 (0.8)	535 (5.8)	1 (1.3)	30 (2.1)	533 (5.1)	-3 (3.6)
Quebec, Canada	75 (2.0)	525 (2.6)	15 (2.8) ▲	10 (0.7)	503 (4.6)	-16 (1.7) ▼	15 (1.8)	493 (4.8)	1 (2.3)

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by students.

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

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

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

A diamond (0) indicates the country did not participate in the assessment.


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

Exhibit 4.3 Students' Parents Born in the Country with Trends (Continued)

TIMSS2007
Science 8th Grade

Country	Both Parents Born in Country			Only One Parent Born in Country			Neither Parent Born in Country		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	--	--	0 0	--	--	0 0	--	--	0 0
Armenia	88 (1.0)	485 (5.2)	-2 (1.2)	9 (1.0)	522 (20.5)	3 (1.1)	3 (0.3)	499 (17.4)	-1 (0.6)
Australia	61 (1.1)	517 (3.4)	7 (2.5)	21 (0.8)	517 (6.3)	0 (1.2)	18 (1.4)	509 (7.9)	-7 (2.8)
Bahrain	78 (0.6)	468 (1.8)	-1 (0.9)	10 (0.5)	457 (5.4)	1 (0.7)	11 (0.4)	485 (4.3)	0 (0.7)
Bosnia and Herzegovina	89 (0.6)	467 (2.8)	0 0	7 (0.5)	478 (6.6)	0 0	4 (0.4)	436 (7.5)	0 0
Botswana	86 (0.6)	361 (3.1)	-3 (1.1)	11 (0.6)	315 (6.4)	3 (0.7)	3 (0.3)	372 (14.2)	0 (0.8)
Bulgaria	96 (0.5)	475 (5.8)	--	3 (0.4)	418 (17.0)	--	1 (0.2)	--	--
Chinese Taipei	96 (0.3)	563 (3.7)	0 (0.5)	3 (0.3)	535 (11.4)	1 (0.4)	1 (0.2)	--	-1 (0.3)
Colombia	96 (0.4)	419 (3.4)	0 0	3 (0.3)	402 (11.7)	0 0	1 (0.2)	--	0 0
Cyprus	82 (0.6)	454 (2.2)	-2 (0.8)	13 (0.5)	451 (4.2)	2 (0.7)	5 (0.3)	430 (7.5)	1 (0.4)
Czech Republic	91 (0.5)	540 (2.0)	0 0	7 (0.4)	530 (5.5)	0 0	2 (0.3)	--	0 0
Egypt	80 (1.8)	421 (3.5)	2 (2.0)	15 (1.7)	364 (8.2)	4 (1.8)	5 (0.4)	361 (6.1)	-5 (0.8)
El Salvador	94 (0.4)	390 (3.0)	0 0	4 (0.4)	378 (8.0)	0 0	2 (0.2)	--	0 0
England	80 (1.4)	544 (4.7)	-2 (2.5)	11 (0.7)	537 (7.1)	1 (1.1)	9 (0.9)	542 (8.4)	2 (1.9)
Georgia	93 (0.6)	429 (4.5)	0 0	3 (0.4)	388 (18.3)	0 0	3 (0.4)	343 (16.3)	0 0
Ghana	89 (0.7)	311 (5.0)	6 (1.1)	8 (0.6)	258 (10.4)	-4 (0.9)	3 (0.3)	269 (9.6)	-2 (0.5)
Hong Kong SAR	42 (1.4)	532 (5.3)	-1 (1.8)	19 (0.7)	527 (5.6)	3 (0.9)	39 (1.3)	532 (6.3)	-1 (1.7)
Hungary	94 (0.4)	540 (2.8)	-2 (0.6)	4 (0.4)	520 (12.0)	1 (0.5)	2 (0.3)	--	0 (0.3)
Indonesia	97 (0.4)	430 (3.3)	2 (0.5)	1 (0.2)	--	-1 (0.3)	1 (0.2)	--	-1 (0.3)
Iran, Islamic Rep. of	97 (0.3)	460 (3.6)	1 (0.6)	2 (0.3)	--	0 (0.4)	1 (0.2)	--	-1 (0.4)
Israel	63 (1.4)	473 (4.3)	2 (1.9)	16 (0.7)	473 (6.5)	-3 (1.0)	21 (1.4)	472 (8.4)	1 (1.8)
Italy	89 (0.6)	496 (3.0)	-2 (0.8)	7 (0.5)	501 (6.9)	0 (0.6)	5 (0.4)	468 (6.9)	1 (0.6)
Japan	98 (0.3)	555 (1.9)	1 (0.4)	2 (0.2)	--	-1 (0.3)	1 (0.1)	--	0 (0.2)
Jordan	70 (1.2)	480 (4.4)	6 (1.7)	15 (0.7)	482 (5.7)	-2 (1.0)	15 (0.9)	498 (5.5)	-4 (1.4)
Korea, Rep. of	100 (0.1)	553 (2.0)	0 (0.1)	0 (0.1)	--	0 (0.1)	0 (0.1)	--	0 (0.1)
Kuwait	77 (1.0)	421 (2.9)	0 0	13 (0.6)	410 (5.0)	0 0	9 (0.8)	429 (7.5)	0 0
Lebanon	87 (0.9)	419 (5.6)	-3 (1.2)	10 (0.7)	399 (9.7)	2 (1.0)	3 (0.4)	400 (15.2)	1 (0.5)
Lithuania	92 (0.5)	519 (2.7)	3 (0.9)	7 (0.5)	518 (6.2)	-2 (0.8)	1 (0.2)	--	0 (0.3)
Malaysia	93 (0.5)	474 (5.8)	-2 (0.7)	5 (0.4)	442 (11.8)	1 (0.5)	2 (0.3)	--	0 (0.5)
Malta	84 (0.5)	459 (1.5)	0 0	13 (0.5)	453 (4.7)	0 0	3 (0.2)	449 (11.8)	0 0
Norway	84 (1.0)	494 (2.4)	-2 (1.3)	9 (0.6)	482 (4.6)	1 (0.8)	7 (0.7)	431 (4.7)	1 (1.1)
Oman	84 (0.8)	429 (2.8)	0 0	10 (0.6)	393 (6.1)	0 0	6 (0.4)	408 (6.8)	0 0
Palestinian Nat'l Auth.	85 (0.7)	412 (3.5)	0 (1.0)	12 (0.6)	379 (7.3)	-1 (0.8)	3 (0.3)	338 (12.8)	1 (0.4)
Qatar	57 (0.6)	303 (3.0)	0 0	15 (0.4)	306 (4.1)	0 0	28 (0.5)	366 (2.8)	0 0
Romania	99 (0.2)	464 (3.8)	0 (0.3)	1 (0.2)	--	0 (0.3)	0 (0.1)	--	0 (0.2)
Russian Federation	83 (1.1)	532 (3.8)	0 (1.5)	11 (0.7)	530 (6.4)	0 (1.0)	6 (0.7)	506 (10.3)	0 (0.8)
Saudi Arabia	80 (1.3)	403 (2.8)	--	9 (0.6)	387 (7.0)	--	11 (1.0)	427 (5.7)	--
Scotland	89 (0.7)	497 (3.3)	-2 (0.9)	7 (0.5)	507 (7.1)	1 (0.7)	3 (0.5)	478 (12.6)	0 (0.6)
Serbia	79 (1.0)	471 (3.4)	-2 (1.3)	12 (0.7)	478 (4.8)	1 (0.9)	9 (0.7)	465 (8.5)	1 (1.0)
Singapore	71 (0.7)	563 (4.7)	-1 (1.0)	16 (0.5)	570 (5.5)	0 (0.7)	13 (0.6)	590 (6.3)	1 (0.8)
Slovenia	82 (1.1)	543 (2.3)	2 (1.7)	9 (0.6)	537 (4.6)	1 (0.9)	9 (0.9)	494 (6.2)	-3 (1.3)
Sweden	77 (1.3)	520 (2.4)	1 (2.2)	11 (0.5)	511 (4.1)	1 (0.8)	12 (1.2)	464 (6.3)	-2 (2.0)
Syrian Arab Republic	86 (0.8)	457 (2.6)	0 0	9 (0.6)	432 (7.1)	0 0	5 (0.4)	419 (6.9)	0 0
Thailand	96 (0.5)	472 (4.3)	0 0	3 (0.4)	432 (11.3)	0 0	1 (0.2)	--	0 0
Tunisia	92 (0.4)	447 (2.2)	-7 (0.5)	5 (0.3)	428 (6.1)	4 (0.3)	3 (0.3)	402 (8.8)	3 (0.3)
Turkey	97 (0.3)	456 (3.7)	0 0	2 (0.3)	--	0 0	1 (0.2)	--	0 0
Ukraine	78 (1.1)	486 (3.5)	0 0	17 (0.9)	492 (5.3)	0 0	5 (0.6)	463 (9.5)	0 0
United States	74 (1.4)	530 (2.9)	-7 (1.8)	9 (0.6)	512 (4.3)	1 (0.7)	17 (1.2)	485 (5.1)	6 (1.5)
‡ Morocco	90 (0.6)	406 (2.8)	--	6 (0.5)	374 (9.9)	--	3 (0.4)	346 (9.4)	--
International Avg.	85 (0.1)	470 (0.5)		9 (0.1)	453 (1.3)		7 (0.1)	442 (1.6)	
Benchmarking Participants									
Basque Country, Spain	89 (0.9)	503 (3.0)	-3 (1.1)	6 (0.6)	475 (8.6)	1 (0.8)	5 (0.7)	460 (9.3)	2 (0.8)
British Columbia, Canada	56 (1.8)	526 (2.6)	0 0	16 (0.7)	527 (3.5)	0 0	29 (1.9)	528 (6.2)	0 0
Dubai, UAE	20 (1.1)	435 (4.9)	0 0	10 (0.6)	448 (6.5)	0 0	70 (1.0)	514 (3.0)	0 0
Massachusetts, US	75 (2.0)	568 (4.2)	0 0	9 (0.7)	550 (6.5)	0 0	16 (1.8)	509 (8.9)	0 0
Minnesota, US	84 (1.9)	547 (4.2)	0 0	5 (0.4)	515 (10.5)	0 0	10 (1.6)	483 (13.3)	0 0
Ontario, Canada	57 (2.2)	525 (4.8)	2 (3.1)	15 (0.9)	532 (4.5)	-1 (1.2)	28 (2.3)	526 (5.4)	-2 (3.3)
Quebec, Canada	78 (2.1)	512 (3.0)	-3 (2.8)	8 (0.6)	517 (6.5)	0 (0.8)	14 (1.9)	482 (7.7)	2 (2.5)

▲ 2007 percent significantly higher
▼ 2007 percent significantly lower

Background data provided by students.

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

A diamond (0) indicates the country did not participate in the assessment.

States, and the Basque Country, and decreased percentages in Australia, Egypt, Ghana, Jordan, and Slovenia. Similar to the fourth grade, average science achievement at the eighth grade was highest for students reporting both parents born in the country (470 points, on average), next for students with one parent born in the country (453 points), and lowest for students with neither parent born in the country (442 points).

Earlier cycles of TIMSS and PIRLS have shown that students from homes with abundant literacy resources have higher achievement, on average, in mathematics, science, and reading than students from less well-endowed homes.³ Exhibit 4.4, which displays students' reports about the number of books in their homes, shows that this continues to be true for science achievement at both fourth and eighth grades. For each grade, the exhibit presents for each TIMSS 2007 participant the percentage of students in five categories of book ownership, *more than 200 books*, *101–200 books*, *26–100 books*, *11–25 books*, and *0–10 books*, together with average achievement in each category and changes in percentages since 2003.

As shown in the exhibit, there was a wide range of book ownership within countries at both grade levels. At fourth grade, 12 percent of students, on average across countries, reported having more than 200 books at home, 13 percent having between 101 and 200 books, 30 percent having between 26 and 100 books, 25 percent having between 11 and 25 books, and 20 percent with no more than 10 books. TIMSS participants with the highest percentages of students (at least 30%) reporting many books at home (more than 100—categories one and two combined) included Australia, Denmark, England, Georgia, Germany, Hungary, New Zealand, Norway, Qatar, Scotland, Singapore, Sweden, the United States, the U.S. states of Massachusetts and Minnesota, and the Canadian provinces of Alberta, British Columbia, and Ontario. In contrast, in Algeria, El Salvador, Iran, Morocco, and Yemen, more than half the students reported having no more than 10 books in their homes. In several countries, there was an increase since 2003 in the percentage of students from homes with many books. For example, Hong Kong SAR, Morocco, and the province of Quebec had increased percentages

3 See, for example, Mullis, I.V.S., Martin, M.O., Kennedy, A.M., & Foy, P. (2007). *PIRLS 2006 international report: IEA's Progress in International Reading Literacy Study in primary school in 40 countries*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

of students in the *more than 200* and in the *101–200* categories. In contrast, Latvia, the Netherlands, and Norway had decreased percentages in both of these categories.

Fourth grade students from homes with more than 100 books had higher average science achievement than those from homes with fewer books. Average achievement of those from homes with more than 200 books (502 points, on average) and from homes with 101–200 books (500 points) exceeded that for students from homes with 26–100 books (490 points), with 11–25 books (469 points), and with 0–10 books (437 points).

At the eighth grade also, there was an association between average science achievement and number of books in the home. Twelve percent of students reported having more than 200 books at home and 12 percent reported having 101–200 books, and these had average achievement of 500 and 496 points, respectively. These averages were higher than the 479–point average of the 27 percent of students with 26–100 books, the 452–point average of the 29 percent of students with 11–25 books, and the 426–point average of the 20 percent of students with 10 books or fewer. TIMSS participants with the highest percentages of students in the *more than 200* books category (20% or more) included Australia, Georgia, Hungary, Israel, Italy, Korea, Norway, Sweden, and among the benchmarking participants the Basque Country, Massachusetts, Minnesota, and the provinces of British Columbia and Ontario. Countries with the greatest percentages of students (30% or more) with no more than 10 books at home included Algeria, Botswana, Colombia, Egypt, El Salvador, Ghana, Iran, Thailand, and Tunisia. There were increased percentages since 2003 of students in the highest category of book ownership (more than 200 books) in Cyprus, Korea, and Lebanon, but decreases in Australia, Bahrain, England, Ghana, Hungary, Romania, the Russian Federation, Scotland, Sweden, the United States, and the Canadian province of Ontario.

In today's age of virtually instantaneous access to a vast repository of information on science and science-related topics, students from homes

Exhibit 4.4 Books in the Home with Trends (Continued)

TIMSS2007
Science 4th Grade

Country	11–25 Books			0–10 Books			
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	
Algeria	29 (1.4)	372 (7.4)	0 0	54 (1.9)	349 (7.9)	0 0	
Armenia	r 23 (1.6)	493 (13.1)	1 (1.8)	23 (1.5)	499 (9.8)	6 (1.9)	▲
Australia	13 (0.8)	494 (5.7)	0 (1.2)	6 (0.6)	464 (7.7)	0 (1.0)	
Austria	29 (0.9)	508 (3.3)	0 0	11 (0.6)	464 (5.2)	0 0	
Chinese Taipei	25 (0.8)	540 (3.2)	1 (1.1)	16 (0.8)	511 (3.7)	-1 (1.1)	
Colombia	26 (0.9)	419 (6.4)	0 0	44 (1.4)	390 (5.4)	0 0	
Czech Republic	26 (1.2)	493 (3.0)	0 0	6 (0.7)	449 (5.7)	0 0	
Denmark	23 (1.1)	500 (3.9)	0 0	9 (0.7)	469 (7.0)	0 0	
El Salvador	26 (0.9)	411 (3.9)	0 0	52 (1.3)	376 (3.8)	0 0	
England	17 (0.8)	511 (3.5)	0 (1.3)	9 (0.7)	477 (4.4)	1 (1.1)	
Georgia	24 (1.4)	413 (4.7)	0 0	17 (1.2)	387 (8.3)	0 0	
Germany	25 (1.0)	502 (3.5)	0 0	8 (0.7)	454 (5.4)	0 0	
Hong Kong SAR	22 (0.9)	552 (4.5)	-8 (1.2)	16 (1.0)	533 (5.7)	-9 (1.7)	▼
Hungary	25 (1.0)	516 (3.5)	3 (1.3)	10 (0.9)	466 (8.2)	2 (1.1)	▲
Iran, Islamic Rep. of	25 (1.2)	458 (5.1)	3 (1.7)	53 (1.9)	408 (5.0)	-2 (2.9)	▲
Italy	31 (0.8)	526 (4.1)	-2 (1.3)	14 (0.9)	508 (5.6)	-4 (1.3)	▼
Japan	28 (0.9)	538 (2.1)	1 (1.2)	14 (0.7)	511 (4.5)	2 (1.1)	▲
Kazakhstan	34 (2.9)	524 (8.5)	0 0	22 (2.7)	531 (8.9)	0 0	
Kuwait	r 30 (1.2)	367 (6.9)	0 0	22 (1.2)	339 (7.2)	0 0	
Latvia	22 (1.1)	523 (3.7)	5 (1.4)	8 (0.7)	500 (6.1)	2 (1.0)	▲
Lithuania	36 (1.3)	506 (3.0)	2 (1.7)	15 (0.8)	489 (6.0)	3 (1.2)	▲
Morocco	r 23 (1.3)	323 (8.2)	-2 (2.0)	53 (2.2)	283 (8.3)	-7 (3.1)	▼
Netherlands	25 (1.1)	506 (3.3)	3 (1.5)	9 (0.8)	488 (5.7)	0 (1.1)	▲
New Zealand	18 (0.6)	471 (3.8)	1 (0.9)	10 (0.6)	430 (5.9)	1 (0.9)	
Norway	23 (0.8)	462 (3.3)	6 (1.1)	7 (0.6)	417 (6.9)	0 (0.8)	▲
Qatar	19 (0.5)	304 (4.0)	0 0	19 (0.5)	287 (5.0)	0 0	
Russian Federation	26 (1.0)	538 (5.0)	-1 (1.8)	10 (1.8)	508 (13.1)	0 (1.9)	
Scotland	20 (0.8)	481 (4.1)	0 (1.4)	12 (0.8)	445 (4.5)	1 (1.1)	
Singapore	21 (0.8)	560 (5.0)	-1 (1.2)	10 (0.6)	516 (5.8)	0 (1.0)	
Slovak Republic	32 (0.9)	519 (4.1)	0 0	11 (1.3)	455 (9.8)	0 0	
Slovenia	30 (1.0)	504 (2.6)	2 (1.5)	9 (0.6)	474 (5.6)	2 (0.8)	▲
Sweden	21 (0.9)	503 (4.7)	0 0	7 (0.7)	463 (7.0)	0 0	
Tunisia	r 29 (1.3)	355 (7.6)	0 (2.0)	44 (2.1)	284 (6.3)	3 (3.1)	
Ukraine	31 (1.1)	462 (4.0)	0 0	11 (0.8)	436 (7.5)	0 0	
United States	21 (0.5)	519 (3.3)	-1 (0.8)	14 (0.7)	485 (3.5)	1 (0.9)	
Yemen	r 22 (1.8)	215 (11.9)	0 0	60 (2.4)	199 (8.1)	0 0	
International Avg.	25 (0.2)	469 (0.9)		20 (0.2)	437 (1.1)		
Benchmarking Participants							
Alberta, Canada	18 (0.9)	513 (4.7)	0 0	6 (0.6)	504 (8.0)	0 0	
British Columbia, Canada	18 (0.8)	507 (4.6)	0 0	6 (0.5)	488 (6.4)	0 0	
Dubai, UAE	r 29 (1.2)	468 (4.6)	0 0	17 (1.2)	421 (7.2)	0 0	
Massachusetts, US	13 (1.2)	529 (8.4)	0 0	5 (0.8)	514 (8.5)	0 0	
Minnesota, US	17 (1.1)	516 (6.0)	0 0	9 (1.3)	482 (8.2)	0 0	
Ontario, Canada	19 (1.3)	516 (5.2)	3 (1.8)	6 (0.9)	468 (13.1)	-1 (1.3)	
Quebec, Canada	23 (0.9)	505 (4.1)	-4 (1.2)	11 (0.9)	481 (5.7)	0 (1.1)	▼

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

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



with a computer, and particularly a computer with Internet access, have opportunities for a greatly enhanced science learning experience compared to those less fortunate. Exhibit 4.5 presents fourth and eighth grade students' reports of having a computer at home and whether or not it has an Internet connection, in relation to their average achievement in science.

At both grades, 70 percent of students reported having a computer at home, and about half (56% at fourth grade, 50% at eighth grade) had an Internet connection. Ninety percent or more of the fourth grade students reported having a computer at home in Australia, Austria, the Czech Republic, Denmark, England, Germany, Hong Kong SAR, the Netherlands, New Zealand, Norway, Scotland, Singapore, Sweden, the United States, as well as Massachusetts, Minnesota, and the four Canadian provinces. In addition, in Denmark, the Netherlands, Norway, Sweden, and the state of Massachusetts, more than 90 percent of students reported having an Internet connection for the computer. Although having a computer at home is clearly very common in many countries, there also are countries where relatively few fourth grade students come from computer equipped homes, and even fewer from homes with computers connected to the Internet. More than 60 percent of students in Algeria, Colombia, El Salvador, Georgia, Iran, Kazakhstan, and Yemen are from homes without a computer, and about 80 percent (or more) do not have a computer connected to the Internet.

On average across countries at the fourth grade, students from homes with a computer had science achievement 40 points above those from homes without a computer (487 points, on average vs. 447 points), and those from homes with an Internet-connected computer nearly 30 points above students from homes without such a facility (487 vs. 459). These achievement differences may be at least partly a reflection of socioeconomic differences, since, in many countries, computers and Internet connections require significant financial outlay.

At the eighth grade, in 18 of the 49 countries and in all 7 benchmarking entities, 90 percent or more of the students reported that they had a computer in the home, and the vast majority of students in these countries also reported

having an Internet connection for the computer. However, there also were countries where many students did not have a computer at home, including Armenia, Botswana, Colombia, El Salvador, Georgia, Ghana, Indonesia, and Tunisia, where 60 percent or more of students reported not having a computer at home, and 80 percent or more did not have Internet access at home. Like at the fourth grade, eighth grade students with a computer at home had higher average science achievement than students without a computer, and students with an Internet-connected computer had higher achievement than students than those that did not.

From an educational perspective, actually using a computer may be more important for a student than merely having one in the home. Exhibit 4.6 presents students' reports on where, if anywhere, they use a computer. This exhibit presents, for each TIMSS participant at fourth and eighth grades, the percentage of students that reported using a computer both at home and at school, at home but not at school, at school but not at home, only at places other than home and school, and not using a computer at all. Also shown is the average science achievement for students in each category of computer use, as well as changes in the percentages in each category since 2003. Countries are ordered by the percentage of students using a computer both at home and at school.

At fourth grade, on average across countries, 38 percent of students reported using a computer both at home and at school and a further 31 percent at home but not at school. Just 9 percent reported using a computer at school but not at home, 5 percent only at places other than home and school, and 17 percent reported not using a computer at all. Average achievement was highest among those reporting using a computer at home and at school and at home only, perhaps reflecting an economic advantage for those with a computer at home, and lowest among those reporting that they do not use a computer at all or use one only at places other than the home and the school.

TIMSS participants with the highest percentage (more than 70%) of students reporting using a computer both at home and at school included Chinese Taipei, Scotland, Australia, England, Hong Kong SAR,

Exhibit 4.6 Computer Use with Trends (Continued)

TIMSS2007
Science 4th Grade

Country	Use Computer Only at Places Other than Home and School			Do Not Use Computer at All		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	1 (0.1)	~ ~	0 (0.2)	1 (0.1)	~ ~	0 (0.2)
Scotland	1 (0.2)	~ ~	0 (0.3)	1 (0.2)	~ ~	-1 (0.3)
Australia	1 (0.2)	~ ~	-1 (0.3)	1 (0.2)	~ ~	0 (0.2)
England	1 (0.2)	~ ~	0 (0.2)	1 (0.2)	~ ~	0 (0.3)
Hong Kong SAR	1 (0.2)	~ ~	-1 (0.3)	2 (0.3)	~ ~	-1 (0.5)
Netherlands	0 (0.1)	~ ~	0 (0.2)	4 (0.5)	502 (7.1)	0 (0.7)
Denmark	1 (0.2)	~ ~	0 0	1 (0.2)	~ ~	0 0
Singapore	1 (0.2)	~ ~	0 (0.3)	2 (0.2)	~ ~	0 (0.3)
New Zealand	2 (0.2)	~ ~	-1 (0.4)	2 (0.2)	~ ~	0 (0.3)
Kuwait	2 (0.2)	~ ~	0 0	3 (0.5)	360 (15.9)	0 0
Norway	1 (0.1)	~ ~	-1 (0.4)	2 (0.3)	~ ~	-3 (0.7)
United States	3 (0.2)	516 (5.7)	1 (0.3)	3 (0.3)	528 (6.7)	1 (0.3)
Sweden	1 (0.1)	~ ~	0 0	2 (0.3)	~ ~	0 0
Japan	2 (0.3)	~ ~	0 (0.4)	6 (0.6)	511 (7.1)	2 (0.7)
Czech Republic	3 (0.3)	493 (8.6)	0 0	2 (0.2)	~ ~	0 0
Qatar	3 (0.2)	266 (12.3)	0 0	4 (0.2)	313 (8.4)	0 0
Italy	1 (0.1)	~ ~	-8 (0.6)	33 (1.0)	520 (4.3)	21 (1.2)
Hungary	4 (0.6)	508 (7.7)	-8 (1.0)	7 (0.5)	518 (8.3)	-5 (1.0)
Germany	1 (0.2)	~ ~	0 0	11 (0.6)	532 (5.6)	0 0
Slovak Republic	4 (0.6)	507 (7.8)	0 0	7 (1.0)	500 (14.0)	0 0
Slovenia	1 (0.1)	~ ~	-4 (0.6)	4 (0.4)	494 (7.1)	-7 (1.0)
Austria	1 (0.2)	~ ~	0 0	12 (0.8)	527 (4.5)	0 0
Tunisia	6 (0.6)	352 (10.2)	-9 (1.2)	25 (2.6)	294 (9.1)	-21 (3.4)
Colombia	9 (0.9)	404 (7.5)	0 0	28 (1.9)	387 (6.4)	0 0
Kazakhstan	12 (1.4)	532 (6.7)	0 0	26 (3.4)	537 (7.2)	0 0
Latvia	10 (0.8)	538 (5.3)	-14 (2.0)	7 (0.7)	532 (6.1)	-16 (2.0)
Morocco	9 (0.7)	332 (8.6)	-6 (1.4)	46 (2.4)	286 (8.2)	9 (4.0)
Lithuania	8 (0.7)	518 (4.4)	-15 (1.3)	7 (0.6)	502 (4.7)	-6 (1.2)
El Salvador	12 (0.9)	405 (6.8)	0 0	40 (2.4)	382 (5.1)	0 0
Russian Federation	14 (0.9)	545 (5.3)	-16 (1.6)	19 (2.0)	529 (8.8)	-16 (2.6)
Yemen	4 (0.5)	189 (13.8)	0 0	55 (3.0)	203 (9.8)	0 0
Algeria	7 (1.0)	349 (15.0)	0 0	55 (2.5)	359 (5.8)	0 0
Armenia	12 (0.9)	504 (13.3)	-12 (1.4)	21 (1.5)	500 (9.5)	-10 (2.1)
Ukraine	12 (0.8)	494 (4.8)	0 0	40 (1.4)	459 (4.6)	0 0
Georgia	10 (1.0)	436 (8.0)	0 0	42 (2.3)	437 (6.1)	0 0
Iran, Islamic Rep. of	4 (0.5)	457 (9.9)	-4 (1.1)	75 (1.7)	415 (4.6)	-1 (2.6)
International Avg.	5 (0.1)	439 (2.1)		17 (0.2)	445 (1.6)	
Benchmarking Participants						
Alberta, Canada	1 (0.2)	~ ~	0 0	1 (0.2)	~ ~	0 0
Ontario, Canada	1 (0.3)	~ ~	0 (0.5)	1 (0.2)	~ ~	0 (0.3)
British Columbia, Canada	1 (0.2)	~ ~	0 0	1 (0.3)	~ ~	0 0
Minnesota, US	2 (0.3)	~ ~	0 0	2 (0.3)	~ ~	0 0
Quebec, Canada	1 (0.3)	~ ~	0 (0.4)	2 (0.3)	~ ~	1 (0.4)
Dubai, UAE	1 (0.2)	~ ~	0 0	1 (0.2)	~ ~	0 0
Massachusetts, US	2 (0.3)	~ ~	0 0	1 (0.3)	~ ~	0 0

SOURCE: IEAs Trends in International Mathematics and Science Study (TIMSS) 2007

● 2007 percent significantly higher
▼ 2007 percent significantly lower

Exhibit 4.6 Computer Use with Trends (Continued)

TIMSS2007
Science 8th Grade

Country	Use Computer Only at Places Other than Home and School			Do Not Use Computer at All		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	1 (0.2)	~ ~	0 (0.2)	1 (0.1)	~ ~	0 (0.2)
Hong Kong SAR	0 (0.1)	~ ~	0 (0.1)	1 (0.1)	~ ~	0 (0.2)
Malta	0 (0.1)	~ ~	◊ ◊	1 (0.1)	~ ~	◊ ◊
Australia	1 (0.2)	~ ~	0 (0.3)	0 (0.1)	~ ~	0 (0.2)
England	1 (0.2)	~ ~	0 (0.2)	0 (0.1)	~ ~	-1 (0.2)
Czech Republic	1 (0.2)	~ ~	◊ ◊	1 (0.2)	~ ~	◊ ◊
Cyprus	0 (0.1)	~ ~	-2 (0.3) ▼	3 (0.2)	386 (8.0)	-2 (0.4) ▼
Scotland	1 (0.2)	~ ~	0 (0.3)	0 (0.1)	~ ~	-1 (0.2)
United States	3 (0.2)	467 (7.5)	1 (0.3)	1 (0.1)	~ ~	0 (0.2)
Norway	0 (0.1)	~ ~	-1 (0.2)	1 (0.1)	~ ~	-1 (0.2)
Singapore	2 (0.2)	~ ~	1 (0.3)	0 (0.1)	~ ~	0 (0.1)
Hungary	1 (0.2)	~ ~	-1 (0.4)	1 (0.2)	~ ~	-2 (0.5) ▼
Sweden	0 (0.1)	~ ~	-1 (0.2)	1 (0.1)	~ ~	-1 (0.3)
Qatar	2 (0.2)	~ ~	◊ ◊	2 (0.2)	~ ~	◊ ◊
Kuwait	3 (0.3)	365 (10.3)	◊ ◊	2 (0.2)	~ ~	◊ ◊
Japan	1 (0.2)	~ ~	0 (0.3)	1 (0.2)	~ ~	0 (0.3)
Italy	0 (0.1)	~ ~	-5 (0.4) ▼	8 (0.5)	446 (7.0)	-1 (0.7)
Jordan	1 (0.2)	~ ~	-6 (0.8) ▼	5 (0.5)	483 (9.3)	1 (0.7)
Slovenia	1 (0.1)	~ ~	-3 (0.4) ▼	1 (0.1)	~ ~	-4 (0.4) ▼
Israel	1 (0.2)	~ ~	-1 (0.3)	1 (0.2)	~ ~	1 (0.3)
Lebanon	7 (1.1)	375 (11.8)	-6 (1.6) ▼	4 (0.8)	364 (17.6)	-5 (1.5) ▼
Palestinian Nat'l Auth.	3 (0.3)	391 (10.5)	-10 (1.1) ▼	7 (0.8)	405 (9.1)	-3 (1.2) ▼
Bosnia and Herzegovina	4 (0.4)	458 (7.1)	◊ ◊	3 (0.3)	448 (9.3)	◊ ◊
Russian Federation	8 (1.0)	519 (6.3)	-13 (1.5) ▼	5 (1.0)	494 (9.8)	-15 (2.0) ▼
Oman	3 (0.4)	397 (8.5)	◊ ◊	14 (1.1)	418 (5.9)	◊ ◊
Serbia	5 (0.6)	452 (8.0)	-14 (1.3) ▼	4 (0.5)	427 (7.9)	-15 (1.2) ▼
Bahrain	2 (0.3)	~ ~	-7 (0.6) ▼	6 (0.4)	463 (6.4)	0 (0.6)
Syrian Arab Republic	2 (0.2)	~ ~	◊ ◊	14 (1.1)	459 (4.2)	◊ ◊
Lithuania	4 (0.4)	495 (8.9)	-8 (1.1) ▼	5 (0.4)	479 (8.9)	0 (0.7)
Korea, Rep. of	2 (0.2)	~ ~	0 (0.3)	2 (0.3)	~ ~	2 (0.3) ▲
Romania	8 (0.8)	446 (6.8)	-16 (1.6) ▼	7 (1.3)	412 (7.3)	-13 (2.2) ▼
Malaysia	10 (0.9)	449 (6.1)	-3 (1.3) ▼	8 (0.8)	418 (9.4)	-3 (1.4) ▼
Thailand	4 (0.5)	462 (7.7)	◊ ◊	9 (0.9)	424 (6.3)	◊ ◊
Turkey	13 (1.2)	428 (6.3)	◊ ◊	4 (0.7)	387 (8.9)	◊ ◊
Egypt	10 (0.7)	423 (5.6)	2 (0.9) ▲	7 (0.5)	431 (6.5)	0 (0.9)
Colombia	12 (0.9)	423 (4.4)	◊ ◊	9 (0.8)	381 (8.9)	◊ ◊
Bulgaria	9 (0.9)	454 (10.7)	--	8 (0.9)	455 (10.8)	--
Saudi Arabia	3 (0.4)	386 (9.0)	--	20 (1.0)	403 (3.7)	--
Ukraine	19 (1.0)	477 (4.5)	◊ ◊	11 (0.9)	454 (6.0)	◊ ◊
Indonesia	3 (0.4)	421 (10.0)	-16 (1.3) ▼	15 (2.0)	402 (6.2)	-26 (3.4) ▼
Botswana	2 (0.2)	~ ~	-3 (0.5) ▼	25 (1.4)	319 (5.4)	-36 (2.9) ▼
El Salvador	21 (1.4)	390 (3.9)	◊ ◊	28 (1.9)	371 (3.8)	◊ ◊
Ghana	14 (1.0)	330 (6.3)	-12 (1.8) ▼	42 (2.5)	308 (7.0)	8 (3.5) ▲
Armenia	19 (1.1)	485 (5.7)	0 (1.6)	20 (1.2)	483 (6.0)	-25 (2.5) ▼
Georgia	12 (1.1)	427 (8.6)	◊ ◊	44 (2.6)	436 (7.2)	◊ ◊
Algeria	11 (0.8)	418 (4.2)	◊ ◊	49 (1.9)	406 (2.0)	◊ ◊
Iran, Islamic Rep. of	7 (0.6)	474 (7.2)	-5 (1.0) ▼	57 (2.1)	436 (2.9)	-11 (2.7) ▼
Tunisia	18 (0.9)	446 (3.5)	-5 (1.4) ▼	32 (1.5)	444 (2.4)	-4 (2.3)
‡ Morocco	19 (1.5)	401 (5.0)	--	18 (1.7)	401 (6.2)	--
International Avg.	6 (0.1)	432 (1.5)		10 (0.1)	421 (1.4)	
Benchmarking Participants						
Ontario, Canada	1 (0.2)	~ ~	0 (0.2)	0 (0.1)	~ ~	0 (0.1)
Minnesota, US	2 (0.4)	~ ~	◊ ◊	0 (0.2)	~ ~	◊ ◊
Massachusetts, US	2 (0.3)	~ ~	◊ ◊	0 (0.1)	~ ~	◊ ◊
Basque Country, Spain	2 (0.3)	~ ~	-1 (0.5)	1 (0.2)	~ ~	0 (0.3)
Dubai, UAE	1 (0.3)	~ ~	◊ ◊	2 (0.2)	~ ~	◊ ◊
British Columbia, Canada	1 (0.2)	~ ~	◊ ◊	1 (0.1)	~ ~	◊ ◊
Quebec, Canada	1 (0.3)	~ ~	0 (0.4)	1 (0.2)	~ ~	0 (0.2)

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

▲ 2007 percent significantly higher
▼ 2007 percent significantly lower

the Netherlands, Denmark, and Canadian provinces of Alberta, Ontario, and British Columbia. As a contrast, 40 percent or more of fourth grade students in Morocco (46%), El Salvador (40%), Yemen and Algeria (55%), the Ukraine (40%), Georgia (42%), and Iran (75%) reported never using a computer.

At the fourth grade, computer use increased in a number of countries between 2003 and 2007. Students reported increases in using the computer both at home and in school in Italy, Hungary, Tunisia, Latvia, and the Russian Federation and in using the computer at home but not in school in 16 countries and 2 benchmarking entities.

At eighth grade, 42 percent of students, on average across countries, reported using a computer both at home and at school and 25 percent at home only. Compared to fourth grade, relatively more students (16% vs. 9%) reported using a computer at school but not at home and relatively fewer reported not using a computer at all (10% vs. 17%). There was a stronger association between using a computer and science achievement at eighth grade, with highest average achievement (482 points) among students using a computer both at home and at school, next highest (466 points) among those using a computer at home but not at school, somewhat similar among those using a computer at school but not at home and those using a computer only at places other than home and school (428 and 432 points, respectively), and lowest (421 points) among those not using a computer at all.

Eighth grade TIMSS participants with the highest percentages of students (more than 70%) of students using a computer both at home and at school included Chinese Taipei, Hong Kong SAR, Malta, Australia, England, the Czech Republic, Cyprus, Scotland, the province of Ontario, and the states of Minnesota and Massachusetts. Lowest levels of computer use were reported in Ghana, Georgia, Algeria, and Iran, where 40 percent or more of eighth grade students reported never using a computer.

Similar to the findings at the fourth grade, computer use also increased at the eighth grade in a substantial number of countries. Students in 15 countries reported more use both at home and at school, and in 10 of

those countries there also were increases in use at home but not in school. Students in an additional 15 countries and 3 benchmarking entities reported increases in use at home but not at school. However, in 9 of these countries and 2 benchmarking entities the increase in use at home corresponded to a decrease in the use both at home and at school category.

How Much of Their Out-of-school Time Do Students Spend on Homework During the School Week?

Homework provides an opportunity for students to extend and consolidate what they have learned in school, and for teachers to extend the time for learning beyond what is available during the hours of formal schooling. Consequently, it might be expected that students who are assigned homework and who spend time on it would have higher achievement than students who do little or no homework. However, the situation is not as straightforward as that. The tradition of assigning homework and expecting students to devote a portion of their after-school time to completing this assignment varies from country to country and from grade to grade. In some countries and especially at the fourth grade, homework is rarely assigned, and when students spend time on homework, it often can be for remedial purposes, to enable them to catch up on material not fully mastered during class. Under these circumstances, lower achievement is associated with time spent on homework. Also, even when homework is regularly assigned as a means of extending classroom learning, the more able students may accomplish the assignment more expeditiously, resulting in a situation where high achievement is associated with less time spent on homework.

To summarize the amount of time typically devoted to science homework in each country, TIMSS constructed an index that assigns students to a high, medium, or low level on the basis of the frequency of science homework they are assigned each week and the amount of time they spend on it. Students at the high level of the Index of Time Students Spend Doing Science Homework (TSH) reported that they were assigned science homework at least 3–4 times a week and spend more than 30 minutes on each assignment. Students at the low level reported being assigned homework

no more than twice a week and spending no more than 30 minutes on each assignment. The medium level included all other response combinations. For each TIMSS 2007 participant, Exhibit 4.7 presents the percentages of fourth and eighth grade students at the three levels of the index, together with their average science achievement. Participants are ordered by the percentage of students at the high level of the index. At fourth grade, results are presented for science as a single subject for all participants. However, at eighth grade, the 20 countries that taught biology, earth science, chemistry, and physics as separate science subjects are presented in separate panels for each subject.

At fourth grade, students generally reported that they spent relatively little time on science homework, with 57 percent of students, on average across countries, at the low level of the index (30 minutes or less no more than twice a week). Thirty-five percent of students were at the medium level and just 9 percent at the high level. The highest percentages of students at the low level of the index (80% or more) were in Denmark, Austria, Norway, the Czech Republic, Australia, Sweden, Japan, England, Scotland, the Netherlands, the states of Minnesota and Massachusetts, and the province of Quebec. Countries with the greatest percentages of students at the high level of the index (20% or more) included Colombia (23%), Yemen (21%), and El Salvador (20%). Average science achievement was highest among students at the low level of the homework index (488 points), next highest at the medium level (474 points), and lowest among students at the high level (446 points), i.e., those assigned most science homework.

Twenty-nine countries and all seven benchmarking participants taught science as a single subject at the eighth grade. On average across these, 14 percent of students were at the high level of the science homework index, 45 percent at the medium level, and 41 percent at the low level. Countries with the greatest homework emphasis (20% or more at the high level) included El Salvador, Colombia, Malaysia, Egypt, Ghana, Jordan, Singapore, and Thailand, and among benchmarking participants, British Columbia and Dubai. In contrast, 50 percent or more of students were at the low level of the index in Tunisia, Israel, the United States, England, Australia, Korea, Scotland, Japan, and the provinces of Ontario and Quebec. Average science

achievement was lower among students at the high level of the index than among students at the medium or low levels.

In countries teaching the sciences as separate subjects at the eighth grade, on average 10 percent of students were at the high level of the homework index in biology, compared with 9 percent for earth science, and 13 percent in both chemistry and physics. Countries with highest percentages of students at the high level of the homework index in all four science subjects included the Russian Federation, the Syrian Arab Republic, and Ukraine (among the top five countries in all four subjects). In each science subject, average achievement was lowest among students at the high level of the science homework index.

Exhibit 4.7 **Index of Time Students Spend Doing Science Homework (TSH) in a Normal School Week**

TIMSS2007
Science 4th Grade

Country		High TSH		Medium TSH		Low TSH	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Colombia	r	23 (1.1)	423 (6.5)	55 (1.2)	407 (5.5)	22 (1.4)	426 (6.1)
Yemen	r	21 (2.0)	232 (11.3)	57 (2.6)	222 (7.5)	22 (2.6)	189 (15.2)
El Salvador	r	20 (1.0)	403 (5.0)	59 (1.3)	398 (4.1)	21 (1.4)	413 (4.2)
Tunisia	r	19 (1.4)	357 (9.8)	50 (1.5)	347 (6.7)	31 (1.8)	347 (8.9)
Singapore		17 (0.7)	585 (5.7)	47 (0.9)	587 (4.9)	36 (0.9)	594 (4.5)
Algeria	r	17 (1.1)	364 (9.3)	47 (1.4)	359 (9.9)	36 (1.7)	369 (6.6)
Qatar	s	16 (0.6)	287 (7.3)	54 (0.8)	306 (3.2)	30 (0.7)	327 (3.1)
Italy		15 (1.2)	525 (5.6)	48 (2.2)	535 (3.7)	36 (2.7)	546 (4.5)
Kazakhstan		15 (1.5)	512 (13.6)	45 (2.6)	529 (6.0)	41 (3.0)	545 (5.1)
Latvia		13 (1.0)	527 (5.0)	43 (1.1)	541 (2.8)	44 (1.4)	554 (3.3)
Slovenia		13 (0.8)	505 (4.9)	66 (1.2)	523 (2.2)	21 (1.2)	524 (3.4)
Morocco	r	13 (1.0)	289 (9.1)	46 (2.2)	305 (7.8)	42 (2.2)	328 (9.3)
Armenia	r	12 (0.9)	476 (8.4)	51 (1.6)	495 (7.5)	37 (1.7)	494 (6.5)
Iran, Islamic Rep. of		12 (0.9)	438 (8.7)	44 (1.5)	435 (5.4)	45 (2.0)	437 (4.7)
Kuwait	r	12 (0.8)	328 (10.1)	54 (1.5)	361 (4.5)	35 (1.5)	390 (6.7)
Georgia		10 (1.1)	415 (11.8)	45 (1.9)	415 (4.8)	46 (2.0)	440 (5.2)
Ukraine		8 (0.7)	449 (6.3)	40 (1.3)	471 (3.8)	52 (1.4)	490 (3.7)
Lithuania		8 (0.5)	496 (4.8)	35 (1.0)	511 (3.3)	57 (1.2)	524 (2.7)
Russian Federation		6 (0.7)	508 (9.6)	34 (1.3)	539 (5.2)	60 (1.6)	558 (4.9)
Hungary		6 (0.5)	520 (6.8)	33 (1.2)	532 (4.1)	61 (1.3)	549 (3.7)
Hong Kong SAR		5 (0.5)	547 (8.8)	43 (1.8)	562 (4.4)	52 (2.0)	554 (3.3)
Germany	r	4 (0.4)	512 (6.5)	30 (1.3)	527 (3.4)	66 (1.4)	536 (2.6)
Slovak Republic		3 (0.3)	498 (10.2)	24 (1.0)	513 (4.5)	73 (1.2)	540 (3.7)
New Zealand		3 (0.3)	463 (12.6)	23 (1.0)	503 (4.0)	74 (1.1)	515 (3.0)
United States		3 (0.2)	502 (8.1)	23 (1.0)	532 (3.3)	75 (1.1)	549 (2.8)
Chinese Taipei		2 (0.3)	~ ~	19 (0.9)	538 (4.2)	79 (1.0)	567 (1.9)
Denmark		2 (0.3)	~ ~	13 (1.0)	501 (4.8)	85 (1.0)	522 (2.9)
Austria		2 (0.3)	~ ~	14 (0.9)	493 (6.0)	84 (1.0)	537 (2.7)
Norway		1 (0.3)	~ ~	16 (1.2)	467 (5.4)	83 (1.3)	486 (3.4)
Czech Republic		1 (0.3)	~ ~	16 (0.9)	496 (5.6)	83 (0.9)	523 (3.2)
Australia		1 (0.2)	~ ~	17 (1.5)	520 (6.9)	81 (1.6)	536 (3.1)
Sweden		1 (0.2)	~ ~	19 (1.1)	514 (5.4)	80 (1.2)	533 (2.7)
Japan		1 (0.2)	~ ~	15 (1.1)	539 (3.9)	84 (1.2)	551 (2.2)
England		1 (0.2)	~ ~	16 (1.4)	540 (8.4)	83 (1.4)	547 (2.8)
Scotland		1 (0.1)	~ ~	10 (0.9)	490 (5.8)	89 (0.9)	507 (2.4)
Netherlands		1 (0.2)	~ ~	9 (1.0)	509 (5.5)	91 (1.1)	527 (2.8)
International Avg.		9 (0.1)	446 (2.2)	35 (0.2)	474 (1.2)	57 (0.3)	488 (1.2)
Benchmarking Participants							
Dubai, UAE	r	10 (1.0)	450 (7.7)	37 (1.4)	461 (4.3)	53 (1.6)	488 (4.7)
Alberta, Canada		3 (0.4)	503 (11.4)	22 (1.2)	532 (4.9)	75 (1.5)	550 (3.6)
British Columbia, Canada		3 (0.4)	496 (10.2)	24 (1.4)	529 (5.3)	73 (1.5)	544 (3.0)
Ontario, Canada		3 (0.5)	527 (15.9)	26 (1.4)	522 (5.7)	71 (1.6)	544 (3.8)
Minnesota, US		2 (0.3)	~ ~	16 (2.1)	537 (8.4)	83 (2.3)	560 (5.6)
Massachusetts, US		1 (0.3)	~ ~	17 (1.6)	572 (10.2)	82 (1.7)	575 (3.8)
Quebec, Canada		1 (0.2)	~ ~	12 (1.0)	511 (5.4)	87 (1.0)	522 (2.5)

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

Index based on students' reports on the frequency of science homework they are given and the amount of time they spend on that homework. High level indicates science homework assigned at least 3 or 4 times a week and students spend more than 30 minutes on that homework. Low level indicates science homework assigned no more than twice a week and students spend no more than 30 minutes on that homework. Medium level includes all other possible combinations of responses.

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

**Exhibit 4.7 Index of Time Students Spend Doing Science Homework (TSH)
in a Normal School Week (Continued)**
TIMSS2007
Science 8th
Grade
General/Integrated Science

Country	High TSH		Medium TSH		Low TSH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
El Salvador	33 (1.2)	395 (3.2)	50 (0.9)	386 (3.3)	17 (1.0)	389 (4.6)
Colombia	30 (1.3)	419 (4.3)	50 (1.0)	420 (3.6)	21 (1.2)	411 (5.4)
Malaysia	27 (1.0)	480 (6.2)	46 (0.8)	471 (5.9)	27 (1.2)	469 (7.7)
Egypt	25 (1.0)	392 (4.8)	64 (1.2)	425 (3.4)	11 (1.0)	417 (8.4)
Ghana	23 (0.9)	321 (7.3)	54 (0.9)	302 (5.4)	23 (1.0)	318 (6.0)
Jordan	22 (1.1)	477 (5.3)	57 (1.1)	490 (3.9)	21 (1.4)	490 (6.3)
Singapore	21 (0.7)	586 (3.8)	45 (1.0)	579 (4.9)	34 (1.2)	552 (5.7)
Thailand	21 (0.9)	472 (5.5)	48 (0.8)	473 (4.6)	30 (1.2)	469 (5.2)
Turkey	18 (1.1)	458 (5.4)	45 (1.0)	456 (4.0)	37 (1.5)	456 (4.8)
Palestinian Nat'l Auth.	17 (1.2)	406 (5.1)	52 (1.5)	405 (4.4)	31 (1.8)	424 (4.9)
Botswana	15 (0.8)	364 (5.6)	45 (1.0)	359 (3.3)	40 (1.1)	364 (4.0)
Chinese Taipei	15 (1.3)	591 (5.0)	40 (1.4)	576 (3.6)	46 (2.1)	552 (4.4)
Qatar	13 (0.4)	321 (4.8)	54 (0.6)	329 (2.3)	33 (0.6)	322 (2.5)
Norway	11 (0.9)	486 (3.3)	43 (1.3)	488 (2.4)	45 (1.8)	492 (3.1)
Kuwait	11 (0.6)	403 (5.9)	47 (1.5)	427 (3.4)	41 (1.7)	427 (3.5)
Italy	11 (0.7)	485 (5.4)	42 (1.2)	496 (4.3)	47 (1.3)	501 (2.8)
Tunisia	11 (0.7)	435 (4.0)	37 (1.1)	444 (3.0)	52 (1.3)	450 (2.2)
Bahrain	11 (0.6)	465 (5.0)	50 (1.0)	470 (2.3)	39 (1.0)	477 (3.0)
Oman	10 (0.6)	408 (6.3)	69 (1.4)	433 (3.1)	21 (1.5)	421 (4.4)
Israel	10 (0.7)	456 (9.4)	40 (1.3)	465 (5.9)	50 (1.3)	490 (4.3)
Saudi Arabia	9 (0.6)	384 (8.7)	61 (1.4)	414 (2.8)	30 (1.6)	403 (4.3)
United States	9 (0.7)	503 (5.4)	41 (1.3)	526 (3.1)	50 (1.5)	524 (3.4)
Hong Kong SAR	8 (0.8)	523 (7.3)	43 (1.4)	540 (4.7)	48 (1.6)	531 (5.7)
Iran, Islamic Rep. of	8 (0.7)	476 (8.6)	45 (1.4)	462 (3.9)	47 (1.5)	454 (4.0)
England	7 (0.9)	588 (8.6)	31 (1.1)	558 (5.0)	62 (1.4)	536 (4.7)
Australia	6 (0.6)	539 (8.9)	32 (1.1)	529 (4.3)	62 (1.4)	511 (4.1)
Korea, Rep. of	2 (0.4)	~ ~	20 (1.4)	556 (3.6)	77 (1.6)	556 (2.2)
Scotland	2 (0.3)	~ ~	22 (0.9)	500 (4.2)	76 (1.0)	500 (3.5)
Japan	1 (0.2)	~ ~	20 (1.1)	550 (3.7)	79 (1.2)	558 (2.1)
International Avg.	14 (0.2)	455 (1.2)	45 (0.2)	466 (0.8)	41 (0.3)	464 (0.9)
Benchmarking Participants						
British Columbia, Canada	27 (1.3)	523 (3.7)	46 (1.2)	529 (3.2)	27 (1.7)	533 (4.2)
Dubai, UAE	20 (1.1)	509 (5.4)	41 (1.7)	501 (3.5)	39 (1.8)	482 (4.6)
Basque Country, Spain	15 (1.5)	491 (5.4)	44 (2.0)	499 (3.7)	40 (2.3)	502 (3.7)
Massachusetts, US	13 (1.8)	546 (8.1)	52 (3.2)	564 (6.0)	35 (4.3)	552 (6.6)
Minnesota, US	12 (2.3)	526 (8.1)	45 (2.3)	540 (5.7)	43 (3.3)	543 (4.9)
Ontario, Canada	8 (0.9)	526 (9.2)	37 (1.7)	534 (4.1)	55 (2.1)	526 (4.2)
Quebec, Canada	3 (0.4)	511 (10.0)	20 (1.1)	519 (5.5)	77 (1.3)	508 (2.7)

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

Index based on students' reports on the frequency of science homework they are given and the amount of time they spend on that homework. High level indicates science homework assigned at least 3 or 4 times a week and students spend more than 30 minutes on that homework. Low level indicates science homework assigned no more than twice a week and students spend no more than 30 minutes on that homework. Medium level includes all other possible combinations of responses.

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

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

Exhibit 4.7 **Index of Time Students Spend Doing Science Homework (TSH) in a Normal School Week (Continued)**

TIMSS2007
Science **8th** Grade

Biology							
Country		High TSH		Medium TSH		Low TSH	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Syrian Arab Republic	r	24 (1.1)	453 (4.1)	51 (1.0)	458 (2.6)	25 (1.0)	464 (3.9)
Russian Federation		20 (1.1)	514 (7.0)	52 (0.9)	530 (4.1)	28 (1.2)	544 (4.7)
Ukraine		18 (0.9)	481 (5.4)	49 (0.9)	489 (3.4)	33 (0.9)	494 (4.3)
Armenia	r	15 (0.9)	484 (8.9)	49 (1.0)	488 (6.5)	36 (1.1)	494 (5.7)
Indonesia		12 (0.7)	434 (7.1)	47 (1.3)	430 (4.0)	41 (1.4)	428 (3.7)
Georgia	r	11 (0.9)	419 (8.0)	51 (1.9)	429 (5.7)	38 (2.3)	438 (5.3)
Lithuania		10 (0.8)	495 (6.2)	40 (1.2)	512 (3.5)	49 (1.5)	532 (2.9)
Serbia		10 (0.9)	455 (5.9)	24 (0.9)	468 (4.5)	66 (1.4)	479 (3.4)
Lebanon	r	8 (0.8)	409 (12.2)	41 (1.7)	400 (5.7)	51 (1.7)	433 (6.3)
Bulgaria	r	8 (0.9)	456 (13.4)	26 (1.5)	468 (8.0)	67 (1.9)	483 (6.1)
Romania		8 (0.8)	430 (8.3)	22 (1.1)	449 (5.4)	70 (1.5)	476 (4.1)
Bosnia and Herzegovina		7 (0.5)	462 (5.0)	28 (1.1)	453 (4.1)	65 (1.1)	476 (3.2)
Hungary		6 (0.5)	521 (5.9)	35 (1.3)	528 (4.0)	59 (1.6)	549 (3.0)
Malta	r	5 (0.3)	497 (7.3)	22 (0.7)	517 (3.9)	74 (0.7)	452 (2.0)
Slovenia		5 (0.5)	506 (8.2)	39 (1.1)	533 (3.0)	56 (1.3)	546 (2.3)
Cyprus	s	2 (0.3)	~ ~	7 (0.6)	398 (9.0)	90 (0.8)	455 (2.2)
Sweden		2 (0.2)	~ ~	32 (1.1)	512 (3.2)	66 (1.1)	516 (2.6)
Czech Republic		1 (0.1)	~ ~	9 (0.8)	519 (4.8)	90 (0.8)	542 (2.0)
Algeria		--	--	--	--	--	--
‡ Morocco	r	11 (0.8)	402 (6.6)	39 (1.9)	405 (3.9)	50 (2.3)	407 (3.7)
International Avg.		10 (0.2)	464 (2.1)	35 (0.3)	473 (1.4)	55 (0.3)	485 (1.0)

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

Earth Science							
Country		High TSH		Medium TSH		Low TSH	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Russian Federation		21 (1.2)	515 (5.9)	50 (0.9)	532 (4.2)	29 (1.3)	542 (4.8)
Syrian Arab Republic	r	18 (1.0)	455 (4.7)	45 (1.2)	457 (2.8)	37 (1.3)	462 (3.5)
Ukraine		16 (0.8)	477 (4.7)	47 (1.0)	489 (3.4)	36 (1.2)	495 (4.4)
Romania		15 (1.4)	460 (7.3)	28 (1.2)	458 (4.6)	58 (2.0)	472 (4.2)
Lithuania		13 (0.8)	498 (5.2)	41 (1.1)	512 (3.4)	46 (1.4)	533 (2.8)
Armenia	r	13 (0.8)	482 (6.8)	43 (1.2)	490 (5.3)	44 (1.2)	494 (6.1)
Serbia		9 (0.9)	453 (8.4)	25 (1.1)	468 (5.2)	66 (1.5)	479 (3.3)
Georgia	r	8 (0.6)	411 (7.8)	36 (2.4)	422 (8.0)	57 (2.8)	438 (5.3)
Bosnia and Herzegovina		7 (0.5)	443 (5.7)	25 (1.0)	454 (3.7)	68 (1.1)	477 (3.1)
Bulgaria	r	6 (0.7)	458 (15.0)	24 (1.6)	474 (7.9)	69 (1.9)	480 (6.5)
Cyprus		6 (0.4)	425 (6.5)	39 (0.9)	455 (3.0)	55 (1.0)	460 (2.4)
Hungary		6 (0.5)	519 (7.1)	34 (1.7)	528 (4.0)	60 (1.9)	550 (3.1)
Slovenia		4 (0.5)	509 (7.1)	37 (1.1)	535 (3.2)	59 (1.1)	543 (2.4)
Malta	r	3 (0.3)	437 (11.9)	22 (0.7)	462 (4.8)	75 (0.7)	462 (1.9)
Sweden		2 (0.3)	~ ~	31 (1.2)	511 (3.4)	66 (1.2)	516 (2.6)
Czech Republic		1 (0.2)	~ ~	11 (0.8)	529 (4.9)	88 (0.9)	542 (2.1)
Algeria		--	--	--	--	--	--
Indonesia		--	--	--	--	--	--
Lebanon		--	--	--	--	--	--
‡ Morocco	r	11 (1.0)	400 (6.9)	36 (1.4)	405 (3.8)	53 (2.0)	409 (4.0)
International Avg.		9 (0.2)	463 (2.1)	34 (0.3)	481 (1.2)	57 (0.4)	491 (1.0)

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

**Exhibit 4.7 Index of Time Students Spend Doing Science Homework (TSH)
in a Normal School Week (Continued)**
TIMSS2007
Science **8th**
Grade

Chemistry						
Country	High TSH		Medium TSH		Low TSH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Russian Federation	33 (1.5)	521 (5.1)	48 (1.0)	533 (4.2)	19 (1.2)	546 (5.2)
Syrian Arab Republic	r 24 (1.1)	455 (3.9)	48 (0.9)	458 (2.5)	28 (1.0)	464 (4.1)
Armenia	r 23 (1.1)	487 (9.0)	48 (1.5)	496 (6.7)	29 (1.6)	489 (5.4)
Ukraine	21 (1.1)	480 (4.9)	47 (1.0)	490 (3.2)	32 (1.1)	495 (4.5)
Georgia	r 19 (1.1)	436 (6.2)	52 (1.2)	428 (6.1)	29 (1.5)	432 (6.8)
Lithuania	17 (0.8)	499 (4.7)	43 (0.9)	516 (3.1)	41 (1.3)	534 (3.1)
Serbia	11 (0.7)	463 (6.3)	29 (1.0)	472 (4.0)	60 (1.3)	478 (3.7)
Romania	11 (0.7)	440 (6.8)	31 (1.6)	457 (5.1)	59 (2.0)	475 (4.2)
Bulgaria	r 10 (1.1)	461 (10.6)	29 (1.4)	474 (8.0)	60 (1.7)	481 (6.1)
Bosnia and Herzegovina	10 (0.5)	454 (5.6)	27 (1.0)	458 (4.0)	63 (1.1)	475 (3.1)
Cyprus	9 (0.5)	431 (6.1)	38 (0.8)	452 (2.8)	53 (0.9)	462 (2.2)
Hungary	8 (0.6)	520 (6.4)	34 (1.4)	531 (3.7)	58 (1.7)	550 (3.4)
Lebanon	r 8 (0.8)	396 (11.1)	42 (1.5)	408 (6.7)	50 (1.6)	430 (5.6)
Slovenia	7 (0.6)	515 (5.9)	42 (1.0)	537 (2.9)	51 (1.1)	544 (2.3)
Malta	s 3 (0.3)	537 (10.3)	14 (0.6)	555 (4.6)	83 (0.6)	451 (1.8)
Sweden	2 (0.3)	~ ~	33 (1.0)	509 (3.5)	65 (1.1)	518 (2.6)
Czech Republic	1 (0.2)	~ ~	13 (0.9)	519 (5.6)	86 (1.0)	543 (2.1)
Algeria	--	--	--	--	--	--
Indonesia	--	--	--	--	--	--
‡ Morocco	r 12 (0.8)	397 (8.1)	40 (1.4)	403 (4.0)	48 (1.8)	410 (3.9)
International Avg.	13 (0.2)	468 (1.9)	37 (0.3)	483 (1.2)	51 (0.3)	488 (1.1)

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

Physics						
Country	High TSH		Medium TSH		Low TSH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Russian Federation	28 (1.3)	520 (5.1)	48 (1.0)	533 (4.4)	24 (1.0)	539 (4.9)
Armenia	r 24 (1.1)	491 (7.4)	52 (1.4)	492 (5.4)	24 (1.1)	485 (6.1)
Syrian Arab Republic	r 22 (0.9)	453 (3.7)	48 (0.9)	456 (2.5)	30 (1.0)	465 (4.2)
Georgia	r 20 (1.2)	432 (6.1)	52 (1.2)	428 (6.0)	28 (1.6)	431 (6.0)
Ukraine	20 (1.1)	478 (4.5)	48 (0.8)	489 (3.6)	32 (1.1)	496 (4.1)
Lithuania	16 (0.8)	503 (4.2)	42 (0.9)	512 (3.5)	42 (1.3)	534 (2.7)
Indonesia	16 (0.7)	437 (5.5)	53 (1.1)	431 (3.9)	31 (1.2)	424 (4.0)
Bosnia and Herzegovina	12 (0.7)	457 (4.5)	31 (1.1)	462 (3.8)	57 (1.2)	474 (3.2)
Serbia	11 (0.7)	456 (6.2)	29 (1.1)	474 (4.5)	61 (1.4)	478 (3.6)
Cyprus	11 (0.6)	430 (4.9)	40 (0.8)	455 (2.7)	50 (1.1)	461 (2.4)
Slovenia	10 (0.8)	520 (4.4)	40 (1.0)	537 (2.9)	50 (1.2)	543 (2.5)
Lebanon	r 9 (0.8)	395 (10.2)	42 (1.6)	412 (6.6)	49 (1.8)	429 (6.0)
Bulgaria	r 9 (0.8)	460 (9.8)	30 (1.3)	475 (6.6)	62 (1.7)	481 (6.5)
Malta	9 (0.5)	456 (6.0)	36 (0.8)	477 (2.7)	56 (0.8)	455 (1.9)
Hungary	7 (0.6)	515 (6.4)	33 (1.3)	529 (3.7)	60 (1.6)	550 (3.4)
Romania	r 5 (0.6)	439 (9.7)	27 (1.7)	451 (5.1)	68 (1.8)	474 (3.8)
Sweden	2 (0.3)	~ ~	32 (1.0)	510 (3.4)	66 (1.1)	518 (2.6)
Czech Republic	2 (0.3)	~ ~	13 (0.9)	518 (4.9)	85 (1.1)	544 (2.1)
Algeria	--	--	--	--	--	--
‡ Morocco	r 15 (0.8)	391 (6.3)	44 (1.4)	401 (3.6)	40 (1.5)	415 (3.9)
International Avg.	13 (0.2)	461 (1.6)	39 (0.3)	476 (1.1)	48 (0.3)	484 (1.1)

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

What Are Students' Attitudes Toward Science?

Developing positive attitudes toward science and scientific explanations is an important goal of the science curriculum in many countries. To summarize information about progress toward these goals, TIMSS examined students' general attitudes toward science, the value they place on science as a way of improving their lives, and their self-confidence in learning science.

To investigate how students feel about science, TIMSS created an Index of Students' Positive Affect Toward Science (PATs), based on students' responses to three statements about science:

- ▶ I enjoy learning science.
- ▶ Science is boring.⁴
- ▶ I like science.

In countries where the sciences are taught as separate subjects at the eighth grade, students were asked about each subject separately. Students were asked to indicate if they *agreed a lot*, *agreed a little*, *disagreed a little*, or *disagreed a lot* with each statement. Students who agreed a little or a lot on average with all three statements were assigned to the high level of the index (i.e., have a positive attitude toward science), while those who disagreed a little or a lot, on average, were assigned to the low level of the index. The medium level includes all other response combinations. For each TIMSS participant at the fourth and eighth grades, the percentage of students at each level of the index is presented in Exhibit 4.8, together with average science achievement. The exhibit also shows changes in percentages since 1995 at the fourth grade, and since 1995 and 1999 at the eighth grade (comparable data were not available from 2003).

Fourth grade students generally had very positive attitudes toward science, with 77 percent, on average across countries, at the high level of the index. There were 13 percent of students at the medium level and 11 percent at the low level. The highest percentage of students at the high level of the index was in Kazakhstan (90%), while countries with proportionately more students with less positive attitudes included the Netherlands, the Czech Republic,

4 The response categories for this statement were reversed in constructing the index.

England, and Denmark, where more than 20 percent of students were at the low level. Australia, Austria, and Latvia, as well as Minnesota and Quebec, had increased percentages of students at the high level in 2007 compared to 1995, whereas Singapore, Slovenia, the Czech Republic, and England showed declines. Across countries, fourth grade students at the high level of the Index of Students' Positive Affect Toward Science had higher average science achievement than students at the medium or low level.

For eighth grade students, Exhibit 4.8 presents results first for the countries and benchmarking participants who teach science as a single subject, and then for countries that teach the four science subjects separately. On average across single-science countries, 65 percent of eighth grade students were at the high level of the positive affect index, compared with 19 percent at the medium level and 16 percent at the low level. Countries with most students expressing positive attitudes included Tunisia, Botswana, Colombia, Oman, Egypt, and Ghana, where 80 percent or more were at the high index level. In contrast, less than half the students in Italy, Australia, Japan, Chinese Taipei, Korea, and the Basque Country of Spain were at the high level of the index. Only Korea (from 1999 and 1995) and Japan (from 1995) showed increased percentages at the high level in 2007, while many countries had declines. Decreased percentages compared to 1999 are shown for Iran, Malaysia, Thailand, Singapore, Hong Kong SAR, England, the United States, Israel, Italy, Chinese Taipei, and the province of British Columbia. Iran, Singapore, Scotland, and England also had declines since 1995. Average science achievement was higher among students at the high index level (476 points) than among those at the medium level (442 points) or the low level (436 points).

On average across the separate science countries, attitudes to biology were about as positive as attitudes to general science in the single science countries (66% at high index level), but somewhat less positive in earth science (58%), and especially in chemistry and physics (both 50%). For each of the four science subjects, average science achievement was higher among

students with the most positive attitudes (i.e., students at the high level of the index).

In addition to having a positive attitude toward science, students' may be more attracted to science and more motivated to learn it if they perceive science achievement as advantageous to their future education and the world of work. The TIMSS Index of Students' Valuing Science (SVS) is based on eighth grade students' responses to four statements about science:

- ▶ I think learning science will help me in my daily life.
- ▶ I need science to learn other school subjects.
- ▶ I need to do well in science to get into the university of my choice.
- ▶ I need to do well in science to get the job I want.

Exhibit 4.8 Index of Students' Positive Affect Toward Science (PATS) with Trends

TIMSS2007
Science **4th**
Grade

Country	High PATS			Medium PATS			Low PATS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1995
Kazakhstan	90 (1.1)	535 (5.7)	0 0	6 (0.9)	517 (12.8)	0 0	4 (0.5)	515 (10.3)	0 0
Colombia	88 (0.8)	410 (5.4)	0 0	8 (0.7)	378 (12.6)	0 0	4 (0.5)	390 (14.4)	0 0
Algeria	87 (0.9)	365 (5.6)	0 0	9 (0.5)	309 (10.6)	0 0	4 (0.6)	305 (15.0)	0 0
Tunisia	86 (1.0)	348 (5.5)	0 0	10 (0.7)	238 (9.5)	0 0	4 (0.5)	212 (15.1)	0 0
Iran, Islamic Rep. of	r 86 (1.1)	452 (4.2)	3 (1.7)	8 (0.7)	393 (8.2)	-6 (1.3) ▼	6 (0.7)	377 (10.4)	3 (0.8) ▲
Kuwait	85 (0.9)	370 (4.5)	--	8 (0.6)	289 (8.3)	--	7 (0.5)	300 (10.8)	--
Morocco	83 (1.1)	315 (6.0)	0 0	11 (0.9)	262 (14.4)	0 0	5 (0.6)	220 (13.1)	0 0
Ukraine	83 (0.9)	483 (3.0)	0 0	10 (0.6)	456 (6.3)	0 0	7 (0.6)	457 (7.0)	0 0
Georgia	82 (1.0)	428 (4.4)	0 0	12 (0.7)	402 (7.3)	0 0	6 (0.8)	414 (7.1)	0 0
Japan	81 (0.9)	553 (2.1)	1 (1.4)	12 (0.6)	534 (4.1)	-1 (0.9)	7 (0.5)	523 (6.1)	1 (0.8)
Lithuania	81 (1.0)	517 (2.6)	0 0	12 (0.7)	500 (4.6)	0 0	7 (0.6)	510 (4.6)	0 0
Germany	81 (0.8)	536 (2.5)	0 0	11 (0.6)	514 (5.4)	0 0	8 (0.5)	501 (4.7)	0 0
El Salvador	79 (0.9)	399 (3.7)	0 0	15 (0.7)	365 (5.3)	0 0	6 (0.5)	371 (8.8)	0 0
Hong Kong SAR	79 (1.0)	562 (3.4)	-2 (2.1)	11 (0.6)	528 (5.2)	-1 (1.0)	10 (0.8)	522 (5.4)	3 (1.6) ▲
Qatar	79 (0.5)	319 (2.7)	0 0	12 (0.4)	257 (4.8)	0 0	10 (0.3)	262 (5.5)	0 0
Italy	78 (0.8)	541 (3.3)	--	12 (0.6)	522 (4.1)	--	10 (0.5)	516 (5.2)	--
Australia	78 (1.3)	534 (3.6)	4 (1.7) ▲	11 (0.8)	513 (5.8)	-1 (1.0)	11 (0.8)	505 (5.1)	-2 (1.1) ▼
Russian Federation	78 (1.0)	552 (4.5)	0 0	13 (0.8)	540 (7.2)	0 0	9 (0.5)	521 (8.1)	0 0
Armenia	r 77 (1.4)	493 (5.0)	0 0	12 (1.1)	493 (17.4)	0 0	11 (0.8)	490 (14.7)	0 0
Slovak Republic	76 (1.1)	531 (4.4)	0 0	12 (0.7)	514 (7.3)	0 0	12 (0.8)	525 (6.5)	0 0
New Zealand	75 (0.8)	513 (2.6)	0 (1.5)	14 (0.5)	482 (5.7)	1 (1.0)	11 (0.5)	480 (5.3)	-1 (1.1)
United States	75 (0.8)	545 (2.5)	-1 (1.3)	13 (0.4)	529 (4.1)	0 (0.8)	12 (0.6)	521 (4.4)	1 (0.9)
Chinese Taipei	75 (1.4)	564 (2.0)	0 0	14 (0.7)	539 (4.2)	0 0	11 (0.9)	534 (4.5)	0 0
Austria	75 (0.9)	530 (2.6)	6 (1.7) ▲	13 (0.6)	518 (4.1)	-4 (1.1) ▼	12 (0.7)	510 (4.2)	-2 (1.3)
Singapore	75 (0.7)	598 (4.0)	-9 (1.1) ▼	15 (0.5)	557 (6.0)	3 (0.8) ▲	11 (0.5)	553 (5.8)	5 (0.6) ▲
Yemen	r 74 (1.8)	226 (8.3)	0 0	17 (1.2)	167 (7.6)	0 0	9 (0.9)	161 (11.1)	0 0
Sweden	73 (1.0)	531 (3.2)	0 0	14 (0.7)	512 (4.0)	0 0	13 (0.6)	509 (4.1)	0 0
Norway	71 (1.2)	484 (3.4)	1 (1.9)	14 (0.8)	468 (4.9)	-2 (1.2)	15 (0.9)	463 (6.8)	1 (1.4)
Latvia	71 (1.1)	544 (2.5)	5 (1.8) ▲	16 (0.7)	538 (4.2)	-7 (1.3) ▼	13 (0.9)	541 (5.3)	2 (1.3)
Scotland	70 (1.3)	505 (2.5)	--	14 (0.7)	498 (4.6)	--	16 (1.1)	483 (4.9)	--
Hungary	69 (1.3)	544 (3.3)	-1 (2.0)	14 (0.6)	522 (6.7)	-4 (1.0) ▼	18 (1.1)	527 (5.5)	5 (1.5) ▲
Slovenia	69 (1.0)	523 (2.2)	-7 (1.8) ▼	14 (0.6)	510 (4.0)	-3 (1.2) ▼	17 (0.9)	509 (3.2)	10 (1.1) ▲
Netherlands	66 (1.5)	528 (2.8)	3 (2.2)	11 (0.6)	514 (4.1)	-4 (1.1) ▼	23 (1.3)	515 (4.0)	1 (1.8)
Czech Republic	64 (1.4)	521 (3.4)	-9 (1.9) ▼	15 (0.7)	504 (5.8)	0 (1.0)	21 (1.1)	509 (3.6)	9 (1.4) ▲
England	59 (1.2)	548 (3.4)	-13 (1.9) ▼	17 (0.7)	538 (4.7)	4 (1.1) ▲	24 (1.1)	533 (4.1)	9 (1.5) ▲
Denmark	59 (1.9)	525 (3.2)	0 0	20 (1.1)	510 (4.3)	0 0	21 (1.5)	507 (4.1)	0 0
International Avg.	77 (0.2)	485 (0.7)		13 (0.1)	456 (1.2)		11 (0.1)	452 (1.3)	
Benchmarking Participants									
Dubai, UAE	84 (1.0)	474 (3.4)	0 0	9 (0.6)	440 (11.2)	0 0	8 (0.7)	415 (10.7)	0 0
Minnesota, US	79 (1.9)	554 (6.6)	7 (3.1) ▲	11 (1.0)	549 (8.7)	-3 (1.6)	10 (1.2)	542 (8.6)	-4 (2.0) ▼
Quebec, Canada	78 (1.2)	522 (2.9)	9 (4.0) ▲	10 (0.8)	497 (5.2)	-5 (2.1) ▼	12 (0.8)	502 (6.1)	-5 (3.4)
Massachusetts, US	77 (1.5)	576 (4.7)	0 0	12 (0.9)	563 (6.9)	0 0	11 (1.2)	552 (6.8)	0 0
Alberta, Canada	75 (1.2)	547 (3.7)	2 (2.5)	13 (0.7)	533 (6.2)	-1 (1.4)	12 (0.7)	526 (6.4)	-1 (2.1)
British Columbia, Canada	72 (1.2)	542 (2.9)	0 0	14 (0.7)	530 (4.6)	0 0	14 (0.9)	522 (5.0)	0 0
Ontario, Canada	71 (1.4)	541 (4.0)	-4 (1.9)	14 (0.9)	531 (6.7)	0 (1.2)	15 (1.1)	523 (5.0)	3 (1.4) ▲

▲ 2007 percent significantly higher
▼ 2007 percent significantly lower

Index based on students' responses to three statements about science: 1) I enjoy learning science; 2) Science is boring (Reversed); 3) I like science. Average is computed across the three items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the three statements are assigned to the high level. Students disagreeing a little or a lot on average across the three statements are assigned to the low level. All other students are assigned to the middle level.

() 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.
A diamond (0) indicates the country did not participate in the assessment.

Exhibit 4.8 Index of Students' Positive Affect Toward Science (PATS) with Trends (Continued)
TIMSS2007
Science 8th Grade

General/Integrated Science								
Country	High PATS				Medium PATS			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Tunisia	88 (0.8)	447 (2.1)	1 (1.1)	0 0	7 (0.5)	428 (4.7)	1 (0.7)	0 0
Botswana	84 (0.8)	370 (3.1)	0 0	0 0	11 (0.6)	291 (5.7)	0 0	0 0
Colombia	83 (1.2)	419 (3.6)	0 0	3 (1.7)	12 (0.9)	416 (5.1)	0 0	-4 (1.3) ▼
Oman	82 (0.9)	434 (2.8)	0 0	0 0	14 (0.7)	387 (5.3)	0 0	0 0
Egypt	82 (1.3)	421 (3.6)	0 0	0 0	13 (1.2)	373 (6.9)	0 0	0 0
Ghana	80 (1.0)	320 (4.7)	0 0	0 0	16 (0.8)	254 (7.7)	0 0	0 0
Jordan	77 (1.7)	493 (3.7)	3 (2.0)	0 0	13 (0.9)	455 (7.4)	-3 (1.1) ▼	0 0
Turkey	77 (1.1)	461 (3.7)	--	0 0	15 (0.7)	435 (5.6)	--	0 0
El Salvador	77 (1.2)	390 (3.0)	0 0	0 0	17 (0.9)	380 (4.5)	0 0	0 0
Iran, Islamic Rep. of	73 (1.3)	467 (3.8)	-8 (1.5) ▼	-7 (1.8) ▼	17 (1.0)	444 (5.1)	5 (1.1) ▲	2 (1.3) ▲
Malaysia	73 (1.2)	483 (6.0)	-17 (1.4) ▼	0 0	18 (0.9)	438 (7.2)	12 (1.0) ▲	0 0
Palestinian Nat'l Auth.	70 (1.2)	421 (3.8)	0 0	0 0	18 (0.8)	377 (5.5)	0 0	0 0
Thailand	68 (1.2)	478 (4.5)	-9 (1.6) ▼	--	25 (0.9)	454 (4.7)	9 (1.1) ▲	--
Bahrain	68 (1.0)	476 (1.9)	0 0	0 0	18 (0.7)	455 (3.5)	0 0	0 0
Singapore	68 (0.9)	586 (4.3)	-10 (1.6) ▼	-14 (1.5) ▼	19 (0.7)	535 (6.1)	7 (1.0) ▲	6 (1.1) ▲
Saudi Arabia	68 (1.3)	413 (2.9)	0 0	0 0	19 (0.8)	389 (4.4)	0 0	0 0
Qatar	61 (0.6)	333 (1.8)	0 0	0 0	19 (0.5)	303 (3.9)	0 0	0 0
Hong Kong SAR	60 (1.4)	549 (4.8)	-4 (1.9) ▼	4 (2.2) ▲	22 (0.8)	508 (5.4)	4 (1.1) ▲	-5 (1.3) ▼
Kuwait	60 (1.1)	428 (3.2)	0 0	--	21 (0.7)	413 (4.5)	0 0	--
Norway	59 (1.3)	495 (2.1)	0 0	2 (2.1) ▲	20 (0.8)	483 (3.7)	0 0	-1 (1.2) ▼
Scotland	56 (1.3)	517 (3.4)	0 0	-13 (2.0) ▼	22 (0.8)	482 (4.5)	0 0	7 (1.1) ▲
England	55 (1.3)	561 (4.9)	-21 (1.6) ▼	-15 (1.8) ▼	20 (0.8)	532 (4.9)	9 (1.1) ▲	4 (1.2) ▲
United States	54 (1.2)	533 (2.9)	-6 (1.5) ▼	-1 (1.9) ▼	22 (0.5)	508 (3.6)	4 (0.8) ▲	-2 (0.9) ▼
Israel	51 (1.2)	492 (4.6)	-7 (1.8) ▼	--	22 (0.7)	453 (5.3)	3 (1.0) ▲	--
Italy	47 (1.1)	511 (3.7)	-16 (1.8) ▼	--	26 (0.9)	488 (3.6)	10 (1.2) ▲	--
Australia	47 (1.4)	535 (4.7)	--	-2 (1.7) ▼	22 (0.8)	504 (4.2)	--	-1 (1.1) ▼
Japan	47 (1.1)	574 (2.2)	1 (1.8) ▲	3 (1.7) ▲	28 (0.9)	545 (2.8)	5 (1.1) ▲	-2 (1.1) ▼
Chinese Taipei	40 (1.3)	597 (3.9)	-22 (1.7) ▼	0 0	24 (0.7)	552 (4.2)	8 (0.9) ▲	0 0
Korea, Rep. of	38 (1.1)	586 (2.4)	8 (1.5) ▲	4 (1.7) ▲	27 (0.7)	544 (2.9)	-3 (0.9) ▼	-15 (1.2) ▼
International Avg.	65 (0.2)	476 (0.7)			19 (0.1)	442 (0.9)		
Benchmarking Participants								
Dubai, UAE	68 (1.6)	506 (2.8)	0 0	0 0	18 (0.9)	469 (5.0)	0 0	0 0
Ontario, Canada	56 (1.8)	542 (3.2)	-4 (2.4) ▼	1 (2.4) ▲	21 (0.9)	514 (5.7)	5 (1.3) ▲	-3 (1.3) ▼
British Columbia, Canada	55 (1.4)	541 (3.3)	-5 (2.4) ▼	0 0	21 (0.8)	512 (3.8)	1 (1.5) ▼	0 0
Massachusetts, US	54 (2.9)	568 (6.6)	-5 (3.6) ▼	0 0	22 (1.3)	551 (5.3)	4 (1.6) ▲	0 0
Quebec, Canada	53 (2.0)	516 (3.8)	6 (3.9) ▲	5 (3.4) ▲	18 (1.0)	503 (6.3)	-4 (2.0) ▼	-4 (1.7) ▼
Minnesota, US	50 (2.1)	553 (5.4)	0 0	-3 (3.5) ▼	23 (1.2)	534 (5.6)	0 0	0 (2.0)
Basque Country, Spain	44 (1.7)	516 (3.5)	0 0	0 0	23 (1.2)	496 (3.9)	0 0	0 0

▲ 2007 percent significantly higher
 ▼ 2007 percent significantly lower

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

Index based on students' responses to three statements about science: 1) I enjoy learning science; 2) Science is boring (Reversed); 3) I like science. Average is computed across the three items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the three statements are assigned to the high level. Students disagreeing a little or a lot on average across the three statements are assigned to the low level. All other students are assigned to the middle level.

() 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.

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

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

A diamond (0) indicates the country did not participate in the assessment.

Exhibit 4.8 Index of Students' Positive Affect Toward Science (PATS) with Trends (Continued)

TIMSS2007
Science **8th** Grade

General/Integrated Science (Continued)

Country	Low PATS			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Tunisia	4 (0.4)	434 (7.1)	-2 (0.7) ▼	0 0
Botswana	5 (0.5)	274 (8.4)	0 0	0 0
Colombia	5 (0.4)	425 (8.6)	0 0	1 (0.7)
Oman	3 (0.4)	383 (13.0)	0 0	0 0
Egypt	5 (0.4)	363 (9.7)	0 0	0 0
Ghana	4 (0.3)	226 (10.7)	0 0	0 0
Jordan	10 (1.1)	470 (8.3)	-1 (1.3)	0 0
Turkey	8 (0.8)	429 (6.9)	--	0 0
El Salvador	6 (0.5)	395 (6.8)	0 0	0 0
Iran, Islamic Rep. of	9 (0.7)	448 (6.8)	3 (0.9) ▲	5 (0.9) ▲
Malaysia	8 (0.5)	434 (9.2)	5 (0.7) ▲	0 0
Palestinian Nat'l Auth.	12 (0.7)	380 (7.6)	0 0	0 0
Thailand	6 (0.5)	466 (7.2)	0 (0.7)	--
Bahrain	14 (0.8)	451 (4.7)	0 0	0 0
Singapore	13 (0.6)	517 (6.8)	3 (1.1) ▲	8 (0.8) ▲
Saudi Arabia	13 (0.9)	388 (4.4)	0 0	0 0
Qatar	20 (0.5)	307 (3.9)	0 0	0 0
Hong Kong SAR	19 (1.1)	498 (6.7)	0 (1.5)	0 (1.6)
Kuwait	20 (0.9)	408 (5.9)	0 0	--
Norway	21 (1.0)	472 (3.7)	0 0	0 (1.6)
Scotland	22 (1.1)	459 (4.3)	0 0	6 (1.5) ▲
England	25 (1.1)	510 (5.0)	12 (1.3) ▲	11 (1.4) ▲
United States	24 (0.9)	503 (3.5)	2 (1.1)	3 (1.3) ▲
Israel	28 (1.2)	452 (5.5)	4 (1.6) ▲	--
Italy	26 (1.0)	475 (3.5)	7 (1.5) ▲	--
Australia	31 (1.1)	494 (4.3)	--	3 (1.4)
Japan	25 (1.1)	529 (3.5)	-6 (1.7) ▼	-1 (1.5)
Chinese Taipei	35 (1.2)	527 (3.8)	14 (1.4) ▲	0 0
Korea, Rep. of	36 (1.0)	526 (2.6)	-5 (1.5) ▼	11 (1.6) ▲
International Avg.	16 (0.2)	436 (1.3)		

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

Benchmarking Participants

Dubai, UAE	14 (1.0)	463 (6.7)	0 0	0 0
Ontario, Canada	23 (1.3)	500 (5.3)	0 (1.8)	2 (1.9)
British Columbia, Canada	24 (1.1)	505 (3.3)	3 (1.7) ▲	0 0
Massachusetts, US	24 (2.3)	536 (4.6)	1 (2.9)	0 0
Quebec, Canada	30 (1.7)	497 (4.8)	-3 (3.5)	-2 (3.3)
Minnesota, US	26 (1.5)	516 (5.5)	0 0	3 (2.5)
Basque Country, Spain	33 (1.7)	476 (4.3)	0 0	0 0

- ▲ 2007 percent significantly higher
- ▼ 2007 percent significantly lower

Exhibit 4.8 Index of Students' Positive Affect Toward Science (PATS) with Trends (Continued)
TIMSS2007
 Science **8th**
 Grade

Biology								
Country	High PATS				Medium PATS			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Indonesia	86 (0.9)	429 (3.4)	--	0 0	11 (0.7)	415 (5.3)	--	0 0
Algeria	84 (0.8)	413 (1.8)	0 0	0 0	11 (0.6)	395 (3.9)	0 0	0 0
Syrian Arab Republic	78 (1.0)	463 (2.8)	0 0	0 0	15 (0.7)	434 (4.8)	0 0	0 0
Bulgaria	r 73 (1.5)	478 (6.5)	--	--	15 (1.0)	452 (8.8)	--	--
Georgia	73 (1.4)	436 (4.7)	0 0	0 0	16 (1.1)	400 (6.0)	0 0	0 0
Ukraine	72 (1.2)	490 (3.3)	0 0	0 0	17 (0.7)	480 (5.2)	0 0	0 0
Armenia	71 (1.0)	492 (6.5)	0 0	0 0	16 (0.7)	490 (7.8)	0 0	0 0
Bosnia and Herzegovina	68 (1.4)	470 (3.0)	0 0	0 0	14 (0.7)	465 (5.2)	0 0	0 0
Russian Federation	66 (1.4)	532 (3.7)	-9 (1.9)	▼ -4 (2.1)	21 (0.9)	523 (4.7)	5 (1.2)	▲ -2 (1.5)
Lebanon	61 (1.4)	436 (5.4)	0 0	0 0	23 (1.0)	392 (7.9)	0 0	0 0
Romania	61 (1.5)	466 (4.7)	-10 (2.0)	▼ -4 (2.1)	19 (0.8)	456 (4.8)	4 (1.1)	▲ -6 (1.4)
Serbia	56 (1.5)	478 (3.5)	0 0	0 0	17 (0.8)	467 (5.3)	0 0	0 0
Lithuania	55 (1.5)	521 (2.9)	-13 (2.1)	▼ -11 (2.1)	23 (0.9)	518 (3.9)	7 (1.3)	▲ 0 (1.4)
Czech Republic	55 (1.4)	543 (2.5)	-8 (2.6)	▼ 6 (2.6)	21 (0.8)	533 (3.4)	4 (1.2)	▲ -7 (1.3)
Hungary	53 (1.5)	541 (3.6)	-8 (2.0)	▼ -5 (2.2)	20 (0.8)	532 (4.8)	-1 (1.2)	-6 (1.4)
Sweden	52 (1.3)	525 (3.0)	0 0	-8 (2.5)	21 (0.6)	505 (3.7)	0 0	-2 (1.4)
Slovenia	46 (1.6)	543 (2.5)	--	-15 (2.5)	20 (0.7)	537 (3.5)	--	-5 (1.2)
Cyprus	x x	x x	--	--	x x	x x	--	--
Malta	x x	x x	0 0	0 0	x x	x x	0 0	0 0
‡ Morocco	84 (1.0)	407 (3.1)	--	--	11 (0.7)	376 (6.0)	--	--
International Avg.	66 (0.3)	481 (0.9)			17 (0.2)	465 (1.3)		

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

Earth Science								
Country	High PATS				Medium PATS			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Syrian Arab Republic	r 75 (0.9)	455 (3.1)	0 0	0 0	17 (0.7)	437 (4.5)	0 0	0 0
Romania	66 (1.6)	472 (4.0)	-7 (2.1)	▼ 4 (2.2)	17 (0.9)	446 (6.2)	1 (1.2)	-9 (1.4)
Bulgaria	r 66 (1.4)	483 (7.3)	--	--	19 (0.9)	456 (8.4)	--	--
Ukraine	64 (1.3)	493 (3.6)	0 0	0 0	21 (0.8)	477 (4.3)	0 0	0 0
Armenia	64 (1.3)	494 (5.8)	0 0	0 0	22 (0.9)	483 (6.0)	0 0	0 0
Bosnia and Herzegovina	62 (1.4)	467 (3.1)	0 0	0 0	17 (0.8)	467 (5.0)	0 0	0 0
Georgia	s 61 (1.8)	433 (5.2)	0 0	0 0	23 (1.3)	420 (6.2)	0 0	0 0
Russian Federation	60 (1.2)	538 (4.1)	-1 (2.3)	8 (1.8)	23 (0.9)	516 (5.0)	0 (1.5)	-8 (1.2)
Lithuania	59 (1.5)	523 (2.5)	--	9 (2.0)	23 (0.9)	512 (4.0)	--	-15 (1.4)
Malta	r 54 (0.8)	462 (2.2)	0 0	0 0	17 (0.6)	430 (5.0)	0 0	0 0
Sweden	r 54 (1.3)	521 (2.7)	0 0	-5 (2.2)	20 (0.6)	509 (4.5)	0 0	-5 (1.2)
Serbia	51 (1.5)	475 (3.8)	0 0	0 0	19 (0.9)	472 (4.0)	0 0	0 0
Cyprus	50 (1.2)	462 (2.6)	--	--	21 (0.8)	444 (4.2)	--	--
Slovenia	49 (1.5)	545 (3.0)	--	--	21 (0.8)	539 (3.7)	--	--
Czech Republic	44 (1.4)	543 (2.7)	-11 (2.3)	▼ -6 (2.8)	22 (0.7)	533 (2.9)	4 (1.0)	▲ -5 (1.2)
Hungary	39 (1.6)	546 (3.5)	-9 (2.1)	▼ -5 (2.3)	21 (1.1)	529 (4.6)	-4 (1.4)	▼ -11 (1.6)
Algeria	x x	x x	0 0	0 0	x x	x x	0 0	0 0
Indonesia	--	--	--	0 0	--	--	--	0 0
Lebanon	--	--	0 0	0 0	--	--	0 0	0 0
‡ Morocco	r 73 (1.3)	408 (2.8)	--	--	16 (1.1)	387 (7.1)	--	--
International Avg.	58 (0.3)	489 (0.9)			20 (0.2)	474 (1.3)		

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

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

Exhibit 4.8 Index of Students' Positive Affect Toward Science (PATS) with Trends (Continued)

TIMSS2007
Science **8th** Grade

Biology (Continued)

Country	Low PATS			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Indonesia	2 (0.3)	~ ~	--	0 0
Algeria	5 (0.4)	399 (5.8)	0 0	0 0
Syrian Arab Republic	7 (0.5)	425 (6.5)	0 0	0 0
Bulgaria	r 11 (1.1)	465 (9.5)	--	--
Georgia	11 (0.8)	412 (7.4)	0 0	0 0
Ukraine	11 (0.9)	488 (5.9)	0 0	0 0
Armenia	12 (0.6)	479 (7.1)	0 0	0 0
Bosnia and Herzegovina	18 (1.1)	464 (4.7)	0 0	0 0
Russian Federation	13 (0.8)	537 (6.7)	4 (1.1) ▲	6 (1.1) ▲
Lebanon	16 (1.0)	381 (8.1)	0 0	0 0
Romania	20 (1.1)	466 (5.1)	6 (1.5) ▲	10 (1.3) ▲
Serbia	27 (1.2)	466 (4.1)	0 0	0 0
Lithuania	22 (1.3)	516 (3.8)	6 (1.6) ▲	11 (1.6) ▲
Czech Republic	24 (1.2)	537 (2.9)	4 (2.1) ▲	1 (2.2)
Hungary	27 (1.3)	541 (3.9)	8 (1.7) ▲	11 (1.7) ▲
Sweden	27 (1.1)	498 (3.3)	0 0	10 (1.8) ▲
Slovenia	34 (1.4)	533 (3.2)	--	20 (1.9) ▲
Cyprus	x x	x x	--	--
Malta	x x	x x	0 0	0 0
‡ Morocco	5 (0.6)	381 (8.4)	--	--
International Avg.	16 (0.2)	470 (1.5)		

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

Earth Science (Continued)

Country	Low PATS			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Syrian Arab Republic	r 9 (0.5)	445 (5.9)	0 0	0 0
Romania	17 (1.1)	451 (5.6)	7 (1.4) ▲	5 (1.3) ▲
Bulgaria	r 16 (1.2)	452 (8.8)	--	--
Ukraine	15 (0.8)	486 (4.3)	0 0	0 0
Armenia	15 (0.9)	482 (11.9)	0 0	0 0
Bosnia and Herzegovina	21 (1.1)	467 (3.8)	0 0	0 0
Georgia	s 16 (1.3)	409 (7.5)	0 0	0 0
Russian Federation	17 (0.9)	528 (5.0)	1 (1.4)	0 (1.3)
Lithuania	18 (0.9)	514 (4.7)	--	6 (1.2) ▲
Malta	r 29 (0.7)	426 (3.0)	0 0	0 0
Sweden	r 26 (1.2)	504 (4.0)	0 0	9 (1.7) ▲
Serbia	30 (1.3)	470 (4.8)	0 0	0 0
Cyprus	29 (1.0)	444 (3.0)	--	--
Slovenia	31 (1.2)	528 (2.6)	--	--
Czech Republic	33 (1.4)	538 (2.8)	7 (2.1) ▲	12 (2.2) ▲
Hungary	40 (1.4)	538 (3.6)	13 (1.8) ▲	16 (1.9) ▲
Algeria	x x	x x	0 0	0 0
Indonesia	--	--	--	0 0
Lebanon	--	--	0 0	0 0
‡ Morocco	r 11 (0.8)	392 (9.2)	--	--
International Avg.	22 (0.3)	475 (1.4)		

▲ 2007 percent significantly higher
▼ 2007 percent significantly lower

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

Exhibit 4.8 Index of Students' Positive Affect Toward Science (PATS) with Trends (Continued)
TIMSS2007
 Science **8th**
 Grade

Chemistry									
Country	High PATS				Medium PATS				
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995	
Algeria	s 78 (1.1)	411 (2.4)	∅ ∅	∅ ∅	14 (0.8)	398 (3.7)	∅ ∅	∅ ∅	
Syrian Arab Republic	68 (1.1)	461 (3.0)	∅ ∅	∅ ∅	19 (0.7)	440 (4.0)	∅ ∅	∅ ∅	
Lebanon	62 (1.4)	427 (5.7)	∅ ∅	∅ ∅	24 (1.2)	394 (7.7)	∅ ∅	∅ ∅	
Russian Federation	54 (1.2)	538 (4.2)	-1 (2.2)	29 (1.7) ⬆	26 (0.7)	521 (5.1)	-2 (1.2)	-31 (1.3) ⬇	
Bulgaria	r 52 (1.8)	486 (6.5)	--	--	21 (0.8)	457 (9.5)	--	--	
Ukraine	51 (1.6)	497 (3.7)	∅ ∅	∅ ∅	24 (0.8)	478 (4.2)	∅ ∅	∅ ∅	
Cyprus	48 (0.9)	469 (2.6)	--	--	21 (0.5)	438 (3.4)	--	--	
Georgia	48 (2.0)	439 (5.4)	∅ ∅	∅ ∅	25 (1.1)	420 (5.8)	∅ ∅	∅ ∅	
Armenia	47 (1.5)	496 (6.7)	∅ ∅	∅ ∅	25 (1.0)	483 (6.1)	∅ ∅	∅ ∅	
Bosnia and Herzegovina	47 (1.5)	470 (3.4)	∅ ∅	∅ ∅	18 (0.7)	465 (3.9)	∅ ∅	∅ ∅	
Czech Republic	44 (1.5)	543 (2.9)	2 (2.4)	26 (1.8) ⬆	22 (0.7)	537 (3.3)	-2 (1.1)	-42 (1.4) ⬇	
Romania	43 (1.4)	467 (5.4)	-8 (2.1) ⬇	11 (1.8) ⬆	24 (0.8)	457 (4.8)	0 (1.2)	-32 (1.3) ⬇	
Sweden	r 42 (1.1)	533 (3.2)	∅ ∅	14 (1.9) ⬆	20 (0.7)	496 (4.1)	∅ ∅	-38 (1.5) ⬇	
Slovenia	42 (1.3)	552 (2.9)	--	22 (1.7) ⬆	22 (0.7)	535 (3.0)	--	-37 (1.2) ⬇	
Lithuania	42 (1.4)	528 (3.5)	5 (2.0) ⬆	17 (1.9) ⬆	26 (0.9)	514 (3.8)	-4 (1.3) ⬇	-29 (1.5) ⬇	
Serbia	31 (1.3)	483 (4.6)	∅ ∅	∅ ∅	16 (0.9)	470 (4.7)	∅ ∅	∅ ∅	
Hungary	29 (1.2)	551 (4.4)	-5 (1.9) ⬇	7 (1.8) ⬆	21 (0.8)	523 (4.8)	-10 (1.2) ⬇	-36 (1.4) ⬇	
Malta	x x	x x	∅ ∅	∅ ∅	x x	x x	∅ ∅	∅ ∅	
Indonesia	--	--	--	∅ ∅	--	--	--	∅ ∅	
‡ Morocco	r 76 (1.4)	412 (3.4)	--	--	14 (0.7)	377 (7.1)	--	--	
International Avg.	50 (0.3)	487 (1.0)			21 (0.2)	467 (1.2)			

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

Physics									
Country	High PATS				Medium PATS				
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995	
Algeria	83 (0.9)	412 (1.9)	∅ ∅	∅ ∅	12 (0.6)	400 (3.1)	∅ ∅	∅ ∅	
Indonesia	69 (1.5)	426 (3.6)	--	∅ ∅	24 (1.1)	428 (4.4)	--	∅ ∅	
Syrian Arab Republic	67 (1.2)	462 (2.9)	∅ ∅	∅ ∅	21 (0.9)	441 (4.0)	∅ ∅	∅ ∅	
Armenia	60 (1.5)	498 (5.9)	∅ ∅	∅ ∅	21 (0.9)	481 (7.9)	∅ ∅	∅ ∅	
Russian Federation	59 (0.9)	540 (4.4)	-1 (1.7)	6 (1.6) ⬆	25 (0.7)	516 (5.3)	-1 (1.1)	-6 (1.2) ⬇	
Georgia	58 (1.5)	437 (4.6)	∅ ∅	∅ ∅	23 (1.1)	416 (7.8)	∅ ∅	∅ ∅	
Lebanon	57 (1.2)	431 (5.6)	∅ ∅	∅ ∅	25 (1.0)	394 (8.3)	∅ ∅	∅ ∅	
Bulgaria	r 55 (2.0)	485 (7.3)	--	--	23 (1.3)	459 (8.3)	--	--	
Ukraine	52 (1.6)	499 (3.6)	∅ ∅	∅ ∅	26 (0.9)	478 (3.8)	∅ ∅	∅ ∅	
Cyprus	49 (0.9)	474 (2.2)	--	--	21 (0.6)	436 (3.9)	--	--	
Malta	45 (0.7)	482 (2.5)	∅ ∅	∅ ∅	19 (0.5)	444 (4.6)	∅ ∅	∅ ∅	
Bosnia and Herzegovina	44 (1.3)	473 (3.3)	∅ ∅	∅ ∅	20 (0.7)	464 (4.0)	∅ ∅	∅ ∅	
Romania	42 (1.4)	469 (5.0)	-5 (2.1) ⬇	-6 (2.1) ⬇	24 (0.8)	453 (5.5)	-2 (1.3)	-10 (1.2) ⬇	
Sweden	r 37 (1.2)	536 (3.4)	∅ ∅	-7 (2.3) ⬇	22 (0.7)	503 (3.8)	∅ ∅	-5 (1.5) ⬇	
Lithuania	37 (1.3)	534 (3.6)	-11 (2.1) ⬇	-2 (2.2)	28 (0.8)	510 (3.4)	2 (1.2)	-6 (1.5) ⬇	
Hungary	31 (1.4)	557 (4.0)	-4 (2.0) ⬇	3 (1.9)	24 (0.9)	534 (4.6)	-8 (1.3) ⬇	-16 (1.3) ⬇	
Czech Republic	31 (1.5)	549 (3.4)	-7 (2.3) ⬇	2 (2.0)	23 (0.7)	538 (3.1)	0 (1.1)	-11 (1.1) ⬇	
Serbia	28 (1.5)	477 (4.9)	∅ ∅	∅ ∅	19 (0.9)	473 (4.2)	∅ ∅	∅ ∅	
Slovenia	23 (1.1)	558 (4.3)	--	-14 (2.0) ⬇	23 (0.8)	534 (3.4)	--	-17 (1.4) ⬇	
‡ Morocco	r 79 (1.6)	410 (3.2)	--	--	14 (1.0)	373 (4.9)	--	--	
International Avg.	50 (0.3)	485 (0.9)			22 (0.2)	464 (1.2)			

⬆ 2007 percent significantly higher

⬇ 2007 percent significantly lower

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

Exhibit 4.8 Index of Students' Positive Affect Toward Science (PATS) with Trends (Continued)
TIMSS2007
 Science **8th**
 Grade

Chemistry (Continued)

Country	Low PATS			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Algeria	s 8 (0.6)	395 (6.3)	0 0	0 0
Syrian Arab Republic	13 (0.7)	450 (4.0)	0 0	0 0
Lebanon	14 (1.0)	409 (7.2)	0 0	0 0
Russian Federation	21 (1.0)	524 (4.5)	3 (1.6)	2 (1.5)
Bulgaria	r 27 (1.7)	460 (7.1)	--	--
Ukraine	25 (1.5)	483 (4.3)	0 0	0 0
Cyprus	31 (0.8)	437 (3.8)	--	--
Georgia	27 (2.0)	420 (4.9)	0 0	0 0
Armenia	28 (1.4)	487 (7.5)	0 0	0 0
Bosnia and Herzegovina	35 (1.3)	465 (3.5)	0 0	0 0
Czech Republic	35 (1.6)	536 (2.8)	0 (2.3)	16 (2.0) ▲
Romania	33 (1.3)	465 (3.6)	7 (1.8) ▲	21 (1.5) ▲
Sweden	r 38 (1.1)	500 (3.4)	0 0	24 (1.6) ▲
Slovenia	36 (1.3)	524 (2.8)	--	15 (1.6) ▲
Lithuania	32 (1.5)	512 (2.9)	-2 (1.9)	12 (1.9) ▲
Serbia	54 (1.3)	468 (3.6)	0 0	0 0
Hungary	50 (1.5)	539 (2.8)	15 (2.2) ▲	29 (2.0) ▲
Malta	x x	x x	0 0	0 0
Indonesia	--	--	--	0 0
‡ Morocco	r 10 (1.0)	376 (9.0)	--	--
International Avg.	29 (0.3)	469 (1.2)		

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

Physics (Continued)

Country	Low PATS			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Algeria	6 (0.4)	402 (5.0)	0 0	0 0
Indonesia	7 (0.6)	443 (6.2)	--	0 0
Syrian Arab Republic	12 (0.7)	448 (4.7)	0 0	0 0
Armenia	19 (1.2)	480 (8.5)	0 0	0 0
Russian Federation	16 (0.7)	519 (4.8)	2 (1.1)	1 (1.4)
Georgia	19 (1.4)	420 (4.6)	0 0	0 0
Lebanon	18 (1.0)	405 (7.3)	0 0	0 0
Bulgaria	r 22 (1.5)	460 (6.7)	--	--
Ukraine	22 (1.1)	481 (4.1)	0 0	0 0
Cyprus	29 (0.7)	432 (3.8)	--	--
Malta	36 (0.7)	435 (2.4)	0 0	0 0
Bosnia and Herzegovina	36 (1.2)	463 (4.0)	0 0	0 0
Romania	34 (1.3)	467 (3.8)	7 (2.0) ▲	16 (1.8) ▲
Sweden	r 41 (1.2)	502 (3.3)	0 0	12 (2.1) ▲
Lithuania	35 (1.2)	511 (3.4)	9 (1.7) ▲	8 (1.9) ▲
Hungary	45 (1.8)	530 (3.4)	12 (2.2) ▲	12 (2.2) ▲
Czech Republic	46 (1.4)	534 (2.3)	8 (2.3) ▲	9 (2.0) ▲
Serbia	53 (1.8)	471 (3.3)	0 0	0 0
Slovenia	54 (1.2)	531 (2.3)	--	31 (1.8) ▲
‡ Morocco	8 (1.1)	392 (10.4)	--	--
International Avg.	28 (0.3)	466 (1.2)		

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

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



In countries where the sciences are taught as separate subjects at the eighth grade, students were asked about each subject separately. Students were asked to indicate if they *agreed a lot*, *agreed a little*, *disagreed a little*, or *disagreed a lot* with each statement. Students who agreed a little or a lot on average with all four statements were assigned to the high level of the index (i.e., placed a high value on science), while those who disagreed a little or a lot, on average, were assigned to the low level of the index. The medium level includes all other response combinations. The percentage of students at each level of the index is presented in Exhibit 4.9 for each eighth-grade TIMSS participant, together with average science achievement and changes in percentages since 2003.

Eighth grade students in countries teaching science as a single subject generally placed a high value on science, with 66 percent of students, on average in these countries, at the high level of the valuing science index. In addition, 23 percent of students were at the medium level and 11 percent at the low level. The highest percentages of students at the high level of the index were in Ghana and Oman, with more than 90 percent. In contrast, less than half the students in Israel, Norway, Australia, Korea, Chinese Taipei, Italy, and Japan, several of which are among the highest performing countries on the TIMSS 2007 assessment. There was an increase since 2003 in the percentage of students at the high level of the index in Ghana, Egypt, Tunisia, Bahrain, Iran, Hong Kong SAR, England, Norway, Korea, and Japan, and declines in Botswana and Malaysia. On average across the countries, eighth grade science achievement was higher among students at the high level of the valuing science index (471 points) than at the medium level (449 points) or the low level (441 points).

Among the separate science countries, students reported placing less value on individual science subjects than students in the single science countries reported placing on general science. Compared with 66 percent of students at high valuing science index level, 52 percent of students were at the high level of the index of students valuing biology, 44 percent at the high valuing earth science index level, 47 percent at the high valuing chemistry

Exhibit 4.9 Index of Students' Valuing Science (SVS) with Trends

TIMSS2007
Science 8th Grade

General/Integrated Science

Country	High SVS			Medium SVS			Low SVS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Ghana	92 (0.8)	311 (5.0)	6 (1.2) ▲	7 (0.7)	245 (16.0)	-5 (1.0) ▼	2 (0.2)	~ ~	-1 (0.3)
Oman	91 (0.5)	429 (2.9)	◊ ◊	8 (0.4)	386 (7.0)	◊ ◊	2 (0.2)	~ ~	◊ ◊
Jordan	88 (0.9)	491 (3.5)	2 (1.1)	10 (0.6)	446 (7.9)	-1 (0.8)	3 (0.4)	439 (19.9)	-1 (0.6)
Egypt	86 (0.7)	417 (3.6)	3 (1.1) ▲	11 (0.5)	375 (6.9)	-3 (0.9) ▼	2 (0.3)	~ ~	0 (0.4)
Thailand	85 (0.7)	475 (4.3)	◊ ◊	14 (0.6)	447 (5.7)	◊ ◊	2 (0.2)	~ ~	◊ ◊
Tunisia	85 (0.8)	446 (2.2)	5 (1.1) ▲	11 (0.6)	442 (4.1)	-3 (0.9) ▼	4 (0.3)	438 (5.5)	-2 (0.6) ▼
Palestinian Nat'l Auth.	84 (0.9)	418 (3.8)	2 (1.2)	12 (0.7)	355 (6.7)	-2 (1.0)	3 (0.4)	350 (10.6)	0 (0.5)
Botswana	83 (0.7)	372 (3.3)	-3 (1.0) ▼	14 (0.6)	287 (4.7)	3 (0.9) ▲	3 (0.3)	274 (13.4)	0 (0.3)
Bahrain	82 (0.8)	472 (1.8)	9 (1.1) ▲	13 (0.6)	460 (4.7)	-6 (0.9) ▼	5 (0.4)	442 (7.2)	-3 (0.6) ▼
Kuwait	82 (0.8)	426 (2.8)	◊ ◊	12 (0.6)	409 (5.5)	◊ ◊	7 (0.5)	385 (9.6)	◊ ◊
Saudi Arabia	80 (1.1)	408 (2.7)	--	14 (0.8)	399 (4.7)	--	6 (0.7)	391 (6.8)	--
El Salvador	78 (0.9)	384 (3.0)	◊ ◊	17 (0.7)	403 (4.4)	◊ ◊	5 (0.5)	411 (7.8)	◊ ◊
Qatar	76 (0.5)	329 (1.9)	◊ ◊	16 (0.4)	305 (4.0)	◊ ◊	9 (0.3)	301 (5.9)	◊ ◊
Colombia	74 (1.0)	414 (3.6)	◊ ◊	20 (0.8)	433 (4.5)	◊ ◊	6 (0.5)	432 (8.3)	◊ ◊
Turkey	69 (1.0)	458 (3.9)	◊ ◊	22 (0.7)	455 (4.7)	◊ ◊	9 (0.5)	430 (6.3)	◊ ◊
Malaysia	69 (1.3)	486 (5.7)	-7 (1.8) ▼	25 (1.0)	449 (6.1)	4 (1.3) ▲	6 (0.6)	390 (12.6)	3 (0.7) ▲
Singapore	67 (0.9)	585 (4.2)	-2 (1.3)	25 (0.7)	547 (5.2)	0 (1.0)	8 (0.6)	483 (7.9)	2 (0.7) ▲
Iran, Islamic Rep. of	67 (1.2)	461 (3.7)	5 (1.7) ▲	25 (1.0)	457 (4.8)	-1 (1.3)	9 (0.6)	450 (6.1)	-4 (0.9) ▼
Hong Kong SAR	58 (1.2)	543 (4.9)	5 (1.6) ▲	33 (0.9)	525 (5.1)	-5 (1.2) ▼	9 (0.8)	472 (9.1)	0 (1.0)
Scotland	57 (1.1)	511 (3.5)	1 (1.5)	27 (0.7)	489 (3.7)	1 (1.1)	16 (0.7)	461 (4.6)	-2 (1.1)
United States	53 (0.9)	532 (3.4)	-2 (1.2)	30 (0.6)	515 (3.0)	0 (0.9)	17 (0.6)	497 (3.2)	1 (0.8)
England	52 (1.3)	552 (5.2)	7 (2.1) ▲	31 (1.0)	542 (5.1)	-4 (1.5) ▼	17 (0.8)	515 (5.2)	-3 (1.4) ▼
Israel	49 (1.2)	481 (5.0)	1 (1.7)	27 (0.9)	470 (5.1)	1 (1.2)	24 (1.0)	459 (6.0)	-2 (1.4)
Norway	45 (0.9)	492 (2.4)	6 (1.4) ▲	35 (0.8)	492 (2.7)	-1 (1.2)	21 (0.9)	472 (3.3)	-5 (1.3) ▼
Australia	42 (1.2)	531 (5.1)	0 (1.6)	30 (0.8)	511 (4.3)	-1 (1.2)	28 (0.9)	496 (3.7)	1 (1.3)
Korea, Rep. of	41 (1.0)	573 (2.6)	5 (1.4) ▲	41 (0.9)	550 (2.3)	-3 (1.1) ▼	17 (0.7)	514 (4.0)	-2 (0.9) ▼
Chinese Taipei	35 (1.0)	588 (4.8)	2 (1.4)	42 (0.9)	566 (3.2)	-1 (1.2)	24 (0.9)	514 (4.7)	-1 (1.3)
Italy	34 (0.9)	512 (4.5)	1 (1.2)	46 (0.8)	492 (2.9)	-2 (1.2)	21 (0.8)	477 (3.2)	1 (1.1)
Japan	26 (0.8)	576 (3.3)	5 (1.1) ▲	43 (0.9)	561 (2.1)	-4 (1.2) ▼	32 (1.0)	528 (3.2)	-1 (1.4)
International Avg.	66 (0.2)	471 (0.7)		23 (0.1)	449 (1.0)		11 (0.1)	441 (1.6)	
Benchmarking Participants									
Dubai, UAE	r 73 (1.1)	495 (3.0)	◊ ◊	18 (0.9)	489 (5.6)	◊ ◊	8 (0.6)	476 (7.0)	◊ ◊
Minnesota, US	57 (1.3)	547 (5.4)	◊ ◊	29 (0.9)	531 (5.0)	◊ ◊	14 (1.0)	521 (6.9)	◊ ◊
Ontario, Canada	53 (1.5)	541 (3.3)	-3 (2.0)	31 (1.3)	515 (5.0)	2 (1.6)	16 (0.8)	499 (6.0)	2 (1.1)
British Columbia, Canada	53 (1.0)	539 (3.2)	◊ ◊	30 (0.8)	518 (3.4)	◊ ◊	17 (0.8)	501 (4.3)	◊ ◊
Massachusetts, US	50 (1.0)	569 (5.3)	◊ ◊	32 (0.9)	548 (5.3)	◊ ◊	19 (0.9)	539 (4.3)	◊ ◊
Basque Country, Spain	41 (1.4)	507 (3.8)	-2 (1.8)	30 (1.1)	500 (3.5)	1 (1.4)	28 (1.4)	483 (4.4)	1 (1.7)
Quebec, Canada	35 (1.4)	522 (4.3)	-4 (2.0)	39 (1.2)	509 (2.9)	1 (1.6)	26 (1.2)	487 (4.2)	2 (1.6)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Index based on students' responses to four statements about science: 1) I think learning science will help me in my daily life; 2) I need science to learn other school subjects; 3) I need to do well in science to get into the university of my choice; 4) I need to do well in science to get the job I want. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average across the four statements are assigned to the low level. All other students are assigned to the middle level.

() 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. A tilde (~) indicates insufficient data to report achievement.
 An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.
 A diamond (◊) indicates the country did not participate in the assessment.

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

Exhibit 4.9 Index of Students' Valuing Science (SVS) with Trends (Continued)

TIMSS2007
Science 8th Grade

Biology

Country	High SVS			Medium SVS			Low SVS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Indonesia	88 (0.7)	426 (3.4)	16 (1.4) ▲	10 (0.7)	439 (7.2)	-16 (1.3) ▼	1 (0.2)	~ ~	-1 (0.3)
Algeria	86 (0.7)	411 (1.9)	◊ ◊	11 (0.6)	404 (3.4)	◊ ◊	2 (0.2)	~ ~	◊ ◊
Syrian Arab Republic	78 (0.8)	456 (3.0)	◊ ◊	17 (0.7)	454 (3.9)	◊ ◊	5 (0.4)	458 (6.1)	◊ ◊
Lebanon	66 (1.2)	423 (7.0)	-2 (1.8)	25 (0.9)	402 (5.7)	3 (1.4)	9 (0.7)	407 (10.5)	0 (0.9)
Malta	63 (1.0)	524 (3.1)	◊ ◊	22 (0.8)	500 (6.4)	◊ ◊	14 (0.7)	472 (9.9)	◊ ◊
Ukraine	53 (1.2)	478 (4.1)	◊ ◊	31 (0.9)	502 (3.2)	◊ ◊	16 (0.9)	499 (4.7)	◊ ◊
Georgia	49 (1.9)	422 (5.1)	◊ ◊	28 (1.1)	435 (6.6)	◊ ◊	23 (1.7)	433 (5.4)	◊ ◊
Bosnia and Herzegovina	49 (1.2)	458 (3.4)	◊ ◊	28 (0.8)	479 (3.4)	◊ ◊	23 (1.0)	474 (4.0)	◊ ◊
Bulgaria	48 (1.5)	461 (7.5)	--	31 (1.2)	483 (7.8)	--	21 (1.5)	483 (7.0)	--
Lithuania	47 (1.0)	514 (3.4)	1 (1.5)	34 (0.8)	522 (3.1)	1 (1.2)	19 (0.9)	524 (3.7)	-2 (1.2)
Russian Federation	44 (1.1)	523 (3.9)	0 (1.4)	35 (0.7)	535 (4.2)	-2 (1.1)	21 (0.9)	540 (5.9)	2 (1.2)
Armenia	43 (1.4)	484 (5.6)	-3 (1.9)	29 (0.9)	495 (7.0)	1 (1.2)	28 (1.2)	494 (8.7)	3 (1.6)
Romania	37 (1.2)	443 (5.1)	-2 (1.9)	33 (0.8)	469 (4.2)	1 (1.2)	30 (1.1)	483 (4.2)	1 (1.7)
Serbia	34 (1.4)	464 (4.6)	2 (1.9)	30 (1.0)	480 (3.5)	0 (1.3)	36 (1.3)	475 (3.8)	-2 (1.8)
Sweden	31 (1.0)	518 (3.9)	7 (1.4) ▲	46 (0.8)	517 (2.5)	-4 (1.3) ▼	23 (0.8)	499 (3.7)	-3 (1.3) ▼
Hungary	31 (1.1)	530 (4.5)	-2 (1.5)	37 (0.9)	539 (3.3)	0 (1.2)	31 (1.1)	548 (3.5)	2 (1.6)
Slovenia	31 (0.9)	537 (3.5)	-2 (1.3)	48 (0.9)	542 (2.4)	3 (1.2) ▲	21 (1.0)	531 (3.6)	0 (1.4)
Czech Republic	24 (0.8)	535 (2.9)	◊ ◊	44 (0.8)	541 (2.6)	◊ ◊	31 (0.9)	540 (2.5)	◊ ◊
Cyprus	x x	x x	--	x x	x x	--	x x	x x	--
‡ Morocco	82 (0.9)	401 (2.9)	--	13 (0.7)	410 (5.2)	--	5 (0.6)	405 (10.1)	--
International Avg.	52 (0.3)	474 (1.0)		29 (0.2)	482 (1.1)		19 (0.2)	486 (1.5)	

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

Earth Science

Country	High SVS			Medium SVS			Low SVS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	79 (1.5)	404 (3.1)	◊ ◊	15 (1.1)	398 (5.7)	◊ ◊	7 (0.8)	403 (7.3)	◊ ◊
Syrian Arab Republic	71 (1.0)	449 (3.2)	◊ ◊	20 (0.8)	453 (4.8)	◊ ◊	9 (0.7)	473 (5.2)	◊ ◊
Lithuania	52 (1.1)	516 (3.0)	1 (1.5)	31 (0.8)	525 (3.3)	-1 (1.2)	17 (0.8)	516 (4.4)	0 (1.1)
Georgia	50 (2.4)	420 (5.5)	◊ ◊	23 (1.1)	432 (6.3)	◊ ◊	26 (1.9)	426 (8.5)	◊ ◊
Ukraine	50 (1.2)	479 (4.1)	◊ ◊	32 (1.0)	501 (3.5)	◊ ◊	18 (0.8)	494 (3.6)	◊ ◊
Romania	48 (1.6)	447 (4.5)	4 (2.1)	29 (1.0)	478 (4.5)	-2 (1.3)	23 (1.1)	481 (5.4)	-2 (1.5)
Bulgaria	47 (1.4)	469 (8.1)	--	29 (1.1)	475 (7.0)	--	24 (1.4)	475 (6.7)	--
Bosnia and Herzegovina	43 (1.1)	453 (3.6)	◊ ◊	29 (0.8)	478 (3.3)	◊ ◊	28 (1.0)	478 (3.9)	◊ ◊
Sweden	40 (1.0)	512 (3.4)	11 (1.4) ▲	46 (0.9)	522 (2.7)	-8 (1.4) ▼	14 (0.7)	494 (4.7)	-3 (1.1) ▼
Russian Federation	39 (1.0)	527 (4.2)	0 (1.4)	36 (0.8)	535 (4.4)	-1 (1.4)	25 (1.0)	530 (5.2)	1 (1.4)
Armenia	38 (1.1)	485 (6.9)	-1 (1.9)	31 (1.0)	491 (6.1)	3 (1.4) ▲	31 (1.3)	493 (6.1)	-2 (1.9)
Slovenia	36 (1.1)	540 (3.6)	--	45 (1.0)	543 (2.5)	--	19 (0.9)	522 (3.5)	--
Serbia	31 (1.0)	457 (5.3)	6 (1.4) ▲	29 (1.1)	479 (4.1)	0 (1.4)	40 (1.1)	480 (3.8)	-5 (1.7) ▼
Hungary	28 (1.2)	526 (4.4)	0 (1.6)	38 (1.2)	544 (3.5)	-1 (1.5)	34 (1.0)	545 (3.4)	1 (1.6)
Cyprus	25 (0.7)	434 (4.2)	-3 (1.0) ▼	33 (0.8)	459 (2.5)	-2 (1.1)	43 (1.0)	459 (2.6)	4 (1.3) ▲
Czech Republic	24 (0.8)	533 (3.2)	◊ ◊	43 (0.8)	542 (2.2)	◊ ◊	33 (1.0)	541 (2.4)	◊ ◊
Malta	23 (0.7)	429 (3.8)	◊ ◊	32 (0.8)	448 (3.1)	◊ ◊	45 (0.8)	454 (2.7)	◊ ◊
Indonesia	--	--	--	--	--	--	--	--	--
Lebanon	--	--	--	--	--	--	--	--	--
‡ Morocco	71 (1.3)	398 (3.0)	--	18 (1.2)	407 (5.8)	--	11 (0.8)	429 (8.1)	--
International Avg.	44 (0.3)	471 (1.1)		31 (0.2)	484 (1.0)		25 (0.2)	483 (1.2)	

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

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

Exhibit 4.9 Index of Students' Valuing Science (SVS) with Trends (Continued)

TIMSS2007
Science 8th Grade

Chemistry

Country	High SVS			Medium SVS			Low SVS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	79 (0.9)	409 (2.2)	0 0	15 (0.7)	404 (3.6)	0 0	6 (0.5)	409 (6.7)	0 0
Syrian Arab Republic	71 (1.0)	455 (3.0)	0 0	20 (0.7)	451 (4.2)	0 0	8 (0.6)	465 (5.0)	0 0
Malta	62 (1.5)	565 (3.8)	0 0	21 (1.4)	526 (7.0)	0 0	17 (1.0)	494 (10.1)	0 0
Lebanon	61 (1.3)	419 (6.7)	-3 (1.8)	26 (1.2)	411 (6.5)	0 (1.5)	13 (0.8)	420 (8.3)	3 (1.1) ▲
Lithuania	50 (1.1)	518 (3.3)	5 (1.6) ▲	28 (0.8)	524 (2.8)	-3 (1.2) ▼	23 (0.9)	516 (4.3)	-2 (1.4)
Ukraine	49 (1.3)	484 (4.0)	0 0	29 (0.9)	497 (3.8)	0 0	22 (1.1)	490 (3.9)	0 0
Bosnia and Herzegovina	48 (1.2)	455 (3.3)	0 0	24 (0.9)	477 (4.2)	0 0	28 (1.0)	479 (3.6)	0 0
Russian Federation	46 (1.0)	526 (4.6)	1 (1.3)	30 (0.6)	535 (4.3)	-3 (1.0) ▼	24 (0.8)	534 (4.5)	2 (1.2)
Georgia	46 (2.2)	423 (6.0)	0 0	24 (1.0)	436 (4.9)	0 0	30 (1.8)	431 (4.7)	0 0
Bulgaria	41 (1.8)	468 (7.6)	--	26 (1.0)	474 (8.0)	--	33 (1.6)	477 (7.2)	--
Armenia	36 (1.5)	484 (5.9)	-2 (2.0)	25 (0.8)	498 (8.4)	-1 (1.1)	39 (1.5)	492 (6.0)	2 (1.9)
Romania	35 (1.6)	445 (5.2)	3 (2.1)	27 (1.0)	469 (4.9)	-1 (1.4)	37 (1.5)	479 (3.7)	-2 (2.1)
Cyprus	34 (0.9)	458 (3.4)	4 (1.1) ▲	28 (0.8)	455 (2.8)	-1 (1.1)	38 (0.9)	447 (2.6)	-3 (1.2) ▼
Slovenia	31 (1.0)	542 (3.5)	1 (1.5)	42 (1.0)	544 (2.4)	1 (1.4)	27 (1.0)	524 (2.8)	-2 (1.5)
Serbia	31 (1.3)	463 (5.5)	4 (1.7) ▲	23 (0.8)	478 (3.7)	-1 (1.1)	46 (1.2)	477 (3.5)	-3 (1.7)
Sweden	31 (1.0)	515 (4.2)	11 (1.4) ▲	40 (0.9)	522 (3.0)	-3 (1.3) ▼	30 (0.8)	500 (3.3)	-8 (1.5) ▼
Czech Republic	28 (0.9)	529 (3.2)	0 0	38 (0.7)	541 (2.4)	0 0	34 (1.1)	545 (2.3)	0 0
Hungary	28 (1.1)	528 (5.3)	3 (1.5) ▲	32 (0.9)	542 (3.2)	-2 (1.3)	40 (1.3)	545 (3.2)	-1 (1.8)
Indonesia	--	--	--	--	--	--	--	--	--
‡ Morocco	77 (1.2)	402 (2.9)	--	16 (0.8)	400 (6.0)	--	7 (0.6)	411 (8.4)	--
International Avg.	47 (0.3)	478 (1.1)		27 (0.2)	483 (1.1)		26 (0.3)	481 (1.2)	

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

Physics

Country	High SVS			Medium SVS			Low SVS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Indonesia	82 (0.8)	427 (3.5)	16 (1.5) ▲	14 (0.7)	436 (4.5)	-14 (1.2) ▼	3 (0.4)	429 (8.8)	-2 (0.6) ▼
Algeria	82 (0.7)	410 (1.8)	0 0	14 (0.5)	407 (3.5)	0 0	4 (0.3)	420 (6.5)	0 0
Syrian Arab Republic	70 (1.0)	455 (2.9)	0 0	21 (0.7)	452 (3.6)	0 0	9 (0.6)	473 (5.2)	0 0
Lebanon	64 (1.2)	422 (6.5)	2 (1.6)	23 (1.0)	403 (7.3)	-4 (1.3) ▼	13 (0.9)	417 (9.6)	2 (1.1)
Ukraine	55 (1.0)	486 (3.8)	0 0	27 (0.8)	496 (3.8)	0 0	18 (0.8)	487 (3.9)	0 0
Malta	54 (0.8)	474 (2.7)	0 0	26 (0.7)	454 (3.2)	0 0	20 (0.6)	418 (3.6)	0 0
Lithuania	54 (1.0)	524 (3.1)	8 (1.5) ▲	27 (0.7)	517 (3.2)	-2 (1.0) ▼	19 (0.9)	508 (4.6)	-5 (1.2) ▼
Russian Federation	53 (1.1)	533 (4.5)	2 (1.4)	30 (0.9)	532 (4.8)	-2 (1.3)	17 (0.7)	521 (5.2)	0 (1.0)
Bosnia and Herzegovina	52 (1.1)	461 (3.3)	0 0	22 (0.8)	475 (3.5)	0 0	26 (0.9)	472 (3.8)	0 0
Georgia	52 (1.8)	422 (5.1)	0 0	24 (1.2)	438 (5.4)	0 0	24 (1.2)	431 (6.1)	0 0
Bulgaria	47 (1.5)	471 (6.9)	--	27 (1.0)	473 (7.7)	--	26 (1.4)	477 (7.8)	--
Cyprus	46 (0.8)	463 (2.6)	4 (1.3) ▲	26 (0.7)	446 (3.9)	-4 (1.0) ▼	28 (0.8)	442 (3.2)	0 (1.2)
Armenia	46 (1.0)	490 (7.1)	0 (1.6)	27 (1.0)	500 (6.7)	0 (1.3)	27 (1.3)	481 (4.5)	0 (1.7)
Romania	38 (1.4)	446 (5.9)	3 (1.9)	27 (0.9)	470 (4.7)	-3 (1.3) ▼	35 (1.5)	480 (3.5)	-1 (2.0)
Sweden	36 (0.9)	522 (3.6)	12 (1.4) ▲	38 (0.7)	524 (3.2)	-4 (1.2) ▼	26 (0.8)	492 (3.6)	-9 (1.3) ▼
Hungary	34 (1.3)	538 (4.9)	4 (1.7) ▲	33 (1.0)	543 (3.1)	-1 (1.3)	33 (1.2)	537 (3.7)	-3 (1.7)
Slovenia	34 (0.9)	542 (3.3)	2 (1.5)	40 (0.8)	545 (2.4)	1 (1.4)	27 (1.0)	524 (2.5)	-4 (1.7) ▼
Czech Republic	31 (0.8)	541 (2.9)	0 0	39 (0.8)	542 (2.5)	0 0	30 (0.9)	534 (2.6)	0 0
Serbia	31 (1.2)	464 (5.1)	3 (1.5) ▲	24 (0.9)	480 (3.5)	0 (1.3)	45 (1.4)	476 (3.5)	-4 (1.8) ▼
‡ Morocco	81 (1.2)	404 (3.4)	--	13 (0.7)	399 (6.7)	--	6 (0.7)	413 (10.4)	--
International Avg.	52 (0.2)	475 (1.0)		26 (0.2)	477 (1.0)		22 (0.2)	472 (1.3)	

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

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

index level, and 52 at the high valuing physics index level. Unlike the single science countries, where average achievement was highest among students placing most value on science, students at the high level of the indices valuing biology, earth science, and chemistry had lower average science achievement than those placing less value on the subjects. In physics, there was little association between valuing physics and average science achievement.

Regardless of how much students like science or value it for how it can help them in their lives, students' confidence in their ability to learn science is based to some extent on their past experience in learning the subject. This in turn is likely to be determined by the difficulty of the subject as well as the individual student's own learning ability. To investigate how students think about their abilities in science, TIMSS created an Index of Students' Self-Confidence in Learning Science (SCS), based on students' responses to four statements about their science ability:

- ▶ I usually do well in science.
- ▶ Science is harder for me than for many of my classmates.⁵
- ▶ I am just not good at science.⁶
- ▶ I learn things quickly in science.

In countries where the sciences are taught as separate subjects at the eighth grade, students were asked about each subject separately. Students were asked to indicate if they *agreed a lot*, *agreed a little*, *disagreed a little*, or *disagreed a lot* with each statement. Students who agreed a little or a lot on average with all four statements were assigned to the high level of the index (i.e., are confident about their science ability), while those who disagreed a little or a lot, on average, were assigned to the low level of the index. The medium level includes all other response combinations. For each TIMSS participant at the fourth and eighth grades, the percentage of students at each level of the index is presented in Exhibit 4.10, together with average science achievement. The exhibit also shows changes in percentages since 2003.

5 The response categories for this statement were reversed in constructing the index.

6 The response categories for this statement were reversed in constructing the index.

At fourth grade, on average across the countries, students expressed considerable self-confidence in their science ability, with 61 percent at the high level of the index, and a further 30 percent at the medium level. Just 8 percent, on average were at the low level of the index. Highest levels of self-confidence were reported in Austria, Germany, Sweden, Iran, Kazakhstan, and Lithuania, with 70 percent or more at the high level of the index, and lowest levels in Morocco (49%), Yemen (46%), El Salvador (45%), and Singapore (41%), all with less than 50 percent. A number of countries showed an increase since 2003 in the percentage of students at the high index level, including Iran, the United States, Scotland, Chinese Taipei, Japan, New Zealand, and Singapore, while countries with a decrease included the Netherlands, Slovenia, Hungary, and Hong Kong SAR. There was a positive association between level of self-confidence in learning science and science achievement at the fourth grade. Achievement was highest among students at the high level of the science self-confidence index (497 points, on average), next highest among students at the medium level (453 points), and lowest among those at the low level (437 points).

Students' confidence in learning science at the eighth grade was lower than at the fourth grade, on average among students in countries teaching science as a single subject, with just 48 percent of students at the high level of the index (compared with 61% at fourth grade). At the medium level, there were 38 percent of students, on average, and 13 percent at the low level. Self-confidence levels were highest in Tunisia, Jordan, Colombia, and Egypt (60% or more at the high level) and lowest in Malaysia, Korea, Chinese Taipei, and Japan (less than 30% at the high level). There were increased percentages since 2003 at the high level in Jordan, Iran, Botswana, and Korea, and decreases in Egypt, Italy, the Palestinian Authority, Scotland, Australia, Singapore, Malaysia, and Chinese Taipei. As at the fourth grade, there was a positive association between self-confidence in learning science and science achievement at the eighth grade. Students at the high level of the self-confidence index had the highest average science achievement (492 points), followed by students the medium level (439 points), and students at the low index level (427 points).

Exhibit 4.10 Index of Students' Self-Confidence in Learning Science (SCS) with Trends
TIMSS2007
Science 4th Grade

Country	High SCS			Medium SCS			Low SCS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Austria	79 (0.9)	539 (2.4)	◊ ◊	16 (0.7)	479 (4.1)	◊ ◊	5 (0.5)	477 (7.2)	◊ ◊
Germany	76 (0.8)	544 (2.5)	◊ ◊	18 (0.6)	491 (4.7)	◊ ◊	5 (0.4)	469 (6.5)	◊ ◊
Sweden	76 (0.9)	534 (3.0)	◊ ◊	20 (0.7)	498 (4.5)	◊ ◊	4 (0.4)	484 (8.1)	◊ ◊
Iran, Islamic Rep. of	74 (1.3)	461 (3.8)	22 (2.0) ◐	21 (1.2)	393 (5.8)	-21 (1.9) ◑	5 (0.6)	359 (13.9)	-1 (0.8)
Kazakhstan	71 (1.7)	542 (5.3)	◊ ◊	23 (1.3)	506 (6.8)	◊ ◊	6 (1.0)	520 (11.0)	◊ ◊
Lithuania	70 (0.9)	527 (2.4)	1 (1.2)	25 (0.8)	491 (3.7)	-1 (1.2)	5 (0.5)	460 (9.3)	0 (0.6)
United States	69 (0.7)	556 (2.4)	14 (1.2) ◐	22 (0.5)	508 (3.8)	-17 (1.0) ◑	8 (0.4)	493 (4.7)	3 (0.5) ◐
Italy	69 (0.9)	548 (3.4)	0 (1.4)	25 (0.7)	514 (3.6)	-1 (1.2)	6 (0.4)	496 (6.6)	0 (0.6)
Slovak Republic	69 (1.2)	546 (3.5)	◊ ◊	24 (1.0)	492 (7.2)	◊ ◊	7 (0.5)	476 (8.9)	◊ ◊
Denmark	68 (1.4)	531 (2.8)	◊ ◊	26 (1.1)	494 (4.3)	◊ ◊	7 (0.6)	485 (6.3)	◊ ◊
Norway	67 (1.3)	492 (3.1)	3 (1.7)	26 (1.0)	454 (4.8)	-3 (1.4) ◑	7 (0.5)	436 (8.4)	0 (0.7)
Netherlands	67 (1.3)	535 (2.7)	-4 (1.8) ◑	25 (1.1)	504 (3.8)	3 (1.4) ◐	8 (0.6)	490 (5.5)	1 (0.9)
Slovenia	65 (1.1)	533 (2.4)	-12 (1.4) ◑	28 (0.9)	497 (3.2)	10 (1.2) ◐	7 (0.5)	472 (6.8)	3 (0.7) ◐
Georgia	65 (1.4)	439 (4.1)	◊ ◊	28 (1.1)	403 (6.3)	◊ ◊	7 (0.6)	393 (9.0)	◊ ◊
Kuwait	65 (1.4)	388 (4.5)	◊ ◊	31 (1.4)	310 (6.3)	◊ ◊	4 (0.5)	285 (13.9)	◊ ◊
Hungary	65 (1.2)	561 (2.9)	-5 (1.6) ◑	26 (1.0)	498 (5.0)	3 (1.3) ◐	10 (0.6)	494 (6.1)	2 (0.8) ◐
Russian Federation	63 (1.2)	563 (4.1)	0 (1.8)	27 (1.1)	523 (6.9)	0 (1.6)	10 (0.7)	520 (7.8)	0 (1.1)
Australia	63 (1.0)	543 (3.0)	-3 (1.6)	28 (0.7)	509 (4.4)	1 (1.3)	9 (0.7)	483 (6.7)	2 (0.8) ◐
Scotland	62 (1.2)	514 (2.6)	5 (1.8) ◐	26 (1.0)	485 (3.9)	-4 (1.5) ◑	11 (0.8)	468 (4.3)	-1 (1.0)
Qatar	62 (0.7)	336 (2.4)	◊ ◊	33 (0.7)	264 (3.7)	◊ ◊	6 (0.3)	233 (6.7)	◊ ◊
Armenia	59 (1.8)	503 (5.3)	0 (2.2)	31 (1.5)	486 (11.8)	-3 (1.8)	10 (0.7)	472 (17.3)	3 (1.0) ◐
Tunisia	58 (1.6)	374 (6.5)	-2 (2.3)	37 (1.4)	283 (6.2)	3 (2.0)	5 (0.6)	222 (10.8)	-2 (0.8) ◑
Chinese Taipei	58 (1.2)	572 (2.3)	8 (1.6) ◐	33 (0.9)	538 (2.9)	-4 (1.2) ◑	9 (0.7)	533 (4.4)	-4 (1.0) ◑
Colombia	58 (1.4)	430 (5.2)	◊ ◊	37 (1.3)	376 (6.6)	◊ ◊	5 (0.6)	366 (13.0)	◊ ◊
Ukraine	57 (1.3)	498 (3.3)	◊ ◊	33 (1.0)	454 (3.6)	◊ ◊	9 (0.6)	447 (6.4)	◊ ◊
Latvia	57 (1.3)	558 (2.8)	3 (2.0)	32 (1.0)	526 (3.2)	-4 (1.6) ◑	11 (0.8)	515 (4.9)	1 (1.3)
Czech Republic	56 (1.3)	534 (3.3)	◊ ◊	30 (1.1)	497 (3.8)	◊ ◊	14 (0.7)	482 (5.0)	◊ ◊
England	55 (1.1)	561 (3.4)	2 (1.6)	31 (0.8)	524 (3.6)	-2 (1.2)	14 (0.8)	512 (4.8)	0 (1.1)
Japan	53 (1.2)	562 (2.4)	8 (1.6) ◐	35 (1.0)	537 (2.8)	-6 (1.3) ◑	12 (0.6)	521 (4.2)	-2 (0.9)
Hong Kong SAR	52 (1.3)	571 (3.4)	-8 (1.9) ◑	38 (1.0)	539 (4.1)	6 (1.5) ◐	11 (0.7)	528 (5.4)	2 (0.8) ◐
Algeria	51 (1.4)	378 (5.6)	◊ ◊	43 (1.2)	341 (7.7)	◊ ◊	6 (0.5)	315 (15.0)	◊ ◊
New Zealand	51 (1.1)	530 (2.7)	15 (1.5) ◐	37 (1.0)	486 (4.0)	-22 (1.4) ◑	12 (0.6)	464 (4.9)	7 (0.7) ◐
Morocco	49 (1.6)	332 (7.2)	-3 (2.5)	42 (1.5)	281 (7.7)	3 (2.3)	8 (0.9)	259 (15.1)	0 (1.5)
Yemen	46 (1.8)	233 (8.3)	◊ ◊	45 (1.5)	194 (7.4)	◊ ◊	9 (0.7)	179 (12.5)	◊ ◊
El Salvador	45 (1.3)	420 (3.9)	◊ ◊	49 (1.1)	372 (3.8)	◊ ◊	6 (0.5)	360 (9.0)	◊ ◊
Singapore	41 (0.9)	621 (4.0)	9 (1.3) ◐	38 (0.7)	568 (4.9)	-3 (1.1) ◑	21 (0.6)	556 (5.0)	-6 (1.0) ◑
International Avg.	61 (0.2)	497 (0.7)		30 (0.2)	453 (0.9)		8 (0.1)	437 (1.5)	
Benchmarking Participants									
Massachusetts, US	75 (1.4)	582 (4.1)	◊ ◊	18 (1.1)	547 (6.7)	◊ ◊	6 (0.7)	517 (7.1)	◊ ◊
Minnesota, US	75 (2.1)	564 (5.7)	◊ ◊	19 (1.5)	519 (10.5)	◊ ◊	5 (0.9)	502 (10.6)	◊ ◊
Quebec, Canada	72 (1.1)	530 (2.9)	3 (1.6)	21 (0.9)	489 (3.8)	-2 (1.4)	7 (0.5)	480 (6.2)	-1 (0.7)
Alberta, Canada	72 (1.1)	555 (3.6)	◊ ◊	22 (0.8)	517 (4.5)	◊ ◊	6 (0.6)	493 (8.1)	◊ ◊
Dubai, UAE	69 (1.4)	488 (3.4)	◊ ◊	25 (1.1)	427 (4.8)	◊ ◊	6 (0.6)	387 (12.5)	◊ ◊
British Columbia, Canada	69 (1.0)	551 (2.8)	◊ ◊	24 (0.7)	513 (4.0)	◊ ◊	7 (0.6)	495 (6.0)	◊ ◊
Ontario, Canada	67 (1.3)	553 (3.6)	0 (1.9)	25 (1.3)	507 (6.0)	1 (1.7)	8 (0.8)	500 (6.4)	-1 (1.1)

◐ 2007 percent significantly higher

◑ 2007 percent significantly lower

Index based on students' responses to four statements about science: 1) I usually do well in science; 2) Science is harder for me than for many of my classmates (Reversed); 3) I am just not good at science (Reversed); 4) I learn things quickly in science. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

() 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.

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

Exhibit 4.10 Index of Students' Self-Confidence in Learning Science (SCS) with Trends (Continued)

TIMSS2007
Science **8th** Grade

General/Integrated Science

Country	High SCS			Medium SCS			Low SCS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Tunisia	70 (0.9)	457 (2.2)	1 (1.4)	26 (0.8)	417 (2.3)	0 (1.2)	4 (0.4)	417 (6.2)	0 (0.5)
Jordan	64 (1.5)	511 (3.6)	7 (1.8) ▲	30 (1.2)	446 (4.1)	-6 (1.5) ▼	5 (0.6)	419 (12.3)	-1 (0.8)
Colombia	62 (1.4)	434 (3.3)	0 0	34 (1.2)	396 (4.3)	0 0	5 (0.4)	390 (8.5)	0 0
Egypt	60 (1.4)	438 (3.4)	-4 (1.8) ▼	35 (1.4)	379 (4.6)	3 (1.7)	5 (0.4)	357 (9.6)	1 (0.5)
Saudi Arabia	59 (1.2)	427 (3.0)	--	36 (1.1)	378 (3.0)	--	5 (0.5)	364 (6.5)	--
Bahrain	58 (0.9)	496 (2.2)	2 (1.3)	35 (0.9)	433 (2.5)	-2 (1.3)	7 (0.4)	421 (6.6)	0 (0.7)
Iran, Islamic Rep. of	58 (1.3)	479 (3.9)	11 (1.7) ▲	35 (1.1)	437 (3.9)	-9 (1.4) ▼	7 (0.5)	432 (8.1)	-1 (0.7)
Norway	57 (1.2)	507 (2.0)	-3 (1.7)	32 (0.9)	467 (2.8)	1 (1.3)	11 (0.7)	447 (4.5)	2 (1.0)
Israel	56 (1.6)	507 (4.2)	-3 (1.9)	33 (1.2)	432 (4.9)	1 (1.5)	11 (0.7)	418 (7.0)	1 (0.9)
United States	56 (1.1)	543 (3.1)	0 (1.4)	29 (0.7)	498 (3.2)	-2 (1.0)	15 (0.7)	482 (3.8)	2 (0.9)
Ghana	54 (1.5)	334 (5.3)	-3 (2.0)	41 (1.3)	273 (5.7)	4 (1.7) ▲	5 (0.5)	268 (11.1)	-1 (0.8)
England	53 (1.5)	569 (4.7)	1 (2.1)	31 (1.1)	517 (5.5)	-1 (1.7)	15 (0.9)	504 (4.7)	0 (1.3)
Italy	53 (1.0)	517 (3.6)	-4 (1.5) ▼	33 (0.9)	476 (3.3)	1 (1.3)	14 (0.8)	460 (4.6)	3 (1.0) ▲
Palestinian Nat'l Auth.	53 (1.3)	446 (3.7)	-4 (1.7) ▼	41 (1.1)	368 (4.2)	4 (1.5) ▲	6 (0.5)	348 (7.5)	-1 (0.7)
Qatar	52 (0.6)	357 (2.1)	0 0	40 (0.7)	288 (3.2)	0 0	8 (0.3)	266 (5.4)	0 0
Oman	52 (1.1)	457 (3.0)	0 0	44 (1.0)	393 (3.1)	0 0	4 (0.3)	373 (10.9)	0 0
Scotland	52 (1.4)	530 (3.2)	-7 (2.0) ▼	31 (1.1)	468 (3.6)	4 (1.5) ▲	17 (1.0)	447 (4.5)	3 (1.3) ▲
Turkey	51 (1.3)	484 (4.0)	0 0	37 (1.0)	427 (4.2)	0 0	11 (0.6)	417 (5.3)	0 0
Botswana	49 (1.0)	381 (3.3)	3 (1.4) ▲	41 (0.9)	338 (4.2)	-3 (1.1) ▼	9 (0.5)	316 (6.9)	0 (0.7)
Kuwait	49 (0.9)	445 (3.4)	0 0	42 (0.8)	401 (3.3)	0 0	9 (0.5)	386 (5.8)	0 0
El Salvador	44 (1.3)	408 (3.4)	0 0	51 (1.2)	372 (3.3)	0 0	5 (0.6)	388 (6.9)	0 0
Australia	41 (1.3)	549 (4.9)	-7 (2.0) ▼	39 (1.0)	496 (3.7)	4 (1.5) ▲	20 (1.0)	483 (4.3)	3 (1.3) ▲
Singapore	40 (1.0)	601 (4.5)	-5 (1.3) ▼	38 (0.9)	544 (5.4)	2 (1.1)	21 (0.7)	546 (6.0)	3 (0.9) ▲
Hong Kong SAR	33 (1.3)	561 (4.9)	1 (1.7)	49 (0.9)	516 (5.1)	2 (1.2)	18 (1.0)	515 (5.9)	-2 (1.4)
Thailand	30 (1.2)	495 (4.9)	0 0	59 (1.0)	457 (4.1)	0 0	11 (0.8)	479 (6.8)	0 0
Malaysia	26 (1.3)	514 (6.4)	-12 (1.8) ▼	52 (1.2)	454 (6.3)	4 (1.6) ▲	22 (0.9)	461 (5.8)	8 (1.1) ▲
Korea, Rep. of	24 (1.0)	603 (2.5)	4 (1.2) ▲	40 (0.9)	556 (2.4)	-2 (1.1)	36 (0.9)	516 (2.5)	-2 (1.3)
Chinese Taipei	23 (1.0)	619 (4.0)	-4 (1.4) ▼	36 (0.9)	552 (4.2)	-2 (1.2)	41 (1.2)	536 (3.3)	7 (1.6) ▲
Japan	20 (0.7)	601 (2.8)	0 (1.1)	44 (1.0)	554 (2.4)	-2 (1.2)	36 (1.1)	529 (2.8)	2 (1.5)
International Avg.	48 (0.2)	492 (0.7)		38 (0.2)	439 (0.7)		13 (0.1)	427 (1.3)	

Benchmarking Participants

Massachusetts, US	58 (2.9)	579 (6.3)	0 0	28 (1.6)	537 (4.8)	0 0	14 (1.7)	506 (6.4)	0 0
Dubai, UAE	57 (1.6)	521 (3.1)	0 0	36 (1.4)	457 (4.1)	0 0	8 (0.7)	452 (8.7)	0 0
British Columbia, Canada	54 (1.2)	548 (3.1)	0 0	32 (0.7)	507 (3.5)	0 0	15 (0.9)	486 (4.0)	0 0
Ontario, Canada	51 (1.4)	553 (3.3)	-1 (2.0)	33 (1.0)	507 (4.0)	0 (1.5)	16 (1.1)	483 (6.5)	1 (1.5)
Minnesota, US	50 (2.8)	567 (4.9)	0 0	32 (1.6)	520 (5.3)	0 0	18 (2.3)	493 (5.3)	0 0
Basque Country, Spain	50 (1.9)	526 (3.4)	-1 (2.6)	33 (1.1)	478 (3.7)	-1 (1.7)	18 (1.3)	455 (4.6)	2 (1.7)
Quebec, Canada	49 (1.5)	525 (3.6)	-1 (2.3)	33 (0.9)	497 (3.9)	2 (1.4)	18 (1.1)	481 (5.6)	-1 (1.6)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

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

Index based on students' responses to four statements about science: 1) I usually do well in science; 2) Science is more difficult for me than for many of my classmates (Reversed); 3) Science is not one of my strengths (Reversed); 4) I learn things quickly in science. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

() 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 (0) indicates the country did not participate in the assessment.

Exhibit 4.10 Index of Students' Self-Confidence in Learning Science (SCS) with Trends (Continued)
TIMSS2007
 Science **8th** Grade

Biology

Country	High SCS			Medium SCS			Low SCS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Bosnia and Herzegovina	74 (1.2)	479 (3.0)	0 0	18 (0.8)	437 (4.2)	0 0	8 (0.7)	437 (5.5)	0 0
Serbia	69 (1.3)	487 (3.5)	-6 (1.7) ▼	22 (1.1)	445 (5.1)	4 (1.4) ▲	9 (0.6)	431 (7.7)	2 (0.8) ▲
Czech Republic	65 (1.5)	550 (2.3)	0 0	27 (1.1)	523 (2.5)	0 0	9 (0.7)	515 (5.0)	0 0
Lithuania	63 (1.3)	533 (2.6)	-1 (1.8)	30 (1.2)	497 (3.7)	1 (1.6)	7 (0.5)	493 (5.2)	0 (0.8)
Syrian Arab Republic	62 (1.1)	473 (2.8)	0 0	33 (1.0)	431 (3.6)	0 0	5 (0.4)	419 (6.1)	0 0
Georgia	61 (1.4)	448 (3.9)	0 0	32 (1.4)	400 (7.9)	0 0	7 (0.5)	382 (8.7)	0 0
Russian Federation	60 (1.3)	547 (4.1)	-9 (2.5) ▼	30 (0.9)	510 (4.7)	6 (1.8) ▲	10 (0.8)	496 (6.0)	3 (1.0) ▲
Hungary	59 (1.6)	553 (3.2)	-1 (2.1)	30 (1.1)	519 (4.2)	0 (1.5)	11 (0.8)	518 (5.4)	1 (1.1)
Bulgaria	59 (1.4)	491 (6.4)	--	32 (1.2)	446 (7.0)	--	9 (0.8)	448 (15.9)	--
Sweden	57 (1.0)	531 (2.6)	-1 (1.5)	35 (0.8)	495 (3.5)	2 (1.2)	7 (0.4)	466 (5.4)	-1 (0.7)
Slovenia	55 (1.2)	556 (2.2)	-8 (1.7) ▼	33 (0.9)	523 (3.0)	3 (1.3) ▲	12 (0.8)	498 (5.7)	5 (1.0) ▲
Ukraine	53 (1.3)	510 (3.2)	0 0	35 (1.1)	470 (3.8)	0 0	12 (0.7)	449 (5.4)	0 0
Algeria	53 (1.1)	422 (2.2)	0 0	39 (0.9)	398 (2.4)	0 0	8 (0.5)	392 (3.3)	0 0
Malta	51 (1.2)	549 (3.4)	0 0	33 (1.4)	481 (5.7)	0 0	16 (0.9)	454 (5.3)	0 0
Armenia	51 (1.2)	501 (5.7)	-6 (1.7) ▼	37 (1.2)	482 (6.6)	2 (1.6)	12 (0.7)	464 (8.0)	5 (0.8) ▲
Romania	49 (1.4)	480 (4.0)	3 (1.9)	40 (1.1)	449 (4.5)	-5 (1.7) ▼	11 (0.6)	447 (6.9)	2 (0.9)
Lebanon	49 (1.5)	454 (5.8)	0 (2.0)	42 (1.3)	381 (5.8)	-1 (1.8)	9 (0.6)	383 (8.3)	1 (0.9)
Indonesia	41 (1.1)	429 (4.0)	1 (1.7)	54 (0.9)	425 (3.6)	0 (1.5)	5 (0.5)	441 (7.0)	-2 (0.7) ▼
Cyprus	x x	x x	--	x x	x x	--	x x	x x	--
‡ Morocco	48 (1.1)	424 (4.5)	--	43 (1.0)	384 (3.7)	--	9 (0.7)	373 (5.2)	--
International Avg.	57 (0.3)	496 (0.9)		34 (0.3)	458 (1.1)		9 (0.2)	448 (1.6)	

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

Earth Science

Country	High SCS			Medium SCS			Low SCS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Bosnia and Herzegovina	72 (1.2)	478 (3.0)	0 0	20 (0.8)	439 (3.6)	0 0	8 (0.7)	441 (5.9)	0 0
Serbia	66 (1.2)	488 (3.1)	-3 (1.7) ▼	24 (0.9)	444 (4.1)	3 (1.3) ▲	10 (0.8)	438 (7.7)	1 (1.0)
Lithuania	64 (1.2)	535 (2.6)	0 (1.6)	29 (1.0)	491 (3.7)	-1 (1.3)	7 (0.6)	493 (6.2)	1 (0.8)
Sweden	60 (1.0)	527 (2.9)	-3 (1.6)	33 (0.9)	497 (3.4)	3 (1.4) ▲	7 (0.4)	484 (6.1)	0 (0.7)
Czech Republic	59 (1.2)	550 (2.4)	0 0	29 (0.9)	526 (2.8)	0 0	12 (0.7)	516 (4.2)	0 0
Cyprus	59 (0.9)	476 (2.3)	0 (1.3)	32 (0.7)	422 (2.9)	0 (1.2)	10 (0.5)	416 (4.8)	0 (0.7)
Russian Federation	57 (1.2)	551 (3.9)	-1 (2.1)	32 (1.0)	508 (4.7)	1 (1.7)	10 (0.6)	490 (6.7)	0 (0.9)
Syrian Arab Republic	56 (1.1)	468 (3.3)	0 0	38 (1.0)	432 (3.1)	0 0	5 (0.5)	427 (6.7)	0 0
Slovenia	56 (1.5)	557 (2.4)	--	33 (1.1)	519 (3.3)	--	11 (0.8)	506 (4.2)	--
Bulgaria	52 (1.6)	495 (7.1)	--	37 (1.4)	454 (6.1)	--	11 (0.9)	433 (12.9)	--
Georgia	r 50 (1.4)	450 (5.0)	0 0	41 (1.5)	405 (7.2)	0 0	9 (0.8)	396 (8.6)	0 0
Ukraine	50 (1.5)	515 (3.2)	0 0	37 (1.0)	466 (3.6)	0 0	13 (0.8)	452 (4.5)	0 0
Malta	50 (0.8)	481 (2.3)	0 0	35 (0.8)	418 (3.2)	0 0	15 (0.5)	399 (4.7)	0 0
Romania	49 (1.5)	488 (3.9)	8 (2.0) ▲	37 (1.2)	436 (5.0)	-9 (1.7) ▼	13 (0.9)	453 (5.3)	1 (1.2)
Hungary	47 (1.4)	560 (2.9)	-8 (2.0) ▼	35 (1.1)	523 (4.3)	3 (1.5) ▲	18 (0.9)	517 (4.6)	4 (1.2) ▲
Armenia	45 (1.3)	503 (6.8)	-10 (1.7) ▼	42 (1.0)	481 (6.7)	2 (1.5)	13 (0.9)	469 (8.2)	7 (1.0) ▲
Algeria	r 38 (1.6)	415 (3.9)	0 0	52 (1.5)	394 (3.8)	0 0	11 (0.8)	397 (4.9)	0 0
Indonesia	--	--	--	--	--	--	--	--	--
Lebanon	--	--	--	--	--	--	--	--	--
‡ Morocco	35 (1.2)	431 (4.3)	--	52 (1.1)	392 (2.8)	--	13 (0.9)	375 (6.1)	--
International Avg.	54 (0.3)	498 (0.9)		35 (0.3)	458 (1.0)		11 (0.2)	450 (1.5)	

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

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



Exhibit 4.10 Index of Students' Self-Confidence in Learning Science (SCS) with Trends (Continued)

TIMSS2007
Science 8th Grade

Chemistry

Country	High SCS			Medium SCS			Low SCS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Malta	52 (1.3)	580 (4.0)	0 0	31 (1.3)	509 (7.2)	0 0	17 (1.1)	512 (7.7)	0 0
Czech Republic	50 (1.5)	554 (2.4)	0 0	31 (1.0)	526 (2.6)	0 0	19 (1.0)	522 (3.6)	0 0
Bosnia and Herzegovina	50 (1.3)	483 (3.1)	0 0	31 (0.8)	453 (3.9)	0 0	19 (1.1)	450 (4.2)	0 0
Slovenia	48 (1.2)	563 (2.5)	3 (1.6)	35 (0.9)	519 (2.7)	-4 (1.4) ▼	16 (0.9)	505 (4.0)	1 (1.2)
Lebanon	48 (1.5)	447 (5.3)	-1 (2.0)	43 (1.3)	387 (6.1)	-2 (1.8)	9 (0.6)	400 (9.0)	2 (0.9) ▲
Cyprus	47 (0.8)	484 (2.3)	1 (1.1)	35 (0.7)	426 (3.0)	-4 (1.1) ▼	17 (0.7)	423 (4.0)	3 (0.9) ▲
Sweden	47 (1.0)	539 (2.6)	0 (1.5)	41 (0.9)	494 (3.4)	2 (1.4)	13 (0.7)	480 (4.7)	-2 (1.0)
Syrian Arab Republic	44 (0.9)	470 (3.1)	0 0	47 (0.9)	444 (3.0)	0 0	9 (0.6)	450 (4.7)	0 0
Lithuania	43 (1.5)	542 (3.5)	4 (1.9) ▲	38 (1.0)	502 (2.8)	-1 (1.3)	20 (1.0)	505 (3.7)	-3 (1.3) ▼
Algeria	41 (1.2)	421 (2.7)	0 0	50 (1.1)	399 (2.7)	0 0	9 (0.6)	398 (4.6)	0 0
Russian Federation	38 (1.1)	555 (4.0)	-3 (1.7) ▼	36 (0.9)	521 (4.2)	0 (1.4)	26 (1.1)	510 (5.8)	4 (1.5) ▲
Georgia	38 (1.5)	457 (4.3)	0 0	45 (1.4)	414 (6.3)	0 0	17 (1.1)	403 (5.4)	0 0
Serbia	38 (1.2)	503 (3.7)	-3 (1.8)	32 (1.3)	453 (4.3)	0 (1.5)	31 (1.3)	457 (4.0)	3 (1.9)
Bulgaria	36 (1.6)	505 (6.7)	--	42 (1.3)	459 (6.7)	--	22 (1.2)	448 (7.4)	--
Ukraine	32 (1.3)	521 (3.5)	0 0	41 (1.0)	476 (3.5)	0 0	27 (1.2)	471 (3.8)	0 0
Hungary	32 (1.0)	565 (3.6)	-2 (1.6)	38 (0.9)	524 (4.0)	3 (1.2) ▲	30 (1.2)	532 (2.8)	-1 (1.7)
Armenia	31 (0.9)	500 (5.9)	-5 (1.6) ▼	49 (0.9)	485 (6.4)	-1 (1.5)	20 (1.0)	482 (5.9)	6 (1.2) ▲
Romania	29 (1.2)	488 (4.8)	3 (1.7)	48 (1.4)	449 (4.6)	-5 (1.8) ▼	24 (1.0)	466 (4.0)	3 (1.4)
Indonesia	--	--	--	--	--	--	--	--	--
‡ Morocco	40 (1.5)	430 (4.9)	--	50 (1.3)	390 (3.7)	--	11 (0.6)	369 (6.6)	--
International Avg.	41 (0.3)	506 (0.9)		40 (0.2)	465 (1.0)		19 (0.2)	462 (1.2)	

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

Physics

Country	High SCS			Medium SCS			Low SCS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	48 (1.0)	421 (2.2)	0 0	46 (1.1)	400 (2.7)	0 0	6 (0.3)	399 (4.8)	0 0
Georgia	48 (1.4)	452 (4.3)	0 0	41 (1.2)	408 (6.0)	0 0	11 (0.7)	407 (6.5)	0 0
Bosnia and Herzegovina	48 (1.1)	489 (3.1)	0 0	34 (0.9)	449 (3.5)	0 0	19 (0.8)	446 (5.0)	0 0
Cyprus	47 (0.9)	489 (2.5)	4 (1.2) ▲	38 (0.8)	422 (2.3)	-4 (1.1) ▼	15 (0.6)	419 (4.6)	0 (0.9)
Russian Federation	46 (1.2)	558 (3.7)	-4 (1.9) ▼	37 (0.9)	515 (4.3)	2 (1.3)	17 (0.9)	490 (5.2)	2 (1.3)
Syrian Arab Republic	46 (1.0)	472 (3.1)	0 0	47 (0.8)	442 (2.9)	0 0	7 (0.4)	447 (6.6)	0 0
Sweden	45 (1.0)	543 (2.7)	-2 (1.6)	43 (0.9)	496 (3.5)	3 (1.3) ▲	13 (0.7)	481 (4.5)	-1 (1.1)
Lebanon	44 (1.4)	452 (5.7)	0 (1.9)	47 (1.2)	390 (6.2)	-2 (1.6)	9 (0.7)	397 (10.7)	2 (0.9) ▲
Armenia	43 (1.2)	504 (6.9)	-5 (1.8) ▼	44 (1.1)	483 (6.7)	-1 (1.7)	13 (0.6)	470 (7.8)	6 (0.8) ▲
Serbia	43 (1.3)	502 (3.5)	-7 (1.9) ▼	34 (1.0)	453 (4.0)	2 (1.4)	23 (1.1)	451 (4.6)	5 (1.5) ▲
Bulgaria	42 (1.6)	496 (6.7)	--	45 (1.4)	459 (6.6)	--	14 (1.1)	453 (10.7)	--
Czech Republic	41 (1.4)	561 (2.8)	0 0	34 (0.9)	530 (2.4)	0 0	25 (1.1)	516 (2.7)	0 0
Hungary	40 (1.4)	572 (3.6)	-6 (1.8) ▼	37 (0.9)	521 (3.5)	1 (1.3)	24 (1.2)	514 (3.8)	5 (1.5) ▲
Lithuania	39 (1.0)	548 (3.6)	3 (1.6)	40 (0.8)	500 (3.1)	-2 (1.2)	21 (1.0)	502 (3.7)	-1 (1.4)
Ukraine	36 (1.3)	524 (3.0)	0 0	43 (0.9)	473 (3.8)	0 0	21 (1.1)	466 (3.5)	0 0
Malta	33 (0.6)	509 (2.9)	0 0	38 (0.8)	436 (3.0)	0 0	29 (0.6)	430 (2.6)	0 0
Slovenia	29 (1.2)	574 (3.1)	-4 (1.6) ▼	41 (0.9)	527 (2.9)	-3 (1.4)	30 (1.0)	519 (3.2)	7 (1.4) ▲
Indonesia	29 (1.1)	422 (4.6)	2 (1.6)	60 (0.9)	427 (3.6)	2 (1.2)	11 (0.7)	451 (4.8)	-4 (1.1) ▼
Romania	27 (1.1)	484 (4.4)	3 (1.4) ▲	51 (1.1)	452 (4.9)	-5 (1.5) ▼	22 (1.0)	469 (4.0)	2 (1.3)
‡ Morocco	43 (1.8)	429 (4.2)	--	49 (1.5)	387 (3.4)	--	8 (0.8)	380 (7.9)	--
International Avg.	41 (0.3)	500 (0.9)		42 (0.2)	458 (0.9)		17 (0.2)	455 (1.3)	

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

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

Among countries teaching eighth grade science as separate subjects, student self-confidence was highest in biology and earth science (57% and 54% of students at the high level of the index, on average) and lower in chemistry and physics (41% of students at the high level in both). In all four subjects, however, average science achievement was higher among students at the high level of the index than among students at the medium and low levels.

As shown in Exhibit 4.11, there was little difference between girls and boys at the fourth grade in self-confidence in learning science. On average across countries, the percentage of girls and boys at each level of the self-confidence index was similar, although there was a slight difference favoring girls at the high level and slightly more boys at the low level. Across the countries, there were 9 countries with a difference in favor of girls at the high index level and 6 countries and one benchmarking participant with a difference in favor of boys. At the medium level, there was a greater percentage of girls than boys in 7 countries and a greater percentage of boys in 3 countries. Boys were more strongly represented at the low level of the self-confidence index, however, with higher percentages of boys in 10 countries and of girls in only 5 countries.

At the eighth grade, among countries teaching science as a single subject, boys had higher self-confidence in learning science than girls. On average across countries, 50 percent of boys were at the high level of the self-confidence index, compared to 47 percent of girls, while 15 percent of girls were at the low level, compared to 11 percent of boys. At the high level of the index, there were higher percentages of boys than girls in 11 countries and 2 benchmarking entities, but higher percentages of girls in just 4 countries. At the low level, the pattern was reversed, with higher percentages of girls in 12 countries and 4 benchmarking entities, and higher percentages of boys in just 2 countries.

Although eighth grade boys had higher self-confidence in learning science than eighth grade girls, on average, in the countries where science is taught as a single subject, the situation is more complicated in countries

where the sciences are taught as separate subjects. Especially in biology, where there was a greater percentage of girls than boys at the high index level in 15 of the 20 countries, but also in earth science and chemistry, there was a greater percentage of girls than boys at the high level of the self-confidence index. Only in physics was there a greater percentage of boys than girls, on average across the countries, at the high level of the index, and a greater percentage of girls than boys at the low index level.

Exhibit 4.11 Index of Students' Self-Confidence in Learning Science (SCS) by Gender
TIMSS2007
Science 4th Grade

Country	High SCS Percent of Students		Medium SCS Percent of Students		Low SCS Percent of Students	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	53 (1.6)	49 (2.0)	42 (1.6)	43 (1.7)	5 (0.5)	8 (0.8)
Armenia	60 (1.9)	57 (2.2)	29 (1.6)	34 (1.9)	11 (1.0)	9 (1.1)
Australia	64 (1.7)	62 (1.4)	28 (1.4)	28 (1.2)	8 (0.9)	10 (1.0)
Austria	78 (1.1)	80 (1.2)	16 (1.0)	16 (1.0)	5 (0.6)	5 (0.5)
Chinese Taipei	54 (1.6)	61 (1.4)	35 (1.3)	31 (1.0)	11 (0.8)	8 (0.9)
Colombia	58 (1.8)	58 (1.6)	37 (1.7)	37 (1.6)	5 (0.8)	5 (0.7)
Czech Republic	59 (1.6)	54 (1.5)	29 (1.2)	31 (1.3)	12 (0.8)	15 (0.9)
Denmark	66 (1.7)	69 (1.7)	26 (1.3)	25 (1.4)	8 (0.9)	5 (0.7)
El Salvador	42 (1.6)	47 (1.6)	51 (1.4)	47 (1.5)	6 (0.7)	6 (0.7)
England	53 (1.5)	57 (1.2)	33 (1.1)	29 (1.0)	14 (1.0)	14 (1.0)
Georgia	66 (1.7)	64 (1.6)	27 (1.3)	30 (1.5)	7 (1.0)	6 (0.7)
Germany	76 (1.1)	77 (1.1)	18 (0.8)	18 (0.9)	6 (0.6)	5 (0.4)
Hong Kong SAR	52 (1.7)	51 (1.6)	38 (1.4)	37 (1.4)	10 (0.9)	11 (0.9)
Hungary	65 (1.7)	64 (1.3)	26 (1.4)	26 (1.0)	10 (0.8)	10 (0.8)
Iran, Islamic Rep. of	76 (1.9)	72 (1.8)	20 (1.8)	22 (1.6)	4 (0.8)	5 (0.8)
Italy	69 (1.2)	69 (1.1)	26 (1.1)	25 (0.9)	5 (0.5)	6 (0.6)
Japan	49 (1.6)	58 (1.6)	38 (1.4)	32 (1.3)	13 (0.9)	10 (0.8)
Kazakhstan	73 (2.2)	69 (1.9)	21 (1.7)	24 (1.6)	6 (1.0)	7 (1.1)
Kuwait	68 (1.7)	61 (2.3)	28 (1.6)	34 (2.2)	4 (0.6)	5 (0.7)
Latvia	60 (1.6)	55 (1.8)	31 (1.5)	33 (1.4)	10 (1.0)	13 (1.1)
Lithuania	73 (1.0)	67 (1.5)	24 (1.0)	26 (1.3)	3 (0.5)	6 (0.8)
Morocco	50 (1.8)	49 (2.0)	43 (1.8)	42 (1.9)	7 (0.7)	9 (1.5)
Netherlands	66 (1.6)	68 (1.4)	26 (1.5)	24 (1.3)	8 (0.8)	8 (0.8)
New Zealand	50 (1.3)	51 (1.4)	38 (1.2)	37 (1.3)	12 (0.7)	12 (0.7)
Norway	68 (1.7)	66 (1.6)	26 (1.5)	25 (1.2)	6 (0.7)	9 (0.8)
Qatar	65 (0.8)	58 (0.9)	30 (0.8)	35 (1.0)	5 (0.4)	7 (0.4)
Russian Federation	66 (1.8)	61 (1.4)	26 (1.6)	28 (1.4)	8 (0.7)	11 (1.2)
Scotland	61 (1.6)	63 (1.4)	28 (1.4)	25 (1.3)	10 (1.1)	12 (0.8)
Singapore	36 (1.1)	47 (1.3)	40 (0.9)	35 (1.3)	24 (0.9)	19 (1.0)
Slovak Republic	69 (1.5)	69 (1.4)	24 (1.3)	23 (1.2)	7 (0.7)	7 (0.6)
Slovenia	66 (1.2)	65 (1.4)	28 (1.1)	28 (1.2)	6 (0.7)	7 (0.7)
Sweden	77 (1.1)	75 (1.3)	19 (0.9)	20 (1.0)	4 (0.5)	5 (0.6)
Tunisia	61 (2.0)	55 (1.7)	35 (1.8)	38 (1.6)	4 (0.7)	6 (0.8)
Ukraine	59 (1.6)	56 (1.5)	32 (1.4)	34 (1.3)	8 (0.8)	10 (0.8)
United States	68 (0.9)	71 (1.0)	23 (0.7)	21 (0.7)	9 (0.5)	8 (0.6)
Yemen	48 (2.6)	44 (2.1)	44 (2.4)	45 (1.8)	8 (0.9)	11 (0.9)
International Avg.	62 (0.3)	61 (0.3)	30 (0.2)	30 (0.2)	8 (0.1)	9 (0.1)
Benchmarking Participants						
Alberta, Canada	71 (1.3)	72 (1.4)	23 (1.2)	21 (1.0)	6 (0.7)	7 (0.7)
British Columbia, Canada	68 (1.3)	69 (1.3)	25 (1.2)	24 (1.0)	7 (0.9)	6 (0.7)
Dubai, UAE	70 (2.0)	69 (1.7)	25 (1.6)	24 (1.2)	5 (0.7)	7 (0.8)
Massachusetts, US	73 (1.9)	78 (1.7)	20 (1.6)	17 (1.4)	7 (0.9)	5 (0.8)
Minnesota, US	76 (2.4)	75 (2.2)	19 (1.8)	20 (2.0)	5 (0.9)	6 (1.2)
Ontario, Canada	65 (1.7)	68 (1.6)	27 (1.5)	24 (1.6)	8 (1.0)	8 (0.9)
Quebec, Canada	73 (1.4)	71 (1.4)	20 (1.2)	22 (1.2)	7 (0.7)	7 (0.8)

▲ Percent significantly higher than other gender

Index based on students' responses to four statements about science: 1) I usually do well in science; 2) Science is harder for me than for many of my classmates (Reversed); 3) I am just not good at science (Reversed); 4) I learn things quickly in science. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four

statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

() 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.



Exhibit 4.11 Index of Students' Self-Confidence in Learning Science (SCS)
by Gender (Continued)TIMSS2007
Science 8th
Grade

General/Integrated Science

Country	High SCS Percent of Students		Medium SCS Percent of Students		Low SCS Percent of Students				
	Girls	Boys	Girls	Boys	Girls	Boys			
Australia	36 (1.5)	46 (1.6)	▲	40 (1.4)	38 (1.1)	24 (1.2)	▲	15 (1.1)	
Bahrain	62 (1.2)	▲	54 (1.3)	30 (1.1)	39 (1.3)	▲	8 (0.4)	7 (0.7)	
Botswana	48 (1.3)	51 (1.3)	42 (1.1)	41 (1.2)	10 (0.7)	8 (0.6)			
Chinese Taipei	16 (1.1)	30 (1.3)	▲	32 (1.2)	39 (1.1)	▲	51 (1.4)	▲	31 (1.4)
Colombia	61 (1.6)	62 (1.5)	34 (1.5)	33 (1.4)	4 (0.5)	5 (0.6)			
Egypt	59 (1.9)	60 (1.7)	36 (1.8)	35 (1.6)	5 (0.6)	5 (0.5)			
El Salvador	44 (1.6)	45 (1.7)	51 (1.5)	51 (1.6)	5 (0.8)	4 (0.7)			
England	46 (1.7)	61 (1.8)	▲	35 (1.3)	▲	28 (1.4)	19 (1.1)	▲	11 (1.0)
Ghana	49 (1.5)	58 (1.8)	▲	45 (1.4)	▲	37 (1.6)	6 (0.7)	5 (0.5)	
Hong Kong SAR	28 (1.4)	38 (1.5)	▲	50 (1.4)	47 (1.2)	22 (1.3)	▲	15 (1.0)	
Iran, Islamic Rep. of	61 (1.9)	56 (2.0)	34 (1.7)	37 (1.7)	6 (0.7)	8 (0.7)	▲		
Israel	56 (1.8)	57 (1.8)	33 (1.5)	33 (1.5)	11 (0.9)	10 (0.9)			
Italy	51 (1.5)	55 (1.5)	34 (1.2)	31 (1.2)	15 (1.1)	14 (1.1)			
Japan	15 (0.9)	25 (1.0)	▲	42 (1.3)	47 (1.3)	▲	44 (1.6)	▲	28 (1.3)
Jordan	67 (1.9)	62 (2.2)	29 (1.6)	31 (1.6)	4 (0.5)	7 (1.1)	▲		
Korea, Rep. of	18 (1.0)	30 (1.3)	▲	41 (1.2)	39 (1.2)	41 (1.3)	▲	31 (1.2)	
Kuwait	51 (1.2)	▲	46 (1.4)	39 (1.1)	45 (1.2)	▲	10 (0.6)	9 (0.7)	
Malaysia	25 (1.5)	27 (1.6)	51 (1.3)	53 (1.6)	24 (1.2)	▲	19 (1.0)		
Norway	52 (1.5)	62 (1.3)	▲	34 (1.3)	▲	29 (1.1)	14 (1.0)	▲	9 (0.7)
Oman	52 (1.8)	52 (1.4)	44 (1.6)	44 (1.3)	4 (0.4)	4 (0.4)			
Palestinian Nat'l Auth.	54 (1.9)	51 (1.7)	39 (1.6)	43 (1.5)	6 (0.7)	6 (0.6)			
Qatar	56 (0.7)	▲	49 (0.9)	37 (0.8)	43 (0.9)	▲	7 (0.4)	8 (0.5)	
Saudi Arabia	61 (1.7)	57 (1.9)	34 (1.6)	37 (1.7)	5 (0.8)	6 (0.7)			
Scotland	47 (1.7)	57 (1.6)	▲	33 (1.4)	30 (1.3)	20 (1.4)	▲	13 (1.0)	
Singapore	34 (1.2)	47 (1.2)	▲	39 (1.0)	38 (1.2)	27 (1.0)	▲	16 (0.8)	
Thailand	29 (1.4)	31 (1.4)	58 (1.2)	61 (1.3)	▲	14 (1.1)	▲	9 (0.8)	
Tunisia	70 (1.2)	70 (1.3)	26 (1.1)	26 (1.2)	4 (0.4)	5 (0.6)			
Turkey	55 (1.7)	▲	48 (1.4)	35 (1.4)	40 (1.3)	▲	10 (1.0)	12 (0.8)	
United States	52 (1.2)	60 (1.3)	▲	31 (1.0)	▲	28 (0.9)	17 (0.9)	▲	12 (0.8)
International Avg.	47 (0.3)	50 (0.3)	▲	38 (0.2)	39 (0.3)	15 (0.2)	▲	11 (0.2)	
Benchmarking Participants									
Basque Country, Spain	48 (2.1)	51 (2.2)	32 (1.4)	33 (1.6)	20 (1.5)	▲	16 (1.5)		
British Columbia, Canada	52 (1.5)	56 (1.8)	32 (1.1)	31 (1.1)	16 (1.2)	13 (1.0)			
Dubai, UAE	58 (2.2)	55 (1.9)	34 (1.8)	37 (1.8)	7 (1.0)	8 (0.7)			
Massachusetts, US	51 (3.4)	65 (2.6)	▲	30 (1.8)	▲	26 (1.9)	19 (2.3)	▲	9 (1.3)
Minnesota, US	46 (3.2)	55 (3.0)	▲	32 (1.6)	32 (2.2)	23 (2.6)	▲	13 (2.2)	
Ontario, Canada	49 (1.7)	53 (1.8)	33 (1.0)	34 (1.6)	18 (1.6)	▲	14 (1.1)		
Quebec, Canada	49 (1.7)	50 (1.9)	34 (1.2)	32 (1.2)	18 (1.3)	18 (1.3)			

▲ Percent significantly higher than other gender

Index based on students' responses to four statements about science: 1) I usually do well in science; 2) Science is more difficult for me than for many of my classmates (Reversed); 3) Science is not one of my strengths (Reversed); 4) I learn things quickly in science. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

() 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 4.11 Index of Students' Self-Confidence in Learning Science (SCS) by Gender (Continued)

TIMSS2007
Science **8th** Grade

Biology

Country	High SCS Percent of Students		Medium SCS Percent of Students		Low SCS Percent of Students	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	54 (1.2)	52 (1.4)	39 (1.1)	40 (1.2)	7 (0.6)	8 (0.6)
Armenia	56 (1.5) ▲	45 (1.6)	34 (1.6)	42 (1.5) ▲	10 (0.9)	13 (1.0) ▲
Bosnia and Herzegovina	80 (1.3) ▲	68 (1.6)	14 (1.0)	22 (1.0) ▲	6 (0.7)	10 (1.0) ▲
Bulgaria	62 (2.0) ▲	56 (1.8)	29 (1.6)	35 (1.7) ▲	9 (1.2)	9 (1.0)
Cyprus	x x	x x	x x	x x	x x	x x
Czech Republic	68 (1.6) ▲	61 (1.7)	25 (1.2)	28 (1.3) ▲	7 (0.8)	10 (0.9) ▲
Georgia	68 (2.0) ▲	53 (1.7)	27 (2.0)	38 (1.6) ▲	5 (0.6)	9 (0.9) ▲
Hungary	64 (1.8) ▲	54 (1.9)	27 (1.4)	33 (1.4) ▲	9 (0.9)	13 (1.1) ▲
Indonesia	41 (1.4)	41 (1.4)	54 (1.2)	53 (1.3)	5 (0.6)	6 (0.6)
Lebanon	52 (1.7) ▲	45 (1.7)	40 (1.6)	45 (1.8) ▲	8 (0.7)	10 (1.1) ▲
Lithuania	66 (1.6) ▲	59 (1.7)	27 (1.3)	33 (1.7) ▲	7 (0.7)	8 (0.7)
Malta	49 (1.6) r	54 (2.0) ▲	34 (1.6)	31 (1.9)	17 (1.4)	15 (1.3)
Romania	54 (1.9) ▲	45 (1.3)	36 (1.4)	44 (1.5) ▲	10 (1.1)	11 (0.9)
Russian Federation	67 (1.6) ▲	53 (1.5)	25 (1.2)	35 (1.2) ▲	8 (0.9)	12 (1.1) ▲
Serbia	76 (1.3) ▲	62 (1.7)	16 (1.0)	28 (1.7) ▲	7 (0.7)	10 (0.9) ▲
Slovenia	60 (1.6) ▲	51 (1.5)	31 (1.2)	36 (1.2) ▲	10 (1.0)	13 (1.1) ▲
Sweden	60 (1.3) ▲	54 (1.2)	32 (1.1)	38 (1.0) ▲	7 (0.6)	7 (0.6)
Syrian Arab Republic	65 (1.6) ▲	58 (1.4)	30 (1.4)	35 (1.3) ▲	5 (0.5)	6 (0.6) ▲
Ukraine	59 (1.8) ▲	47 (1.8)	31 (1.5)	40 (1.8) ▲	10 (0.8)	13 (1.0) ▲
‡ Morocco	49 (1.5)	47 (1.7)	42 (1.7)	44 (1.5)	9 (0.9)	9 (0.9)
International Avg.	61 (0.4) ▲	53 (0.4)	31 (0.3)	37 (0.3) ▲	8 (0.2)	10 (0.2)

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

Earth Science

Country	High SCS Percent of Students		Medium SCS Percent of Students		Low SCS Percent of Students	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	36 (2.0) r	39 (2.2)	52 (2.0)	51 (1.9)	12 (1.1)	10 (1.1)
Armenia	47 (1.8) r	42 (1.4) ▲	39 (1.4)	45 (1.4) ▲	14 (1.3)	13 (1.1)
Bosnia and Herzegovina	76 (1.4) ▲	68 (1.6)	17 (1.0)	23 (1.2) ▲	7 (0.8)	9 (0.9)
Bulgaria	52 (2.3) r	53 (1.5)	36 (2.1)	37 (1.4)	13 (1.2) ▲	10 (1.1)
Cyprus	59 (1.2)	58 (1.2)	30 (1.0)	33 (1.1)	11 (0.8) ▲	9 (0.7)
Czech Republic	56 (1.4)	62 (1.5) ▲	30 (0.9)	28 (1.3)	14 (0.9) ▲	10 (0.8)
Georgia	57 (1.8) r	44 (2.0)	34 (1.9)	47 (2.0) ▲	9 (0.8)	9 (1.1)
Hungary	45 (1.9)	49 (1.7)	35 (1.6)	34 (1.5)	20 (1.3)	17 (1.0)
Indonesia	--	--	--	--	--	--
Lebanon	--	--	--	--	--	--
Lithuania	66 (1.3) ▲	61 (1.5)	26 (1.2)	32 (1.3) ▲	8 (0.8)	7 (0.7)
Malta	45 (1.1)	54 (1.0) ▲	36 (1.1)	34 (1.1)	19 (0.8) ▲	12 (0.7)
Romania	52 (2.0) ▲	47 (1.8)	35 (1.5)	40 (1.4) ▲	13 (1.3)	14 (1.1)
Russian Federation	61 (1.2) ▲	53 (1.7)	30 (1.0)	36 (1.5) ▲	9 (0.8)	12 (0.9) ▲
Serbia	70 (1.6) ▲	63 (1.5)	20 (1.2)	27 (1.3) ▲	10 (1.0)	10 (1.0)
Slovenia	55 (1.8)	56 (1.9)	32 (1.2)	35 (1.6)	14 (1.1) ▲	9 (0.8)
Sweden	58 (1.4)	62 (1.3) ▲	33 (1.3)	33 (1.2)	9 (0.7) ▲	5 (0.5)
Syrian Arab Republic	58 (1.4)	55 (1.5)	37 (1.3)	40 (1.4) ▲	6 (0.7)	5 (0.6)
Ukraine	54 (2.1) ▲	46 (1.5)	34 (1.6)	40 (1.2) ▲	12 (0.9)	14 (1.0)
‡ Morocco	34 (1.6)	36 (1.7)	51 (1.7)	53 (1.8)	15 (1.2) ▲	11 (1.3)
International Avg.	54 (0.4) ▲	53 (0.4)	34 (0.3)	37 (0.3) ▲	12 (0.2) ▲	10 (0.2)

▲ Percent significantly higher than other gender

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

Exhibit 4.11 Index of Students' Self-Confidence in Learning Science (SCS) by Gender (Continued)

TIMSS2007
Science **8th** Grade

Chemistry

Country	High SCS Percent of Students		Medium SCS Percent of Students		Low SCS Percent of Students	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	40 (1.6)	42 (1.4)	50 (1.5)	50 (1.4)	10 (0.9)	8 (0.7)
Armenia r	35 (1.3) ▲	27 (1.4)	45 (1.2)	52 (1.3) ▲	20 (1.2)	21 (1.2)
Bosnia and Herzegovina	56 (1.5) ▲	45 (1.6)	27 (1.0)	34 (1.1) ▲	17 (1.3)	21 (1.3) ▲
Bulgaria r	38 (2.2)	35 (1.9)	38 (1.8)	45 (2.0) ▲	24 (1.8)	20 (1.4)
Cyprus	50 (1.2) ▲	45 (0.9)	32 (1.0)	38 (0.9) ▲	18 (0.9)	17 (0.8)
Czech Republic	51 (1.8)	50 (1.6)	29 (1.2)	32 (1.3)	20 (1.3)	18 (1.0)
Georgia	42 (1.8) ▲	33 (1.9)	41 (1.9)	49 (1.6) ▲	17 (1.3)	18 (1.4)
Hungary	30 (1.4)	34 (1.5) ▲	38 (1.2)	39 (1.2)	32 (1.4) ▲	28 (1.4)
Indonesia	--	--	--	--	--	--
Lebanon	47 (2.2)	48 (1.3)	44 (2.0)	42 (1.2)	9 (0.8)	9 (0.8)
Lithuania	44 (1.8) ▲	41 (1.5)	35 (1.4)	40 (1.1) ▲	20 (1.3)	19 (1.2)
Malta s	51 (2.2)	53 (1.7)	33 (2.2)	30 (1.6)	17 (1.6)	17 (1.4)
Romania	30 (1.7)	27 (1.5)	47 (1.5)	49 (2.0)	23 (1.4)	24 (1.3)
Russian Federation	42 (1.4) ▲	34 (1.4)	33 (1.5)	39 (1.2) ▲	25 (1.7)	27 (1.3)
Serbia	42 (1.5) ▲	33 (1.4)	28 (1.5)	36 (1.3) ▲	30 (1.5)	31 (1.5)
Slovenia	50 (1.6)	47 (1.4)	34 (1.3)	36 (1.3)	16 (1.2)	17 (1.1)
Sweden	43 (1.4)	50 (1.2) ▲	40 (1.2)	41 (1.2)	16 (1.1) ▲	9 (0.7)
Syrian Arab Republic	45 (1.3)	43 (1.3)	45 (1.1)	49 (1.3)	9 (0.8)	8 (0.7)
Ukraine	35 (1.6) ▲	30 (1.5)	38 (1.3)	43 (1.4) ▲	27 (1.5)	27 (1.5)
‡ Morocco	37 (1.8)	43 (1.7) ▲	50 (2.0)	49 (1.5)	13 (1.1) ▲	8 (1.0)
International Avg.	42 (0.4) ▲	40 (0.3)	38 (0.3)	42 (0.3) ▲	19 (0.3) ▲	18 (0.3)

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

Physics

Country	High SCS Percent of Students		Medium SCS Percent of Students		Low SCS Percent of Students	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	46 (1.3)	50 (1.5) ▲	47 (1.3)	45 (1.4)	7 (0.5) ▲	5 (0.5)
Armenia r	46 (1.5) ▲	40 (1.5)	42 (1.5)	46 (1.6)	12 (1.0)	14 (1.0)
Bosnia and Herzegovina	52 (1.4) ▲	43 (1.5)	30 (1.0)	38 (1.3) ▲	18 (1.2)	19 (1.0)
Bulgaria r	40 (2.5)	43 (2.0)	44 (2.0)	45 (1.8)	15 (1.5)	13 (1.5)
Cyprus	47 (1.2)	47 (1.2)	35 (1.1)	41 (1.2) ▲	18 (1.0) ▲	12 (0.7)
Czech Republic	37 (1.7)	46 (1.6) ▲	33 (1.4)	35 (1.3)	30 (1.5) ▲	20 (1.1)
Georgia	50 (2.1)	46 (1.9)	39 (1.9)	44 (1.6) ▲	11 (1.0)	10 (1.0)
Hungary	35 (1.7)	44 (1.7) ▲	37 (1.3)	36 (1.3)	28 (1.7) ▲	20 (1.2)
Indonesia	29 (1.4)	28 (1.2)	58 (1.3)	62 (1.2) ▲	13 (0.9) ▲	10 (0.8)
Lebanon	43 (1.8)	45 (1.6)	48 (1.7)	46 (1.3)	9 (1.0)	9 (0.9)
Lithuania	37 (1.3)	40 (1.2)	38 (1.2)	43 (1.0) ▲	25 (1.2) ▲	17 (1.1)
Malta	29 (0.9)	36 (1.0) ▲	36 (1.1)	40 (1.1) ▲	35 (1.0) ▲	24 (0.8)
Romania	27 (1.5)	28 (1.3)	49 (1.3)	52 (1.5)	25 (1.4) ▲	20 (1.2)
Russian Federation	47 (1.5)	46 (1.6)	35 (1.1)	38 (1.5)	18 (1.1)	16 (1.3)
Serbia	46 (1.4) ▲	40 (1.7)	29 (1.3)	38 (1.5) ▲	25 (1.6)	22 (1.2)
Slovenia	24 (1.4)	35 (1.6) ▲	39 (1.2)	42 (1.3)	37 (1.3) ▲	23 (1.1)
Sweden	39 (1.4)	50 (1.2) ▲	43 (1.1)	42 (1.1)	18 (1.1) ▲	8 (0.7)
Syrian Arab Republic	48 (1.4) ▲	44 (1.4)	46 (1.2)	49 (1.3)	6 (0.6)	7 (0.6)
Ukraine	33 (1.5)	40 (1.6) ▲	43 (1.1)	43 (1.3)	24 (1.4) ▲	18 (1.2)
‡ Morocco	39 (2.2)	48 (2.3) ▲	52 (1.9) ▲	45 (1.9)	9 (1.0) ▲	7 (0.9)
International Avg.	40 (0.4)	42 (0.3) ▲	41 (0.3)	44 (0.3) ▲	19 (0.3) ▲	15 (0.2)

▲ Percent significantly higher than other gender

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

